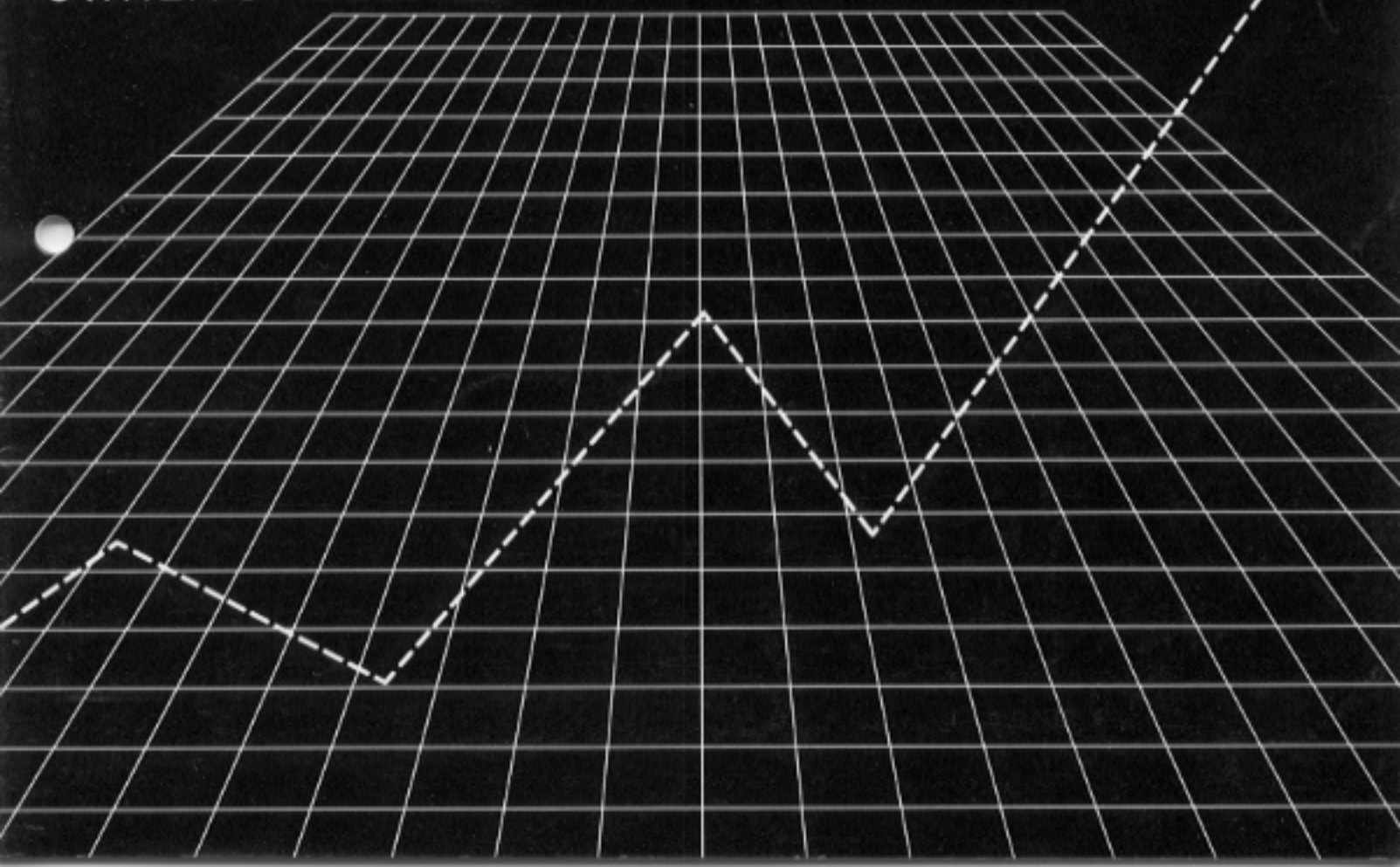


YAMAHA

CS70M

DUAL CHANNEL POLYPHONIC SYNTHESIZER
OWNER'S MANUAL



WARNING : TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE. THERE ARE NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO A QUALIFIED SERVICE PERSONNEL.

SERVICE

The CS70M is supported by Yamaha's worldwide network of qualified dealer service personnel. In the event of a problem, contact your nearest Yamaha dealer or authorized service center.

Thank you for buying the Yamaha CS70M programmable dual channel polyphonic synthesizer. To ensure that you get maximum performance from this sophisticated instrument, be sure to read this operating manual before use, and keep it in a safe place for later reference.

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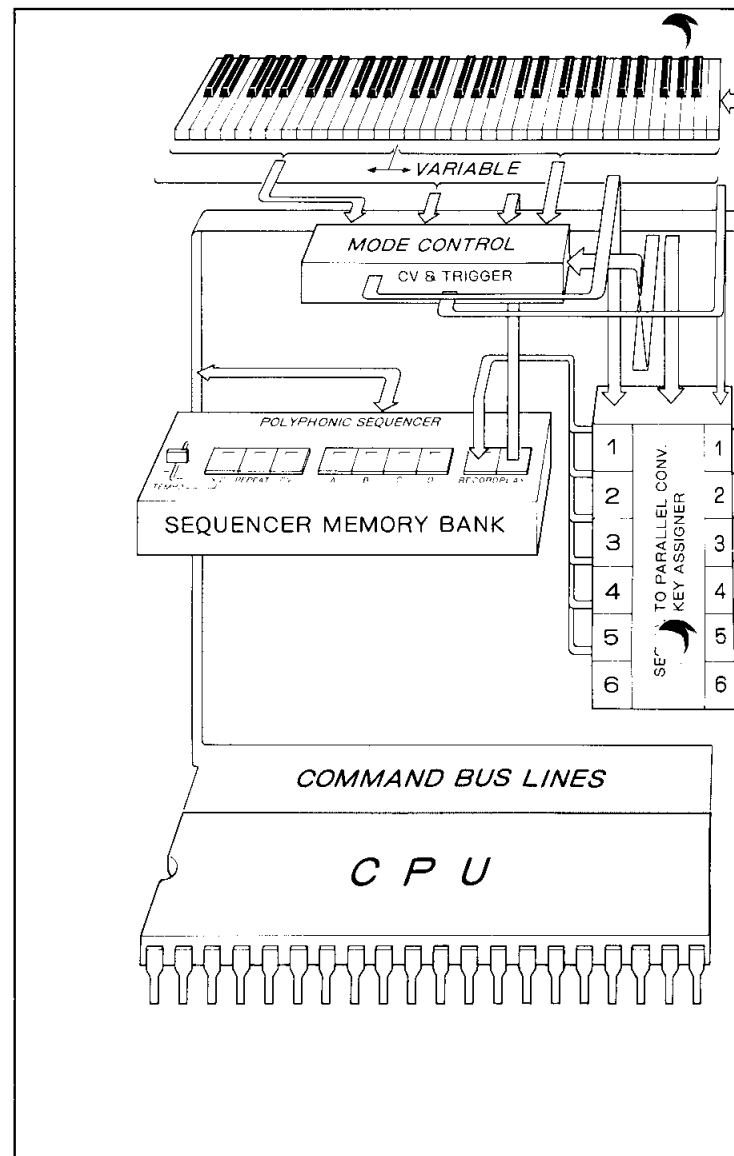
Introduction

The Yamaha CS70M programmable dual channel polyphonic synthesizer offers full six-voice polyphonic capability, an internal memory system capable of storing up to 30 sounds, a built-in magnetic card reader/writer that provides unlimited external sound storage capacity, and a sophisticated built-in polyphonic sequencer. In addition to these extraordinary features the CS70M has a full complement of sound parameter controls, many of which are remarkably innovative, and an extensive range of effects. Just a few moments at the CS70M's keyboard will convince you of the enormous expressive potential it offers – expressive potential and creative freedom so vast that your musical scope will never be limited.

Conventional non-programmable synthesizers are fine for studio work, but they tend to limit your flexibility on stage due to the time required for repatching whenever a new sound is needed. The CS70M lets you pre-program up to 30 separate voices, each comprising 39 voice parameters, for instant recall during performance at the touch of a button. It also incorporates a magnetic data card system that provides literally unlimited storage capacity. Sounds you create with the voice parameter controls can be digitally stored on external memory cards, and then later reloaded into the internal memory.

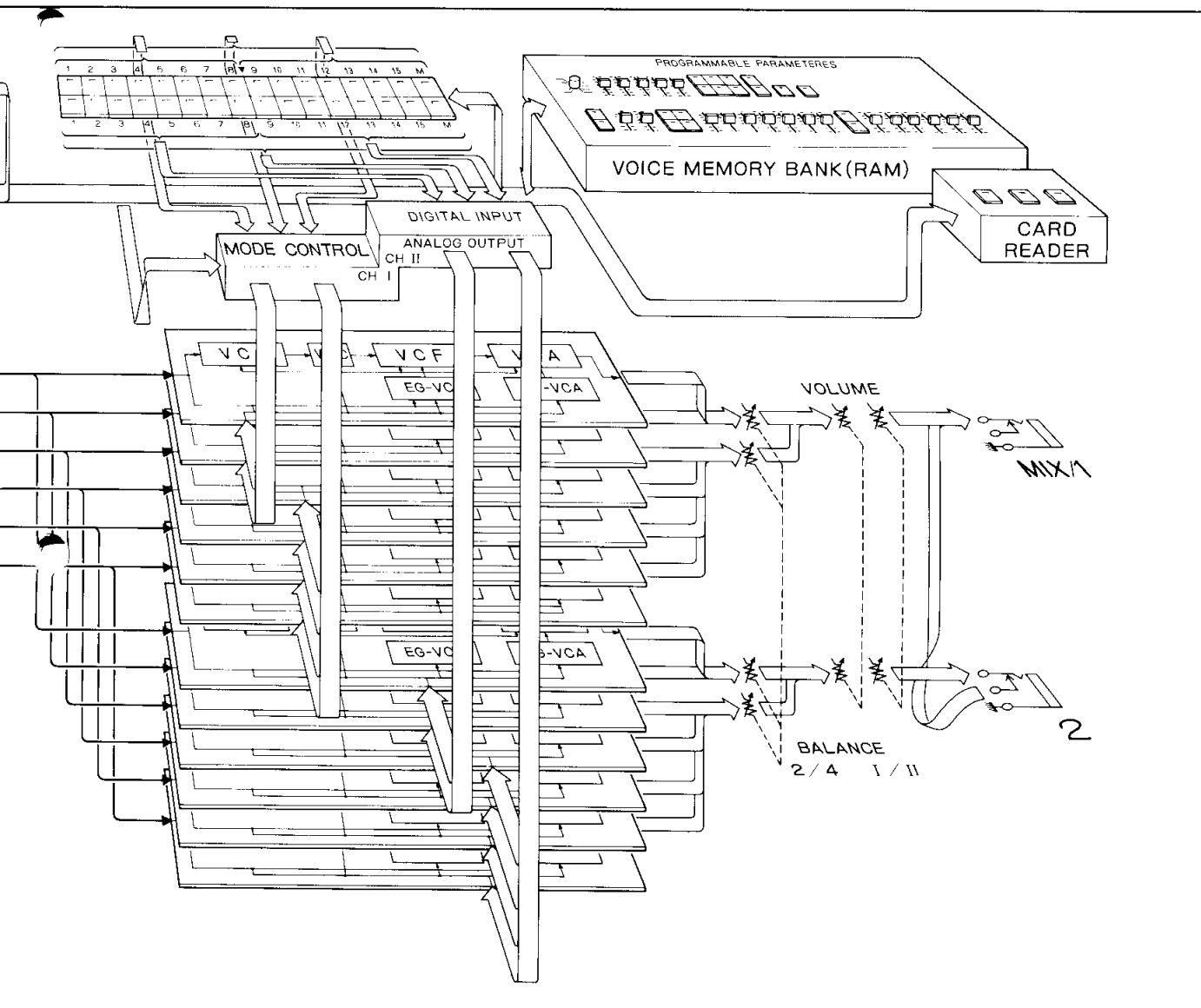
The built-in 4-bank polyphonic sequencer can be valuable as an extra pair of hands in live performance situations. It can record up to 4 independent note sequences exactly as played with six-note polyphonic capability.

The CS70M has an extremely sophisticated split keyboard system. It features a programmable split point, the capability of playing different pairs of voices on the two sides of the split, and a split balance control.



In addition to its highly versatile low frequency oscillator section, the CS70M also offers an independent LFO that provides a broad range of manual LFO modulation possibilities. The independent LFO can be used to modulate the VCOs, VCFs, and VCAs – independently or in combination – via the modulation wheel, an optional foot pedal, or the exclusive built-in keyboard after-touch sensitivity.

With the CS70M's infinite possibilities for sound creation, plus extensive expression control, it's sure to open up a whole new world of creative freedom.

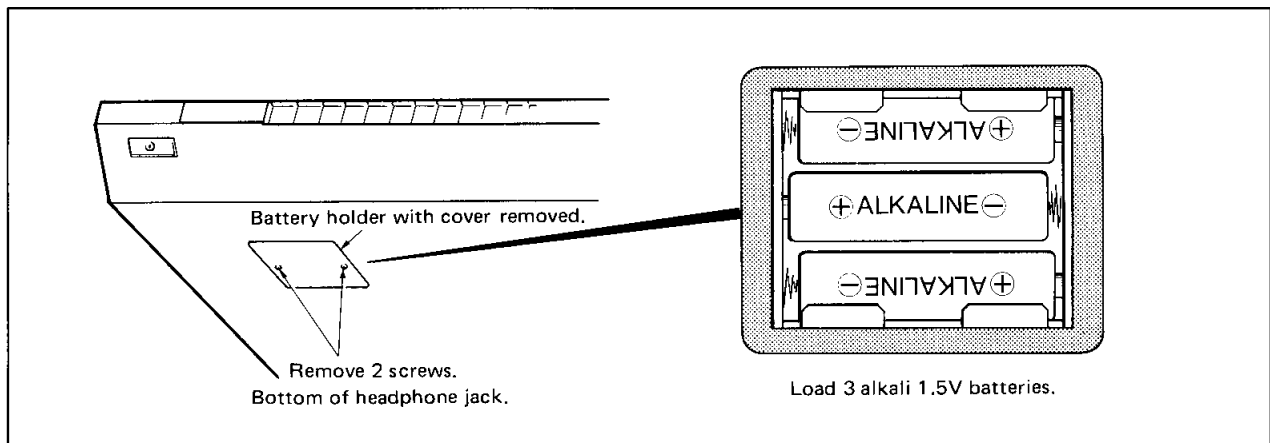


Setup

Loading the Back-up Batteries

The CS70M employs batteries to preserve the contents of the RAM memory so that programmed voices can be retained even when power is switched off. Load the batteries prior to connection and operation.

1. Disconnect the power cord to prevent possible short-circuits when loading the batteries.
2. As shown in the illustration, load the 3 alkali 1.5 volt batteries supplied with the unit.
3. The life of the batteries is about 2 years. Use alkali batteries for replacement. Replace all 3 batteries at the same time.
4. Timely replacement of batteries will prevent trouble with leakage of old batteries.



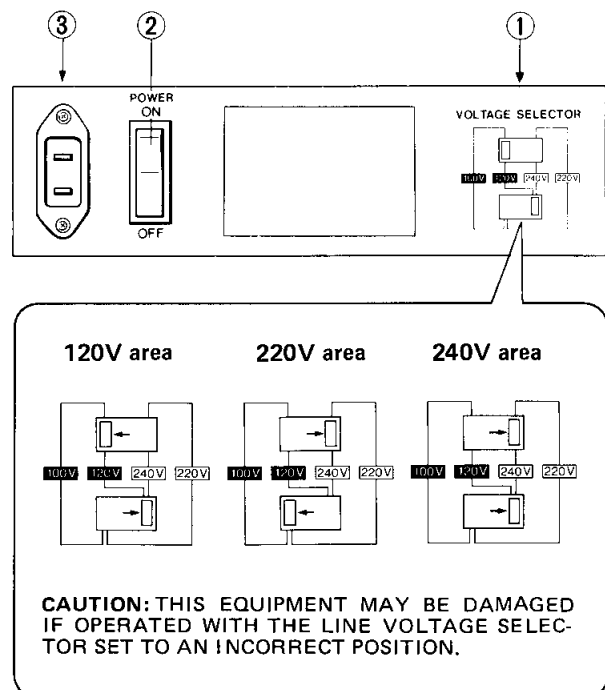
① VOLTAGE SELECTOR

Before applying power, check that the voltage selector is set for the line voltage in your area. If it is incorrect, remove the two switchguard screws, set the switch to the correct voltage setting, and replace the switchguard. Operating the CS70M at the wrong voltage setting will result in impaired performance or even severe damage to the unit. After the voltage selector has been verified, plug line cord into an AC outlet.

② POWER SWITCH

③ POWER CORD CONNECTOR

Plug in the line cord here.



The CS70M does not incorporate a power amplifier. Therefore, it is necessary to connect it to an amplifier/speaker system except when headphones are being used.

OUTPUT BLOCK

- The output level is compatible with conventional line level inputs including keyboard amplifiers or mixers.
- Be sure to observe the maximum input ratings of amplifiers speakers are used. A signal exceeding the rated capacity may burn out the voice coil of the speaker.

Nominal output level

Mixed Balanced	-20 dBm
Mixed/1, 2	-14 dBm

④ MIXED BALANCED

This is a balanced XLR connector for mixed output from channels I and II. Use this connector for output to a professional type mixer with low impedance (balanced or unbalanced) inputs.

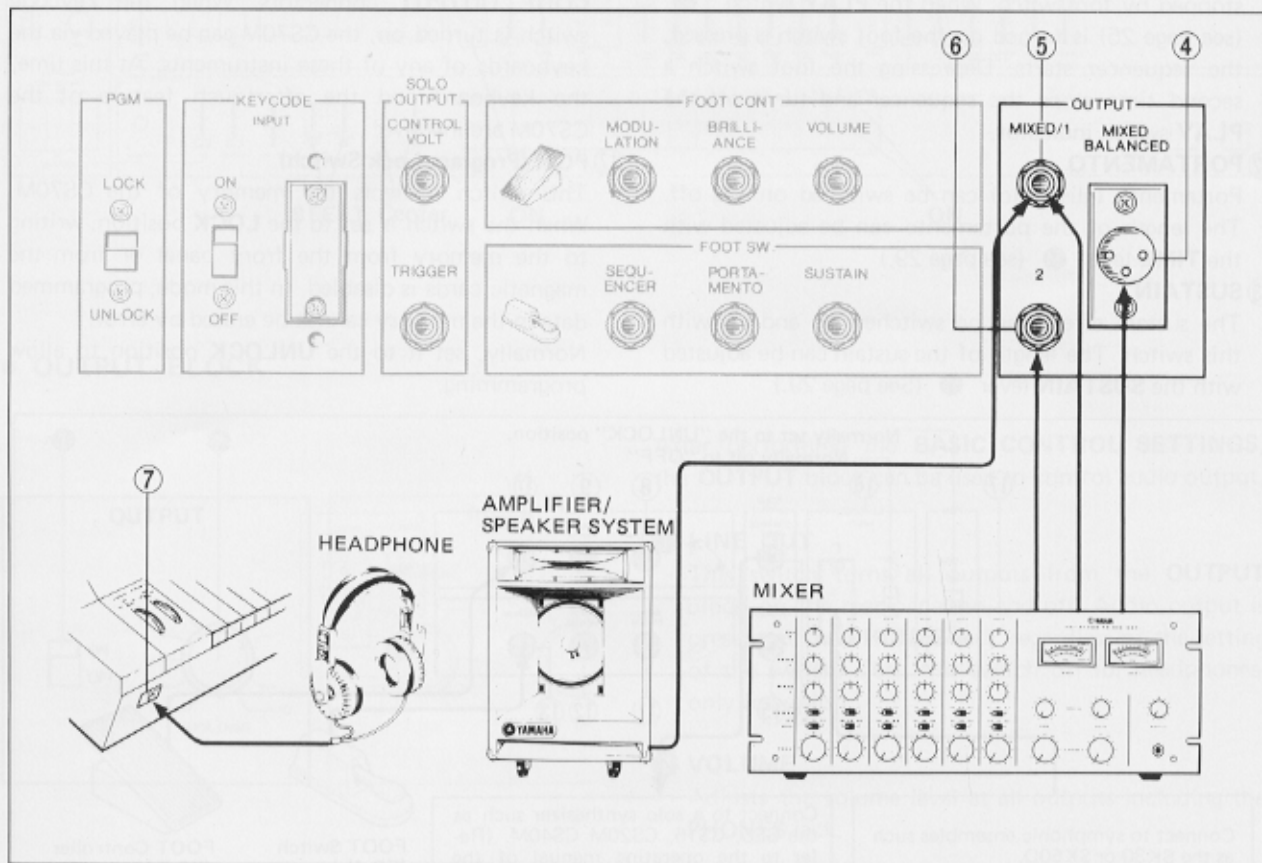
⑤, ⑥ MIXED/1, 2

These are unbalanced output jacks for standard 1/4" phone plugs, and can provide either mixed output or separate channel I and II outputs.

When a plug is inserted only into the MIXED/1 jack ⑤, the mixed output of both channels is available. When plugs are inserted both jacks mixed 1, and 2, separate signals from channels I and II are present.

⑦ PHONES (front, lower left)

Use with all stereo headphones. This jack carries the signals from channels I and II mixed – the same as the MIXED jack.



The CS70M has several connections for optional equipment. There are jacks for foot switches, foot controllers, and a data input/output terminal for connection to other Yamaha synthesizers.

FOOT CONT

These 3 jacks are for use with optional **FC-3A** foot controllers.

⑧ MODULATION

The LFO modulation effect can be controlled with a foot controller. When the foot controller is plugged into this jack, the MODULATION wheel on the left side of the keyboard is disabled. (See page 30.)

⑨ BRILLIANCE

Brilliance can also be controlled with the **FC-3A** foot controller.

⑩ VOLUME

Overall output volume can be adjusted.

FOOT SW

These 3 jacks are for use with optional **FC-4** foot switches, for the control of sustain, portamento, and the built-in polyphonic sequencer.

⑪ SEQUENCER

Sequencer playback can be automatically started and stopped by footswitch. When the **PLAY** switch ④ (see page 25) is turned on the foot switch is pressed, the sequencer starts. Depressing the foot switch a second time stops the sequencer and turns off the **PLAY** switch indicator.

⑫ PORTAMENTO

Portamento (glissando) can be switched on and off. The length of the portamento can be adjusted with the **TIME** lever ⑤ (see page 29.)

⑬ SUSTAIN

The sustain effect can be switched on and off with this switch. The length of the sustain can be adjusted with the **SUSTAIN** lever ⑥ (See page 29.)

SOLO OUTPUT

SOLO OUTPUT has two output phone jacks which provide a control voltage (CV) indicating the pitch of the highest note presently being played, and a trigger voltage (Trigger) which indicates keyboard on/off. These allow the CS70M to be connected to any **YAMAHA solo synthesizer**, which will then automatically follow the highest notes played on the CS70M.

⑭ CONTROL VOLT

This jack provides a 1 Hz/V control voltage signal, and should be connected to the **CONTROL VOLTAGE IN** jack of the solo synthesizer.

⑮ TRIGGER

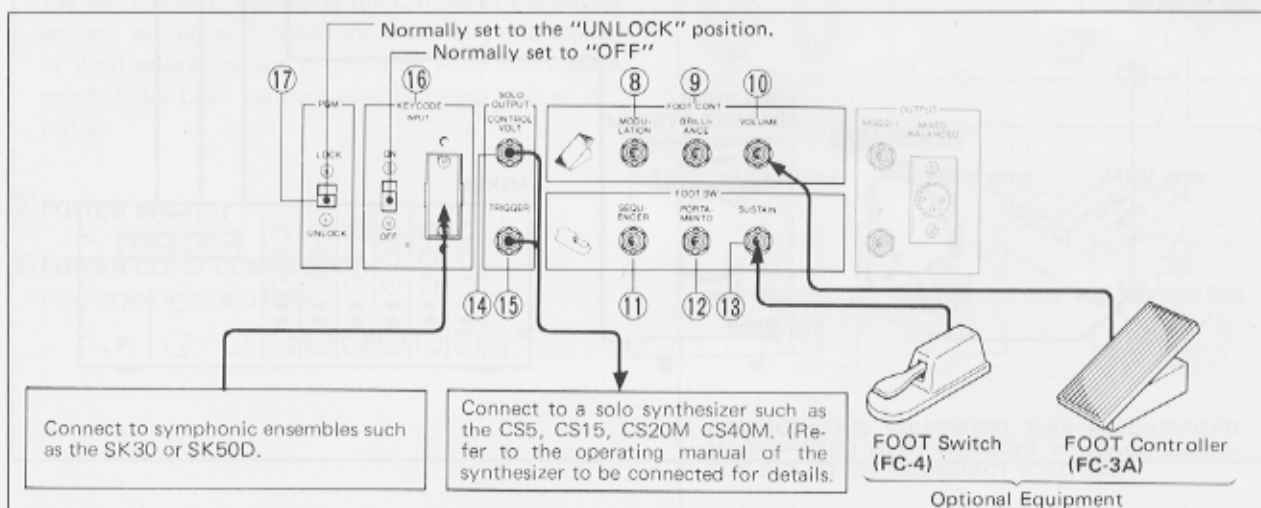
This jack carries a negative-going trigger voltage, and should be connected to the **TRIGGER IN** terminal of the solo synthesizer.

⑯ KEY CODE INPUT

This connector inputs keycode data from the keyboards of **YAMAHA SK30** and **SK50D SYMPHONIC ENSEMBLES** and **CP35 PIANO**, which have **KEY-CODE OUTPUT** connectors. When the keycode switch is turned on, the CS70M can be played via the keyboards of any of these instruments. At this time, the keyboard and the aftertouch feature of the CS70M are inactive.

⑰ PGM (Program Lock Switch)

This switch protects the memory of the CS70M. When the switch is set to the **LOCK** position, writing to the memory from the front panel or from the magnetic cards is disabled. In this mode, programmed data in the memory cannot be erased by error. Normally, set it to the **UNLOCK** position to allow programming.

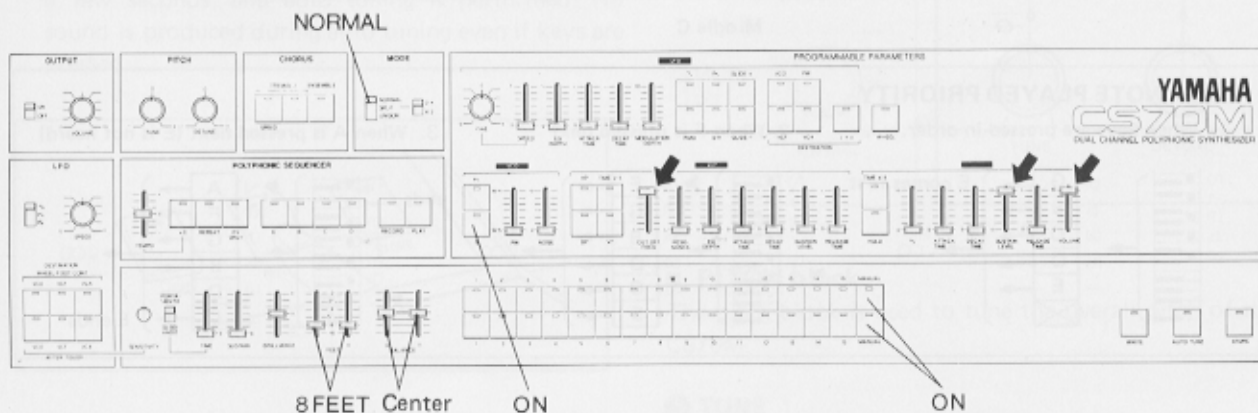


The operation of the synthesizer will be explained a section at a time on the following pages. Return the synthesizer controls to their nominal settings with the **BASIC CONTROL SETTINGS** in the examples listed below. With the **BASIC CONTROL SETTINGS** the various sound-producing waveforms and control functions of the synthesizer can be checked:

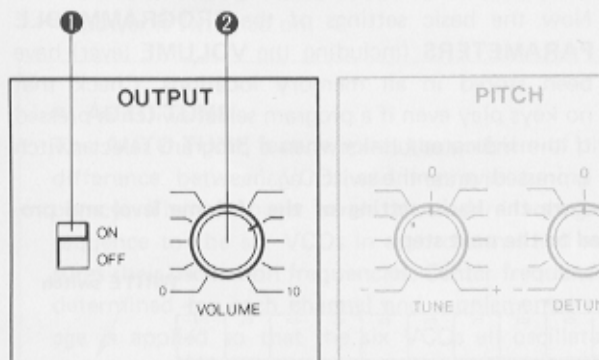
- Before using the synthesizer for the first time.
- For generating sounds to check the synthesizer, amplifier and other equipment.
- When the synthesizer status is unknown.

1. Turn on the **POWER** switch.
2. Turn on both of the grey **MANUAL** program select switches. The VCO (square wave) and the LFO (sine wave) should light up in the **PROGRAMMABLE PARAMETERS** block.
3. Turn off any indicators that are on except in the **PROGRAMMABLE PARAMETERS** block. (This happens automatically when power is first turned on.)
4. Set all other switches, levers, and knobs as shown below.

Basic Control Settings



■ OUTPUT BLOCK



After performing the **BASIC CONTROL SETTINGS**, the **OUTPUT** block can be used to control audio output.

1 LINE OUT

This switch turns all outputs from the **OUTPUT** block on the rear panel on and off. Audio output is present at the **PHONES** jack regardless of the setting of the switch. Turn this switch off for headphones-only operation.

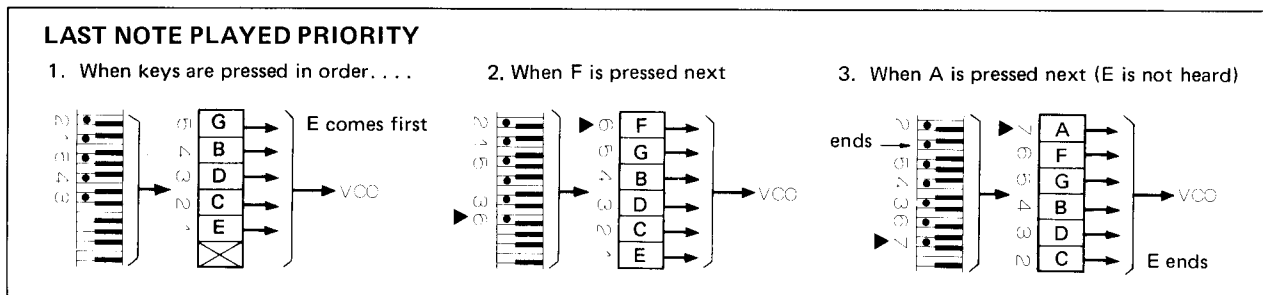
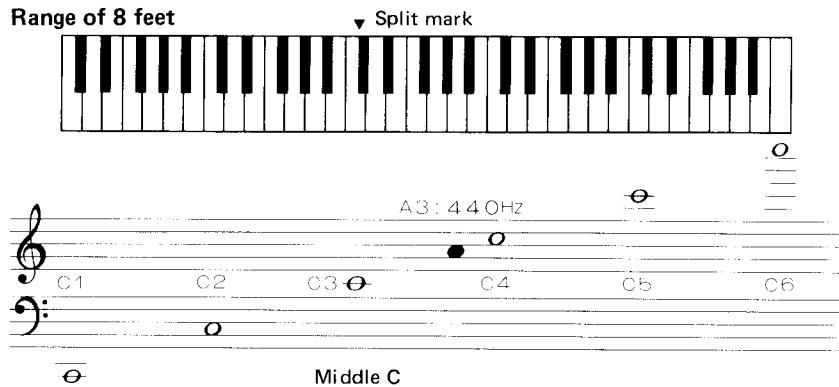
2 VOLUME

Adjusts the volume level at all outputs including the **PHONES** jack.

3 KEYBOARD

The CS70M has 61 keys covering 5 octaves. The range varies with the setting of the **FEET** switch 12. (see page 14). When the switch is set to 8 feet, the keyboard covers C₁ through C₆. Up to six keys can be

depressed at once, producing six tones. When still more keys are pressed, the note of the key first depressed ends. (Priority to the last key played). For further details, refer to page 11, **MODE**.



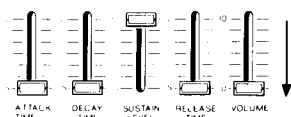
INITIAL MEMORY CLEAR

Initially, select the grey **MANUAL** switches to begin programming. No programs are in upper and lower memories 1 through 15. However, if any unprogrammed memory buttons are selected, random data may be present. This will cause extraneous signals at the outputs when any keys are depressed. Therefore, to initialize the programming process, perform the following memory clear operation.

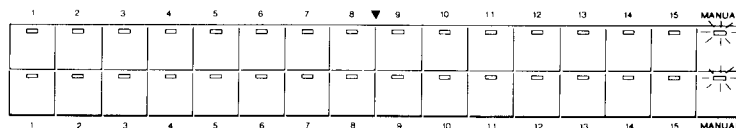
1. Push down the **VOLUME** lever in the right-hand end of the programmable parameters. In this condition,

2. While holding down the **WRITE** switch on the lower right side of the panel, press the program select switches (1 through 15) in sequence, first the upper row, and then the lower.
3. Now the basic settings of the **PROGRAMMABLE PARAMETERS** (including the **VOLUME** lever) have been stored in all memory locations. Check that no keys play even if a program select switch is pressed. If the indicator blinks when a program select switch is pressed, press the switch again.

Restore the basic setting of the Volume level and proceed to the next step.



1. Slide down the **VOLUME** lever



2. While pressing the **WRITE** switch, press the program select switches (1 through 15)

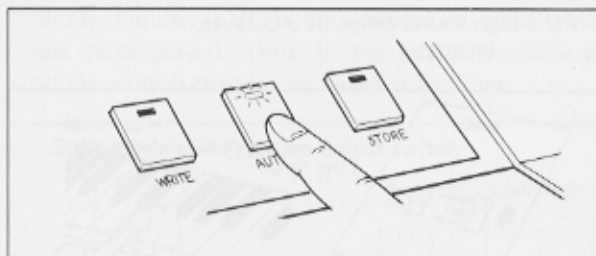
These controls determine the basic real-time operation of the synthesizer and are not programmed in the memory.

■ AUTO TUNE

The CS70M is a polyphonic synthesizer equipped with 12 VCO's (**VOLTAGE CONTROLLED OSCILLATOR**) for six tones each in two channels. It is important that the six sets of VCOs be tuned to the same pitch when a CV (control voltage) of the same value is applied to the respective VCOs of two channels. The **CS70M AUTO TUNE** function can perform this operation automatically. Be sure to perform the **AUTO TUNE** before tuning with the **TUNE** in the **PITCH** block.

4 AUTO TUNE

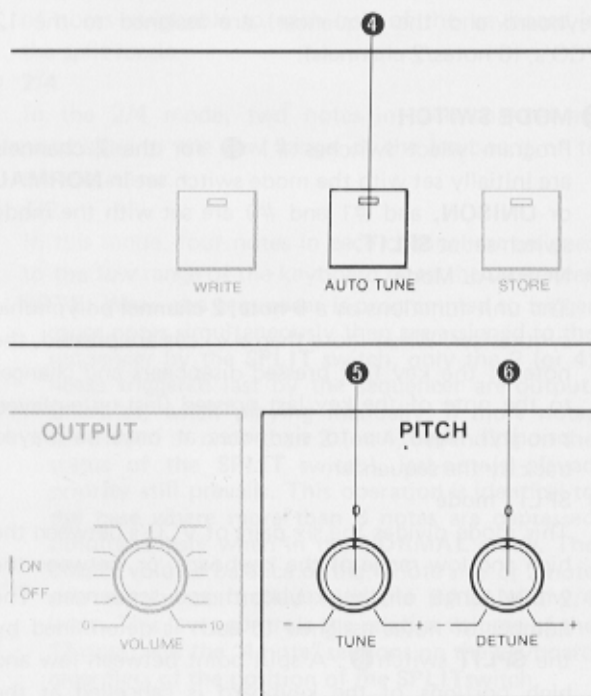
Depress and release the **AUTO TUNE** switch on the lower right of the panel. The indicator lights up for a few seconds, and auto tuning is performed. No sound is produced during auto tuning even if keys are pressed.



- **AUTO TUNE** is performed independently on channels I and II. Detune status is maintained even if **AUTO TUNE** is performed.
- About 15 minutes is required until the operation is stabilized after the power switch is turned on. Perform **AUTO TUNE** about 15 minutes after the power is switched on.

■ AUTO TUNE

The **AUTO TUNE** feature solves the problem of pitch difference between VCOs and improves tuning accuracy. The computer sends a standard voltage in sequence to the six VCOs in each channel and measures their oscillation frequencies. Center frequency is determined for each channel and supplemental voltage is applied so that the six VCOs all oscillate at that center frequency.



■ PITCH block

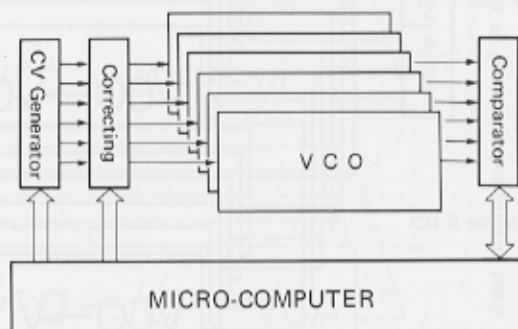
The pitch block is used to tune the overall pitch of the CS70M.

5 TUNE

The absolute pitch of channels I and II can be adjusted over a range of ± 100 cents.

6 DETUNE

The pitch of **CHANNEL II** can be offset from that of **CHANNEL I**. This is used for "detune" type effects.



MODE block

The **MODE** block determines how the key data (of the keyboard and the sequencer) are assigned to the 12 VCO's, (6 notes/2 channels).

7 MODE SWITCH

Program select switches #1 (42) for the 2 channels are initially set with the mode switch set in **NORMAL** or **UNISON**, and #1 and #9 are set with the mode switch set at **SPLIT**.

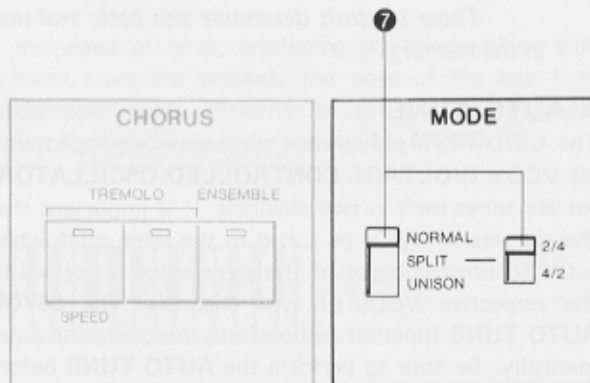
◆ NORMAL Mode

The unit functions as a **6-note, 2-channel** polyphonic synthesizer. When more than six keys are pressed, the note of the key first pressed disappears and changes to the note of the key last pressed (last-note-played priority). Also, up to six notes at once be played back by the sequencer.

□ SPLIT mode

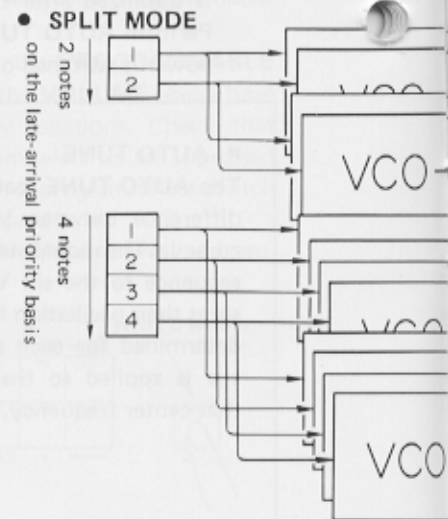
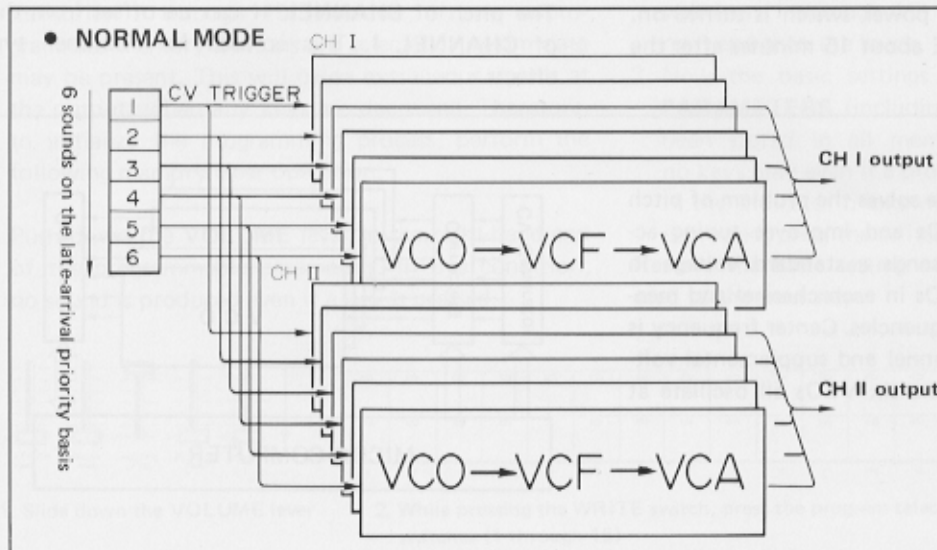
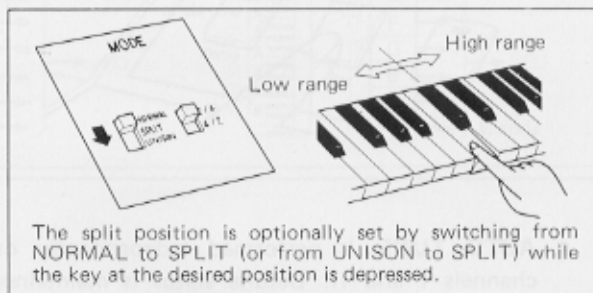
This mode divides the six pairs of VCO's between the high and low range of the keyboard, or, between the whole range of the keyboard and sequencer. The number of notes assigned to each is determined by the **SPLIT** switch (8). A split point between low and high portions of the keyboard is cancelled at the moment when the **PLAY** switch of the sequencer is pressed. A split between the sequencer and the whole range of the keyboard is then activated.

- The **PLAY** mode of the sequencer is switched off upon completion of sequencer playback. Then, the split goes back to being between the low and high ranges of the keyboard.



PROGRAMMING THE SPLIT POINT

To program the split point on the keyboard, depress and hold the key of the position where the split is desired, while changing the **MODE** switch from **NORMAL** to **SPLIT** or from **UNISON** to **SPLIT**. Unless otherwise specified, after turning power on, the split is at the position marked (▼), which divides the keyboard into a low sound range of 2 octaves and a high sound range of 3 octaves.



- When changing the **MODE** switch to **SPLIT**, be careful not to accidentally press any keys, as the split position will change.

SPLIT OF VOICES

In the **SPLIT** mode, program select switches 1 through 8 are assigned to the low range of the keyboard (or the sequencer, if it is in the "play" mode), and switches 9 through 15 to the high range of the keyboard, or to the whole range of the keyboard when the sequencer play is used.

UNISON mode

When the **MODE** switch is set to **UNISON** all six VCOs in each of the two channels are triggered irrespective of the number of keys depressed. When only a single note is pressed, the same key "played" data is input to all 6 pairs of oscillators, so they all have the same pitch. When two keys are depressed, the key data of the key depressed first is assigned to one VCO on each channel. The key data of any key pressed later is assigned to all of the remaining VCOs. Similarly, VCOs are assigned in order of the last note played. Thus, in the **UNISON** mode six VCOs on each channel are heard at all times.

8 SPLIT switch

The **SPLIT** switch determines the maximum number of notes assignable to each half of the keyboard in the split mode.

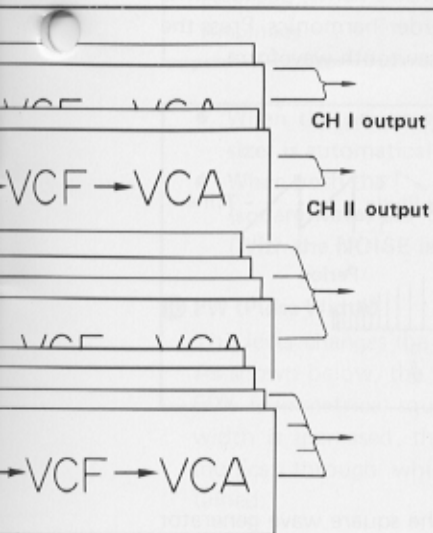
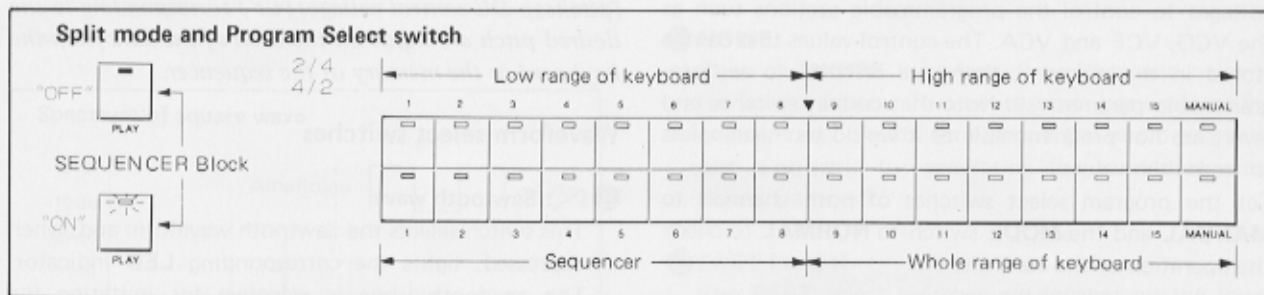
2/4

In the 2/4 mode, two notes in each channel are assignable to the low range of the keyboard or to the sequencer.

4/2

In this mode, four notes in each channel are assigned to the low range of the keyboard or to the sequencer.

NOTE: When the sequencer is programmed to trigger more notes simultaneously than are assigned to the sequencer by the **SPLIT** switch, only the 2 (or 4) notes triggered last by the sequencer are output. Likewise, when playing manually, if more notes are played at once than 2 (or 4, depending on the status of the **SPLIT** switch), last-note(s)-played priority still prevails. This operation is identical to the case where more than 6 notes are depressed simultaneously when in the **NORMAL** mode. The output volume balance of the 4-note side or 2-note side can be controlled with the **BALANCE** 2/4 lever. This lever controls the relative volume of the "2-note" and the "4-note" sections on the keyboard regardless of the position of the **SPLIT** switch.



UNISON MODE (Example of 3 simultaneous notes)

