


ai² Synthesis Module

OSR/W

Quick Guide

 ai² Synthesis System

KORG

Ⓔ

①

CONTENTS

Introduction	2
Making Connections Part 1: Audio Output	3
Connect the 05R/W to audio equipment	3
Turn on the power	3
Listen to the demo	3
Making Connections Part 2: MIDI	4
Making Connections Part 3: Computer	5
Playing the 05R/W	6
Check the MIDI channel settings	6
Play a few of the 05R/W's programs	6
Using the 05R/W as a General MIDI	
Sound Source	6
Combining Sounds: Combination Editing	7
Edit Combination Mode	7
How to save a Combination Mode	8
Using a Sequencer to Control the 05R/W	8
What is an Effects Processor?	9
The Function of an Effects Processor	9
A Variety of Effects	9
Effects that add Acoustic Ambience to a Sound	9
Effects which add Spatial Characteristics to	
Sound, but can be used as Sound Elements	10
Effects that change the Characteristics of	
a Sound	11
Using the Effects Processors	12
Sound Synthesis: Editing Programs	14
Three Elements of Sound	14
The Elements of Volume in Sound Synthesis	14
How Tone is Defined	15
A few Words about Pitch	17
And what is Double Mode?	18
About the Drum Kit	18
Effects with Programs	19
Saving Programs	19
Creating Original Programs	19

Introduction

This 05R/W Quick Guide is for users of the 05R/W who are new to computer music or have relatively little experience using synthesizers. If you find yourself wondering what to do after you've turned on your 05R/W, read this manual through from cover to cover. The instructions you will find herein will give you a basic understanding of the 05R/W's operation. Once you have mastered the techniques described in the following pages, you will find it easier to refer to the 05R/W Owner's Manual. The Owner's Manual contains a great deal of information that you won't find in this Quick Guide—including detailed explanations of less frequently used special functions. If you have experience using full-scale synthesizers such as Korg's Wavestation or the models in the M,T Series and 01/W Series, feel free to skip this guide – you will probably be able to make full use of the 05R/W's capabilities with reference to the 05R/W Owner's Manual alone.

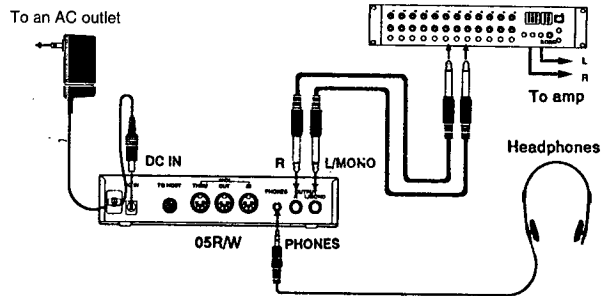
Making Connections Part 1: Audio Output

Connect the 05R/W to audio equipment

Before you can use the 05R/W, you must connect it to a set of amplified monitor speakers or stereo equipment in order to amplify the audio signal output by the 05R/W and turn it into sound. Always remember to turn the power switch OFF and the volume control down on the 05R/W and audio equipment before you connect them.

Some amplified keyboard speakers have two or three input channels, allowing you to input signals from more than one sound source. However, you may find it troublesome to make level settings using such equipment. For greater ease of operation, we recommend using a mixer such as Korg's KMX-122 when using a number of MIDI tone generators in combination.

Caution: The 05R/W outputs sounds over an extremely wide dynamic range. If you connect the 05R/W to the AUX IN jack of a stereo amplifier, be sure to keep your stereo's volume control turned down to avoid damaging your speakers.



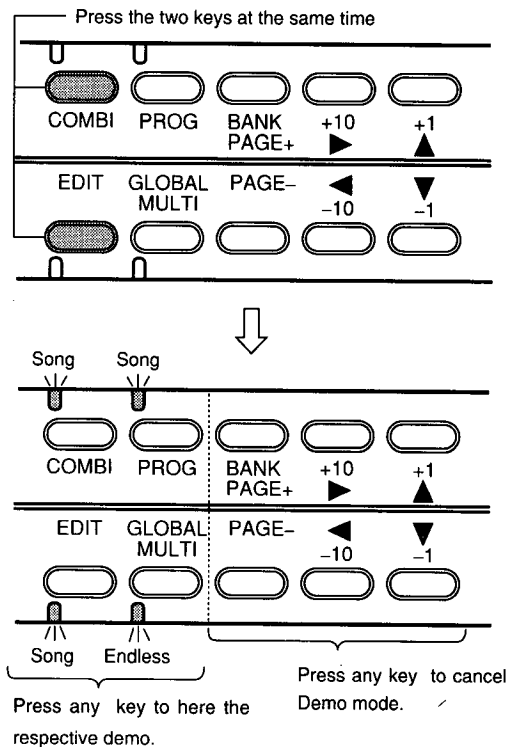
Turn on the power

Now you can turn the power on. First, turn the 05R/W on, followed by your mixer (if you're using one) and then your amplifier(s).

Listen to the demo

Before you do anything else, you'll probably want to hear what sounds your 05R/W is capable of producing. Set the 05R/W's VOLUME slider to about 8, and raise your mixer and amplifier volume settings slightly. While you're at it, connect a pair of headphones to the 05R/W's PHONES jack.

When you're ready, press the COMBI and EDIT keys at the same time to enter Demo mode, causing the LED indicators to blink. Press any of the demo keys located above or below the LED indicators to play the respective demo. The 05R/W will begin playing the demo. Adjust the volume of your amplifier(s) as you listen. (If you are using a mixer, you should generally use the mixer's controls to adjust the volume.) When you've got the volume setting just right, sit back and enjoy the music Korg has prepared to show you what you can do with the 05R/W. If you can't hear any music, run over the connection procedure once again. If you can hear sound from your



headphones but not from the speakers, there is probably something wrong with your cables or your audio equipment.

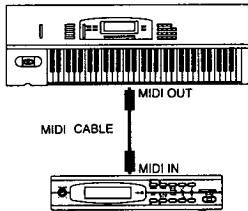
After listening to the demo, press any one of the demo buttons to stop the demo, then any one of the four buttons on the right to cancel Demo mode.

Making Connections Part 2: MIDI

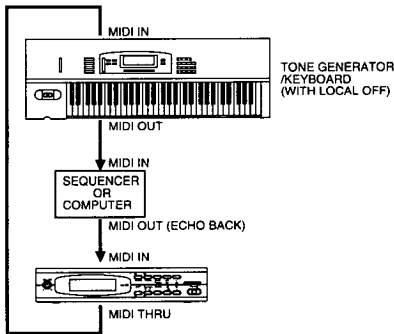
Once you've verified the audio connections by playing the 05R/W's demo, you can begin connecting the 05R/W to other MIDI equipment. Since the 05R/W is a flexible tone generator module, it can be effectively used in a variety of MIDI systems. Here are a few possibilities:

To connect a computer to a MIDI you normally need a MIDI interface, but the 05R/W can be connected directly to a computer. For details of how to connect the 05R/W directly, see the following page and pages 6-7 of the Owner's Manual.

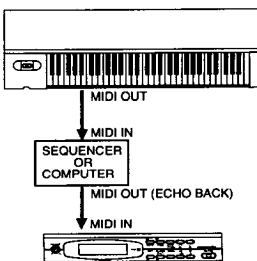
- Connected directly to a keyboard



- With a synthesizer and a sequencer or computer

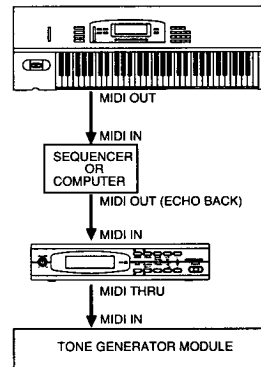


- With a MIDI master keyboard and a sequencer or computer

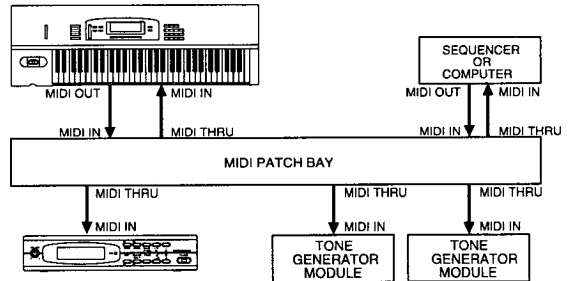


- With another tone generator module

It is a good idea to link no more than three tone generators or synthesizers in a row using the MIDI THRU jack. When creating larger MIDI systems such as those shown in the last three examples above, the addition of a MIDI patch bay can result in a more efficient configuration.



- Using a MIDI patch bay



Note: When a tone generator in a MIDI system fails to produce any sound, the cause is usually faulty MIDI cables or connections. Use only high-quality MIDI cables, and connect them to your equipment carefully.

Making Connections Part 3: Computers

You can connect the 05R/W directly to an IBM PC (or compatible machine) or an Apple Macintosh series using the special connecting cable, without a MIDI interface. Effectively, you are using the 05R/W as a combined tone generator module and MIDI interface.

Please see your Owner's Manual for instructions on setting up the 05R/W with each make of computer:

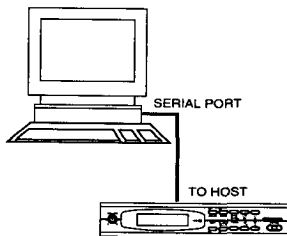
IBM PC (or compatible) on page 6

Apple Macintosh series on page 7

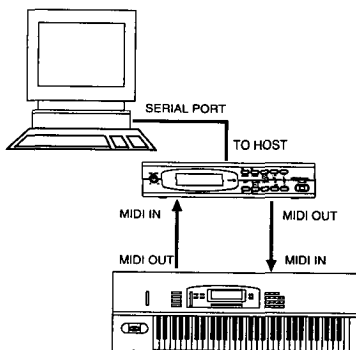
With some makes of computer and some applications (sequencers) you may not be able to use this function.

Here are some typical setups:

- Connected directly to a computer

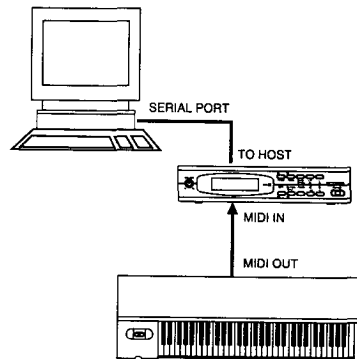


- With a keyboard (with tone generator) and a computer

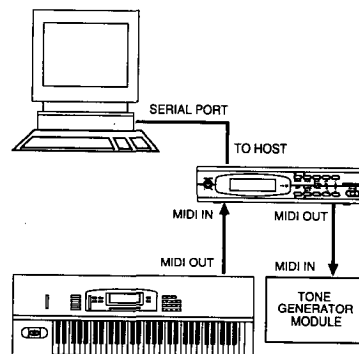


*Apple® and Macintosh® are registered trade marks of Apple Computer, Inc.

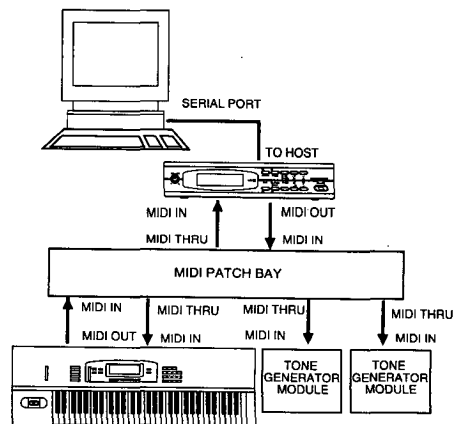
- With a keyboard (without tone generator) and a computer



- With another tone generator module and a computer



- With a MIDI patch bay, two other tone generators and a computer



*IBM® is a registered trademark of International Business Machines Corporation.

Playing the 05R/W

Check the MIDI channel settings

Now it's time for you to start using your 05R/W to make music. But first make sure your MIDI channel settings are correct.

Your keyboard will be sending MIDI signals to the 05R/W telling it which keys you have pressed, how hard, and for how long. If the keyboard and the 05R/W are not set to the same MIDI channel, however, the latter will not be able to receive the information that the former transmits. The MIDI standard provides sixteen different channels that digital instruments can use to communicate with each other. In order for them to exchange information, both the sending device and the receiving device have to use the same channel.

Your 05R/W was set to MIDI channel 1 when it left the Korg factory. Make sure that the MIDI transmit channel of your keyboard is also set to channel 1, so that the 05R/W will be able to receive keyboard information.

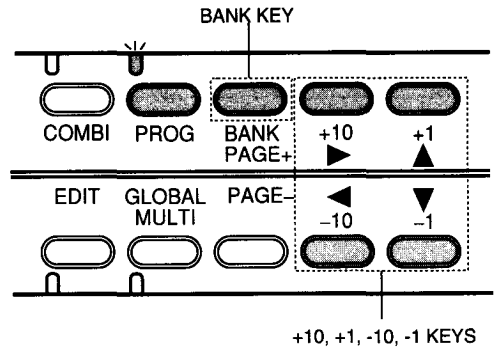
Play a few of the 05R/W's programs

The 05R/W outputs sound at two levels. Individual sounds produced by such units as the oscillator (OSC), filter (VDF), and amplifier (VDA) are called programs. You can combine as many as eight of these programs in a variety of manners to create sets of programs known as combinations. The 05R/W plays programs when it is in Program mode, and combinations when it is in Combination mode.

Let's start by listening to a program.

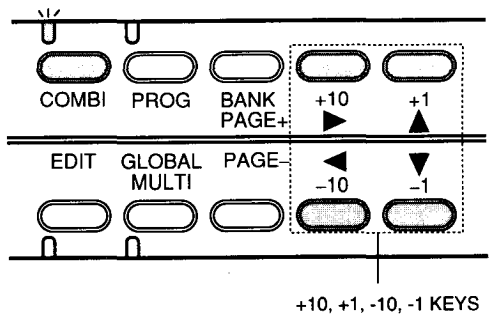
Press the PROG key to enter Program mode. The program number and name should appear on the top line of the display. Now try playing a note on a keyboard such as a 01/W connected through the MIDI input of the 05R/W (or transmit performance information from a sequencer). Did you hear a sound? If not, check your connections and settings—especially the MIDI channel setting—once again.

The 05R/W contains 236 programs: 100 programs (numbered A00 through A99) and 136 other programs (numbered G01 through G136). Press the BANK key to change the bank, and use the +10, +1, -10 or -1 key to select the programs you'd like to hear. Now try listening to a program while referring to the Voice Name List.



Next, try playing some combinations. Press the COMBI select key to enter Combination mode. The combination number and name should appear on the top line of the display, while the number of program being used in Combination mode appear on the bottom line. (Every time you press the COMBI key, the display will be switched between Timbres1-4 and Timbres5-8.) As the name implies, a combination is essentially a group of programs. By combining programs you can produce more elaborate sounds, or create multiple-sound sets that let you play a number of different parts from a single keyboard during live performances.

Combinations also let you use the 05R/W with a sequencer to play complex songs consisting of a parts. As with programs, the 05R/W has 100 combinations stored in a bank. Now try listening to a combination by pressing the +10, +1, -10, and -1 key while referring to COMBINATION in the Voice Name List.

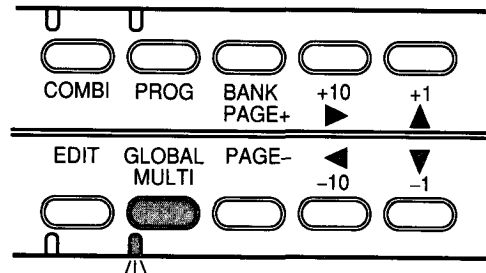


Using the 05R/W as a General MIDI Sound Source

The 05R/W supports the General MIDI (GM) Standard and can thus be used to play GM-Standard Sequencer data without having to make complicated settings.

To do this, press the GLOBAL/MULTI key. The unit will enter either Multi or Global mode. If the Global mode screen appears (i.e., if MASTER TUNE or other items appear), press the GLOBAL/MULTI key again to enter Multi mode. A GM-Standard sequencer or other equipment, connected to the MIDI input of the 05R/W, can now be turned on and the GM data played through the 05R/W.

The data may not be played back correctly according to settings made in Global mode. Check the settings for Global mode in your Owner's Manual under "USING GM DURING PLAYBACK", page 11.



Combining Sounds: Combination Editing

If you use the 05R/W as part of a MIDI system, you will probably want to use it more often in Combination mode than in Program mode.

A combination is a set of up to eight programs. There are several types of combinations; including one which plays one program throughout the entire range of the keyboard. Combinations which play only one program are often referred to as single combinations. Playing a program in a single combination is effectively no different from playing the same program in Program mode.

Another is a combination which plays two programs simultaneously throughout the entire range of the keyboard. This method of combining programs is called layering. Layered combinations provide a richness and complexity that is hard to achieve with a single program. Yet another one is a combination which plays different programs on either side of a given key. Such an arrangement is known as a split. Split combinations are useful when you want to play different sounds with your right and left hands during live performances.

Next, let's take a look at a combination method utilizing velocity, which measures how hard you hit the keyboard. Such a combination plays one program when the key is struck with a velocity (force) lower than a given value, and another program when struck with a higher velocity. This method of combining programs is known as a velocity switch.

In the preceding examples, we have restricted our use of layering to two programs. However, since the 05R/W can produce up to 8 programs at once, you can mix to-

gether as many of these as you like in order to produce combinations of even greater complexity. Or you can use all eight of them separately.

Programs comprising a combination are called timbres. Now let's look at a combination. The top line of the display shows the number of the combination currently selected, and the bottom line shows four timbres. Press the COMBI key again. Another four timbres will be displayed in the same way. When no timbres are in use, the message OFF will be displayed. Combinations are made up of these programs.

Edit Combination Mode

Press the EDIT key to enter Edit Combination Mode. This mode allows you to create and edit combinations. Check that the top line of the display reads "00A PROGRAM1-4". (If it does not, press the ◀ key or the PAGE- key to open page 0A.) The bottom line parameters are used to set the various timbres.

Press the ▲ key to change the program and the sound. (These are used to specify parameter values. Pressing the ▲ key increases the value by 1, and pressing the ▼ key decreases the value by 1. Holding the key down changes the value continuously. Also, holding down the ▲ key and pressing the ▼ key increases the value in increments of 10, while reversing the keys decreases the value by 10 each time.)

Next try moving to page 3 of the display. (you can do this by pressing the PAGE+key three time.) Layers and splits switches are all created using this page. Pages 3A and 3B contain Key Window Top (the upper end of the range) and pages 3C and 3D contain Key Window Bottom (the lower end of the range)

Now press the PAGE+ key again to open page 4. The Velocity Switch is set via this page.

To edit these arrangements and create your own original combinations, use the ▲ and ▼ keys to select the desired parameters and change the settings.

How to save a combination

Once you have created a combination, you can save it and give it a new name. Go to page 15. Use the ◀ and ▶ keys to select "15B RENAME", then use the ◀ and ▶

keys to Move the cursor to the desired letter of the combination's name and the ▲ or ▼ key to select that letter. To make a blank space, use the ▼ key to go to the bottom.

When you have given the combination a name, press the ◀ key several times to move to the "15A COMB WRITE" parameter. Use the ▲ and ▼ keys to set the number of the address in memory to which you wish to write the combination. Now press the ▶ key once. The flashing message "OK?" will appear. Now press the ▲ key. If you write to an address, any combination previously recorded at that address will be erased. The message "Are You Sure OK?" appears. To confirm the writing, press the ▲ key. When you press the ▲ key, the message "Completed" appears. If you do not wish to save the combination, press the ▼ key.

Using a Sequencer to Control the 05R/W

Normally when you use a sequencer or computer to control 05R/W performances, you will want to assign each part — drums, bass, strings, and so on — to one of the 16 MIDI channels.

When we mentioned the 05R/W's MIDI receive channel earlier we referred to only one channel. However, it is possible to assign a different MIDI channel to each of the 05R/W's eight timbres, so that you can send note information to control the performances of the programs assigned to each channel separately. In other words, the 05R/W has eight parts, and allows different information to be transmitted to each part. Of course, not all the parts need perform.

Tone generators which possess the ability to perform more than one part simultaneously are called multi-timbral tone generators. (In fact, the 05R/W is capable of handling up to sixteen parts in Sequencer mode. For details regarding this function, refer to the "Sequencer Mode" section in the 05R/W Owner's Manual.)

Let's try setting up the 05R/W to perform as a multi-timbral tone generator. Check that the program is set to Timbre 8 of the page 0B of Combi Edit Mode. (If it is OFF, use the ▲ and ▼ keys to select a program. Now go to page 2. The bottom line of the display shows the MIDI channels of the various timbres.

If you select a different MIDI channel for each timbre in this way, you can use the 05R/W as eight independent synthesizers.

As you can see, it is possible to create splits and layered combinations for different parts by assigning more than one timbre to a single MIDI channel.

What is an Effects Processor?

The function of an effects processor

One of the 05R/W's main features is its pair of built-in digital multi-effect processors. This section of the Quick Guide explains what these effects processors do, what kinds of effects they provide, and how you can use them. As their name implies, effects processors are used to add effects to sound that has been converted into an electronic signal, such as the sound from synthesizers, guitars, or microphones. Effects such as reverberation or delay can be used to add acoustic ambience or echoes to the sounds produced by digital instruments or instruments recorded in a studio. Other effects, such as equalizers, can be used during sound synthesis to process the electronic signal, altering the qualities of the sound itself, while effects such as compressors and limiters can be used to compress the wide dynamic range of natural sounds and limit level fluctuations.

(A multi-effect processor does not limit you to a single effect, but allows you to select from a variety of supplied effects. Since the 05R/W is a synthesizer, most of its effects are those that add acoustic ambience or echoes or those used during sound synthesis to alter the quality of the sound itself.)

A variety of effects

Various effects

To get an idea of the various effects the 05R/W can provide, try listening to them as you read this explanation. First select a combination.

To try out an effect, you must first adjust the settings. Press the EDIT key to enter Edit Combination mode, open page 1 and select Timbre 1 "G47 Harp" and Timber 2 "G50 SlowString". Switch the other timbres OFF. Can you hear the effect of a harp and strings playing together? If you can hear no sound, check Timbers 1 and 2 for the following:

- page 1 Are the LEVEL settings correct?
(Try setting both to 100)
- page 2 Are the MIDI CH settings correct?
(Try setting both to 1CH)
- page 3 Are KW TOP and KW BTM parameters correct?
(Both should be set to G9 for KW TOP and C-1 for KW BTM)

page 4 Are the VW TOP and VW BTM settings correct?
(Both should be set to 127 for VW TOP and 001 for VW BTM)

Now you need to decide how to input the outputs of these combinations into the effects processor and where you want to place the effects processor. You will find detailed instructions under "Using the effects processors" on page 12, so for the moment we will just deal with the settings.

Press the PAGE+ key three times to open page 7, "PANPOT". Use the ▲ and ▼ keys to set Timbres 1 and 2 to "CNT". Now press the PAGE+ key six times to open page 13, "PLACEMENT" and use the ▲ and ▼ keys to select Serial, Parallel, or Parallel2.

The effects processor is now ready.

The 05R/W has two built-in effects processors, but for simplicity we will explain their functions using just one processor.

Press the PAGE- key twice to open page 11 "EFFECT2". Press the ▼ key to change the top right parameter (if you hold the ▼ key down while you press the ▲ key, the parameters will go down in units of 10) and the bottom line of the display to "00: No Effect". Now press the PAGE+ key twice to move to page 9 "EFFECT1". Set the effect value to "01: Hall".

Now we are ready to begin our explanation of the 05R/W's effects.

Effects that add acoustic ambience to a sound

Effects used to add a sense of acoustic ambience to a sound are commonly known as reverb.

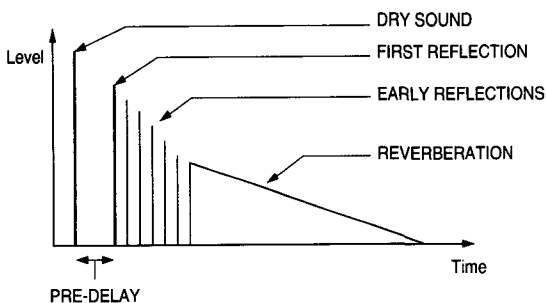
■ Reverb

Sounds exhibit a wide variety of reverberations, depending on the size of the surrounding acoustic environment and the materials used in nearby walls, ceiling, and so on. Reverb is an effect that is used to add such reverberations to dry sound. (Dry sound is the term used to refer to the original sound without any added effects.)

The 05R/W features nine types of reverb — 1:Hall through 9:Spring — each of which simulates an acoustic environment with different characteristics. Try listening to all of these effects, pressing the ▲ key and playing a

few notes with each. (You will find it easier to distinguish the effect added to the harp sound by these effects — and by the early reflection and delay effects described below — if you hit the keys and release them quickly.) Can you hear the differences in the reverberations produced by these effects?

Let's look at the nature of these reverberations. Imagine making a noise in a hall. After that noise travels directly to your ear, you will hear a number of sounds reflected from the surrounding walls and ceiling. These are known as early reflections. The time that passes before you hear these reflections — known as pre-delay — will vary depending on the size of the hall. The reflections then bounce around wildly, producing a fuzzy reverberation that gradually fades away. The time that it takes for these reflections to disappear is known as the reverb time; it, too, changes with the size of the acoustic environment.



Finally, the quality of these reverberations depends upon the material used in the ceiling, walls, and other objects in the room. If the walls are made of a soft material, for example, they will tend to absorb the high-range portion of the sound and reflect only the low range. The proportion of high-range sound that is lost is represented by the high damp parameter.

Effects which add spatial characteristics to sound, but can be used as sound elements

There are some effects which add spatial characteristics to sound, but are also suited for use as elements of the sound synthesis process. These include early reflections, delay, chorus, and flanger effects.

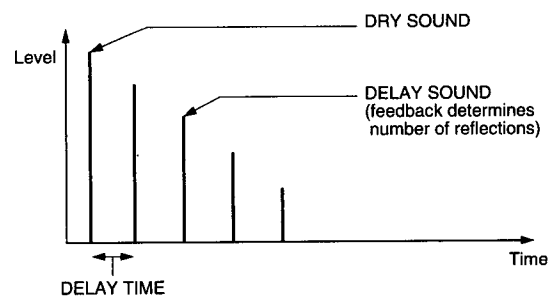
■ Early Reflections

This effect reproduces only the early reflections segment of the reverb effect. By using only the early reflections, you can add weight to a sound or create effects like those added by gated reverb. The 05R/W lets you choose from three types of early reflection effects: 10:Early Ref 1 through 12:Early Ref 3. The volume of the reflections provided by 12: Early Ref 3 grows in level instead of fading away.

■ Delay

While reverb and delay both add delayed sounds to the dry sound, they are nonetheless completely different effects. If reverb is a "hall" effect, delay is a "mountain echo" effect. While reverb involves a mass of undistinguishable reflections that fade away as a group, the delay effect creates discrete delayed sounds at regular intervals. The amount of time that elapses before the first echo returns is known as the delay time, while the number of repetitions you hear are called feedback.

The 05R/W offers six kinds of delay, from 13:Stereo Delay through 18:Multitap Dly3. While the delay effect was originally devised to add spatial characteristics to sound, effects such as cross delays and multi tap delays are best thought of as elements for sound creation.



■ Chorus

As its name implies, chorus creates an effect that makes it sound as if a number of instruments are being played. It is used with a wide variety of sounds, from electric pianos to strings, guitars, and so on.

When an ensemble plays in unison, variations in the pitch of each instrument create a sort of warbling in the sound. It is this warbling effect that gives listeners the impression that a number of instruments are being played. The chorus effect uses a delay to create similar variations of pitch.

Changing the delay time of a delay effect alters the pitch

of a delayed sound. The chorus effect uses a low-frequency oscillator (LFO) to modulate the delay time, creating a signal in which the pitch is constantly fluctuating. When this signal is mixed with the dry sound, it creates an effect similar to the warbling that is produced by several instruments being played in unison.

Put simply, chorus is an effect which modulates the time of a delay effect. The speed at which the LFO oscillates—that is, the speed of the pitch fluctuations—is called the modulation speed. The amount by which the LFO modulates the specified delay time, and hence the pitch, is known as the modulation depth.

The 05R/W provides you with six types of chorus effects, from 19:Chorus 1 through 24:Symphonic Ens. When listening to these effects (and all of the following effects), hold down the keys so that you can hear how they add different breadths, depths, and amounts of warbling to the sound of the string section.

■ Flanger

The flanger effect is like the chorus effect, but with a shorter delay time and the addition of a feedback loop which routes part of the output signal back into the effect. The result of these changes makes the flanger very different effect. Technically speaking, the comb filter alters the pitch characteristics of the sound. This can create a powerful effect when used on sounds with a lot of harmonics.

The 05R/W has three flanger effects, from 25:Flanger 1 through 27:XOver Flanger.

Effects that change the characteristics of a sound

Effects which alter the character of the sound itself by processing the electronic signal include equalizer and distortion effects, as well as a number of others.

■ Exciter

The 05R/W's exciter effect, 28:Exciter, modulates the sound itself, optimizing its acoustic characteristics in order to give it definition and help it stand out.

■ Enhancer

The 05R/W's enhancer effect, 29:Enhancer, clarifies the sound, giving it greater definition and presence to bring it

to the forefront. It also includes a delay which adds breadth to the sound.

■ Distortion

Originally devised for use with guitars, the distortion effect electronically simulates the distortion that occurs when you input a signal to an amplifier at an excessive gain level. Since it adds thickness to single sounds, it can be effectively used with solo instruments. It produces a muddy effect when used with an instrument playing chords.

The 05R/W has two kinds of distortion, 30:Distortion and 31:Over Drive.

■ Phaser

The phaser effect shifts the phase of a sound, as its more proper name — the phase shifter effect — implies. This effect creates a signal with a continuously varying phase that creates a fluctuating effect at a certain frequency when added to the dry sound. Since this effect alters the phase of the sound, it creates a different sort of growling *from that created by the chorus or flanger effects, which alter the delay time.* It is effective with electric piano, and guitar sounds, as well as with synthesizer sounds and low-range sounds that don't fade out too quickly.

The 05R/W gives you two phaser effects to choose from: 32:Phaser 1 and 33:Phaser 2.

■ Rotary Speaker

The rotary speaker effect, 34:Rotary Speaker, simulates the sound produced by rotary speakers commonly used in organs. Rotary speakers have a motor which causes the high-range speaker horn to rotate. This physical rotation of the horn creates a Doppler effect, like the sound you hear when an ambulance goes past. The horn can usually rotate at one of two speeds: the slower speed produces a chorus-like effect, while the faster speed provides a tremolo effect. In either case, the sound has a special characteristic all its own. The rotary speaker effect is best suited to organ sounds; in fact, the two are pretty much inseparable.

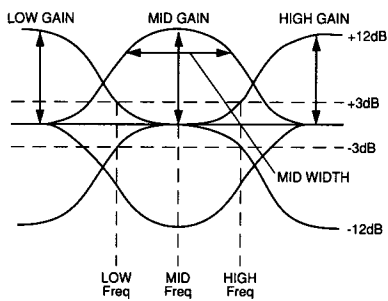
■ Tremolo

The tremolo effect produces cyclic variations in the volume of a sound. Effect 35:Auto Pan modulates the two stereo channels inversely, creating the sort of stereo tremolo that suitcase-type electric pianos are famous for.

The other tremolo effect, 36:Tremolo, modulates both channels in sync. This effect is more useful with languid melodies and broad chords, less so with detailed phrases.

■ Parametric Equalizer

The parametric equalizer effect, 37:Parametric EQ, provides you with a three-band equalizer. It allows you to set cutoff frequencies for the high and low ranges, and apply a filter with a variable band width to the middle frequencies.



Using the effects processors

Now that you have checked out the various types of effects that the 05R/W makes available, you're probably wondering how to go about setting up a combination or program so that its output is sent to the effects processors.

Connect the combination to the effects processor.

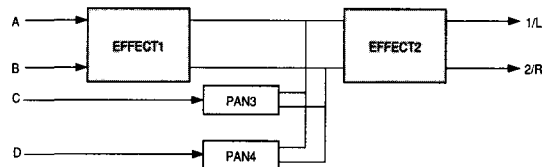
The 05R/W's effects processors have four input circuits labelled A through D. To connect each of these, go to Edit Combination mode and set the Panpot parameters A and B on pages 7A and 7B, and the Send parameters C and D on pages 8A and 8B. Then go to Edit Program mode and set the Panpot parameters A and B on page 1C (or pages 1C and 2C in Double mode), and the Send parameters C and D on page 1D (1D and 2D in Double mode). In Multi mode, all these parameters are on page B.

Select an effects processor placement.

The 05R/W's two digital multi-effect processors can be arranged in one of four ways. Let's look at each of these arrangements in turn.

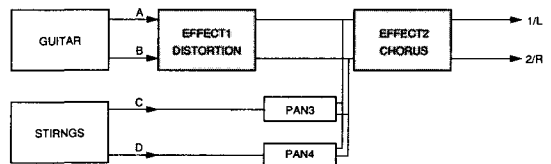
■ Serial

Move the cursor to the Effect Placement parameter in the lower left corner of page 13A (20A in the Edit Program mode). When the effects processors are connected in series, both effect 1 and effect 2 are applied to the signals input via channels A and B before the signals are output from the L/MONO and R jacks. Signals input via channels C and D can be mixed into the two inputs of Effect2.



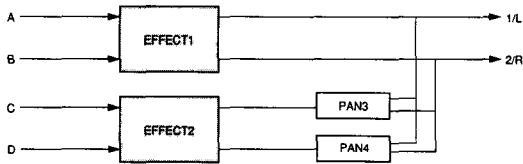
The Serial placement is normally used with programs. It can also be applied to single combinations (i.e., not split combinations or multi-timbre combination).

It is common to select a chorus, flanger, or phaser effect for effect 1 to give the sound breadth, then add reverb using effect 2. you can use the effects processors for even more elaborate sound creation, selecting distortion or the parametric equalizer for effect 1 and a chorus or flanger effect for effect 2. If you use input channels C and D as well, such a setup would allow you to apply distortion and chorus effects to guitar, for example, while applying the chorus effects alone to a strings sound.



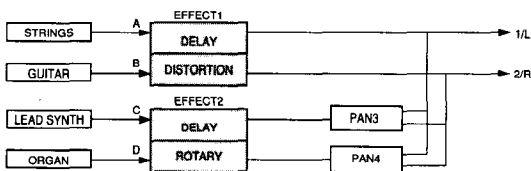
Parallel

Press the ▲ key once. With the Parallel placement, a different effect is applied to each of the two pairs of input channels. The signals input via channels A and B are run through effect 1 and then output via the L/MONO and R jacks. The output from Effect2, which has received input from channels C and D, can be mixed in with those output from L/MONO and R.



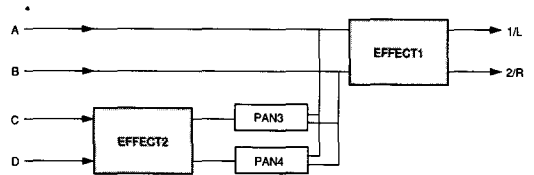
You will find this arrangement useful when you use the 05R/W as a multi-timbral tone generator, as it allows you to apply the most appropriate affects to different sounds, and output the results from different channels.

You can use each of the 05R/W's two multi-effect processors as a pair of monaural effects processors by selecting one of the combination effects (numbered 40 through 47). This lets you apply different effects to each of the four signals input via channels A through D. If, for example, you choose 44: Delay/Dist (Delay/Distortion) for effect 1 and 47: Delay/R. SP (Delay/Rotary) for effect 2, you create a setup which applies a short delay to strings input via channel A, distortion to a guitar from channel B, a long delay to a lead synth sound from channel C, and a rotary speaker effect to an organ input via channel D.



Parallel 2

Press the ▲ key once again. As with the Parallel placement, the Parallel 2 setting applies effect 1 to the signals input via channels A and B. Effect2 can be applied to the output from channels C and D and they can be mixed in with Effect1.

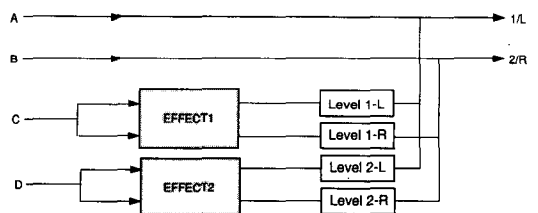


This arrangement is also useful with multi-timbral and split combinations. Effect1 is always applied to channels C and D inputs. This lets you achieve a result similar to but opposite that which you can achieve using the Serial placement; in this case, both effects 1 and 2 are applied to the signals input via channels C and D, while only effect 1 is applied to the signals of channels A and B.

Parallel 3

Press the ▲ key once again. A and B input is output to L and R just as it is, while C and D are input to Effects 1 and 2, respectively. Only under these placement conditions is the effect output not pan, but level. In other words, A and B are output directly, while C and D become the Send for the Effects, and the output level of each Effects serves as the return from the Effects.

* The usual placement is used during GM performance.



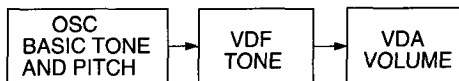
Sound Synthesis: Editing Programs

The past sections should have given you a good idea how to use the 05R/W's combinations. Since these combinations are essentially combinations of the preset programs, you will find it possible to create great music by simply creating the combination that best suits your purposes.

However, the 05R/W is an extremely flexible tone generator that allows you create a wide variety of sounds. You will not be making much use of its creative potential if you limit yourself to using the preset programs. There's one good way to give you an idea of this potential: at last, it's time for you to try creating a new program.

Three elements of sound

You're probably aware that sound consists of vibrations or "waves" in the air. We make judgments about the sounds that reach our ears based on three points: pitch, tone, and volume. These three points are the elements of sound. Synthesizers are often depicted as being divided into a number of blocks, but generally speaking, each of these blocks deals with one or more of these three elements: tone in one block, pitch in another block, and so on. If you compare the various parts of a 05R/W program to these elements, you will find that the oscillator (OSC) creates the basic tone and sets the pitch, the filter (VDF) function modify the tone, and the amplifier (VDA) sets the volume. You can create a wide range of sounds by setting appropriate values for the parameters in each of these blocks.

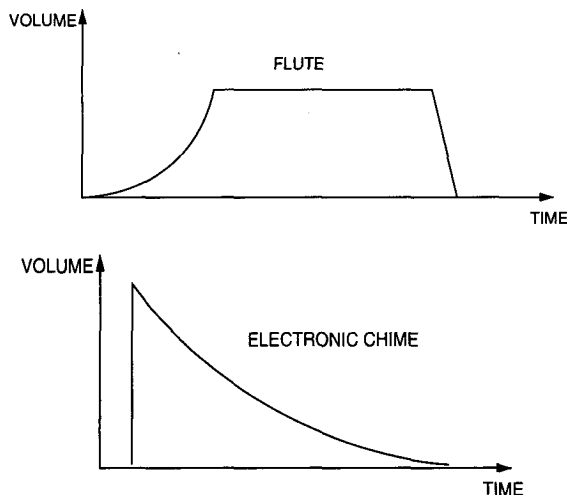


The element of volume in sound synthesis

Let's begin our discussion of these three elements with the concept of volume. Even though we use the word volume, when it comes to sound synthesis we are not talking about simple loudness. The sound of a piano can be recognized as such whether you're listening to someone play it nearby, or whether you hear it coming from another room down the hall. So if loudness doesn't help to distinguish between different sounds, what does?

You are probably able to distinguish between, say, a flute and the electronic chime that you hear when you dial to get the correct time. However, if you check the shape of the sound waves produced by these two instruments using an oscilloscope (that is, if the air vibrations caused by the two instruments are converted to an electric signal that produces a visible wave pattern on an electronic display), you will find that they are nearly the same.

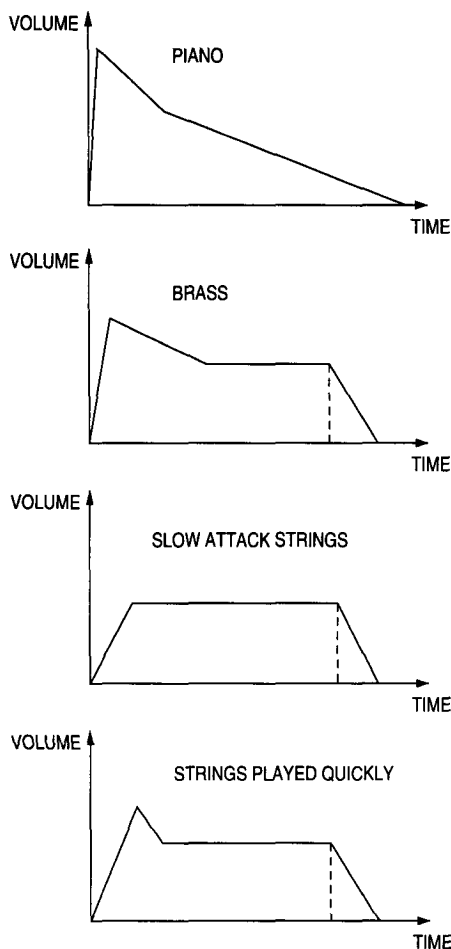
If sound only consisted of waves in the air, it might seem odd that you can tell these two instruments apart. The fact is that the two sounds differ in the way that their volume changes over time, as the following diagram shows.



The two instruments probably look something like this. Since the volume levels of these two sounds change differently over time, human beings recognize them as coming from completely different sources. Sounds such as the electronic chime which grow quieter over time are called attenuating sounds, whereas sounds which remain constant, such as that of the flute, are called continuous sounds. If you were to try to change the electronic tone so that its volume changed as shown in the upper diagram, it would sound very much like a flute.

The sound of every instrument has its own way of changing over time. This is one of the characteristics that defines the instrument's sound.

When you are creating new sounds, too, volume will play an important role. Here are some more diagrams illustrating how the volume of sounds produced by a number of instruments change over time. Try imagining their sounds as you look at the diagrams.

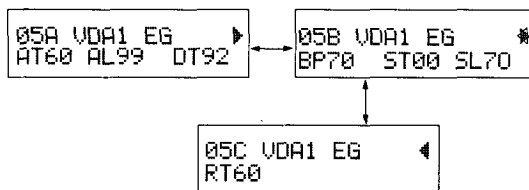


In a synthesizer, the shapes of the lines indicating changes over time in diagrams such as these are known as envelopes. The block that actually creates these changes as the sound is output is known as an envelope generator (EG). Thus, the envelope generator for the amplifier is called the VDA EG.

Let's try changing the settings of one of the 05R/W's preset programs to see how the VDA EG works. Press the PROG key to enter Program mode, and select program G02 BritePiano. Now press the EDIT key to put the 05R/W in Edit Program mode, and move to page 5 (VDA 1) EG. The bottom line of the display shows the VDA EG parameters.

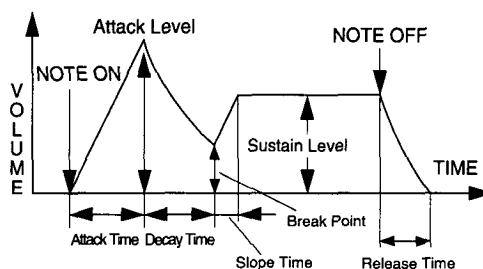
Press the \blacktriangleright key to move the cursor.

Try raising AT (Attack Time) to 60 and BP (Break Point) and SL (Sustain Level) to +70, and RT (Release Time) to 60. Now try playing a few notes. The strange sound you'll hear no longer resembles the piano you started out with.



Below is a chart illustrating how the VDA EG parameters affect the volume of a sound. Feel free to try changing the values assigned to each, and see how the display's graphic and the sound itself change in response.

VDA EG SETTINGS



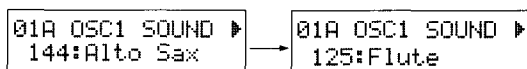
How tone is defined

Next let's take a look at the concept of tone. The tone of a sound is defined by how it causes air to vibrate—in other words, it is defined by the sound's waveform. With the 05R/W, you can choose a basic waveform from the list of those produced by the oscillator (OSC), then process it with the filter (VDF) functions to create the final tone.

The basic tone is defined by the oscillator.

Traditional musical instruments have a fixed waveform. The 05R/W's oscillator (OSC) provides you with as many as 340 different waveforms. These waveforms, which are called Multisounds, include waveforms from acoustic instruments as well as original waveforms unique to synthesizers. Among the Multisounds which reproduce acoustic instruments you will find variations including "loop only" Multisounds, which contain the sustain portion of the sample only, and non-transposing Multisounds whose pitch stays constant regardless of the note played on the keyboard. These Multisounds allow you to create highly authentic simulations of natural instruments with relative ease.

In Program mode, select program G66 Alto Sax and play a few notes. This is a realistic saxophone sound. Now display page 1 of Edit Program mode. The value that has been set for this parameter is 144:Alto Sax. Change it to 125: Flute using the ▲ and ▼ keys, then play a few notes. The saxophone has become a flute. Next, set the value to 152—now it's a trombone! Well then, what about number 167? Here's a Multisound that practically shouts "synthesizer." And 187? The cheers of a stadium crowd.



The filter changes tone over time

You might be wondering what makes all of these Multisound waveforms different from one another. The answer to this question is harmonics. A sound's waveform is ultimately defined by the harmonics that it contains.

Try comparing the sounds produced by a violin and a flute when they play the note A4 (the A above middle C). Both instruments produced continuous sounds, but the sound from the violin is much brighter. While the flute's tone is duller and more monotonous, that of the violin is more complex and has a richer resonance. This complexity of tone indicates that the sound of the violin is composed of a large number of elements. By contrast, the simpler tone of the flute is composed of fewer elements.

In fact, both of the instruments produced sounds of a much higher pitch when they played the note A4. It is these higher sounds that are called harmonics. To rephrase the explanation above, the waveform of the violin sound produced contains more harmonics than does that of the flute. Now, you may be thinking that you couldn't hear any higher notes. Keep in mind that harmonics are merely one of the elements that make up the entirety of a sound's tone — they can't be heard separately from the sound itself (together, they form a single sound). Thus, when we say that a sound's tone consists of its waveform, we are taking into account the fact that a certain variety and quantity of harmonics are mixed in with the note's basic pitch.

the simpler tone of the flute is composed of fewer elements.

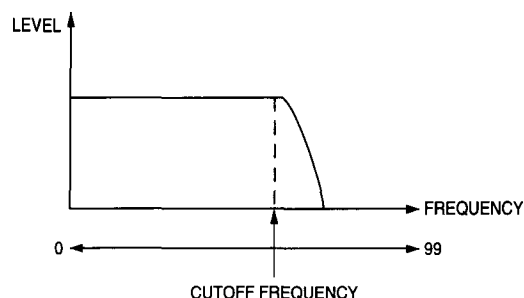
In fact, both of the instruments produced sounds of a much higher pitch when they played the note A4. It is

these higher sounds that are called harmonics. To rephrase the explanation above, the waveform of the violin sound produced contains more harmonics than does that of the flute. Now, you may be thinking that you couldn't hear any higher notes. Keep in mind that harmonics are merely one of the elements that make up the entirety of a sound's tone — they can't be heard separately from the sound itself (together, they form a single sound). Thus, when we say that a sound's tone consists of its waveform, we are taking into account the fact that a certain variety and quantity of harmonics are mixed in with the note's basic pitch.

What would happen if we started removing the harmonics from a sound, beginning with those of the highest-pitch and working down? If we do this to the sound produced by a violin, it will eventually begin to sound more like a flute. (That is, without the high-pitch harmonics, the harmonic structure of a violin comes to resemble that of a flute.) This removing of harmonics from the highest down is exactly what the 05R/W's filter (VDF) does. Let's try doing this to the program we're editing.

Move to page 3 (VDF1) after selecting Multisound 144 or 125. Lower the value of the Cutoff parameter in the upper left corner of the display to 00, then play a few notes. The sound will become quite dark and muddy.

Next try raising the value all the way to 99. The sound will become much brighter. Generally speaking, the more harmonics a sound contains, the brighter it will become.



In order to pass a Multisound through the VDF without removing any harmonics, set the value of the filter Cutoff parameter to 99. Careful use of the filter will allow you to create sounds with characteristics that the original Multisounds do not possess.

Now press the ► key to open pages 3B–3E. The VDF also has an EG. The VDF EG changes the Cutoff time. Try using the ◀ and ▶ keys to set DT (Decay Time) to

50, and BP (Break Point) on page 3C to -99. Now play a note. The sound will suddenly become dark, then bright again.

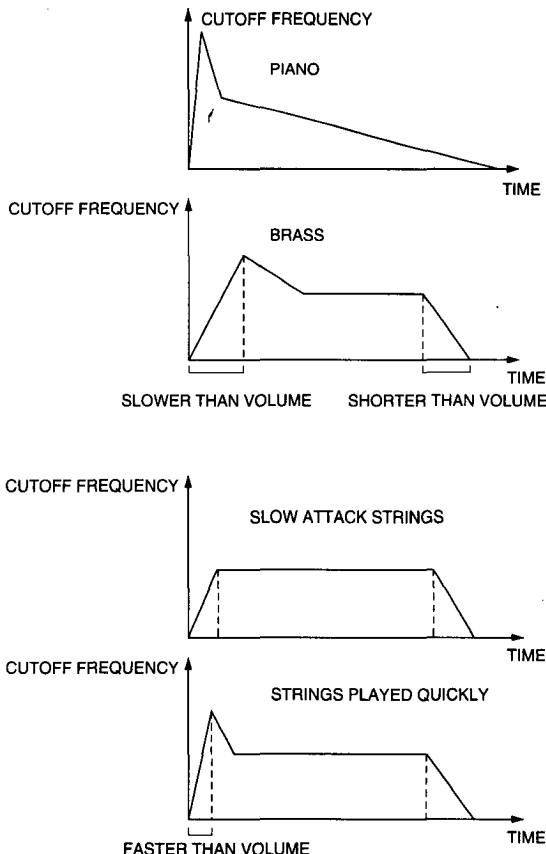
```

03B VDF1 EG  *
AT00 AL+99 DT50
    
```

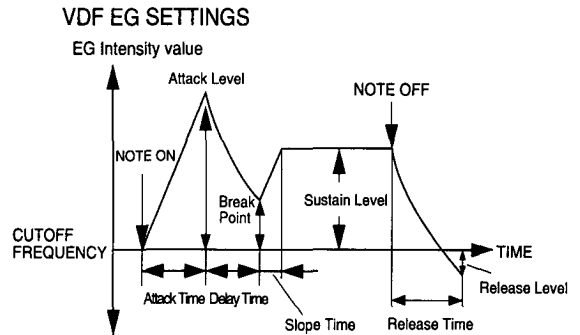
```

03C VDF EG  *
BP-95T88 SL+87
    
```

The tone of every instrument also changes over time in a particular way. The Multisounds themselves include a certain amount of tonal variation, but if you find this insufficient for your purposes, however, you will need to use the VDF EG to create the shape you desire. Below you will find the VDF envelope shapes for the instruments we showed you when we were discussing the VDA. Please compare them with the VDA envelopes, and refer to this information when you are creating your own sounds.



Unlike the VDA EG, the VDF EG has a Release Level (R) parameter. In addition, all of the level parameters may be set to negative values. The following chart illustrates how the VDA EG parameters change the cutoff frequency over time. Compare it with the chart we presented above for the VDA to see how they differ.



A few words about pitch

Finally, let's consider the element known as pitch. The pitch of a sound is determined by its frequency. Frequency is measured in hertz, which is abbreviated Hz. One hertz represents the number of times that a sound causes the air to vibrate in a second. The frequency of a sound doubles each time the pitch rises an octave. Thus, while A4 (the A above middle C) has a frequency of 440 Hz, the A one octave above it has a frequency of 880 Hz.

Modern music is based on a musical scale of European origin which divides the octave into 12 steps according to specific frequency ratios. The methods of representing the pitches in this scale include the familiar five-bar musical staff and systems of note names, and a great many instruments are designed to produce notes in accordance with this scale when their keyboards or frets are fingered. The MIDI standard follows this system as well: it assigns 128 note numbers (0 to 127) to consecutive pitches on the musical scale, so that (for example) an instrument will play C4 whenever it receives note number 60.

However, although there might be some minor differences depending on the frequency range, the sound of a piano is still recognizable as such whether you play C3 or C6. As with volume, it is not pitch per se that defines the

sound of an instrument. How, then, does pitch help to define the sound of an instrument? You've got it: once again, it is the change of the characteristic over time that makes the difference.

Return to Program mode and select Program G71 Bassoon/Oboe. This is a wood wind sound. Enter Edit Program mode and select page 2 (PITCH EG). The bottom line of the display shows the Pitch EG parameters which are used to control change of pitch. Move the cursor to SL (Start Level) at the left hand side. The starting pitch should sound just a little higher. Try pressing the ▼ key and changing the parameter to +00. How does that sound? The nuance may have changed slightly, but the change should be almost imperceptible. Now try setting Start Level to +99, AT (Attack Time) and DT (Decay Time) to 50, and AL (Attack Level) to -99.

02A PITCH EG * SL+99 AT50 AL-99	→	02B PITCH EG * DT50 RT00 RL+00
------------------------------------	---	-----------------------------------

Now the pitch will change dramatically with each note. The new sound seems more like a sound effect than anything. Clear-cut changes of sound such as this tend to produce very unusual results, so the PITCH EG tends *not to be used other than to simulate the minute changes of pitch that occur when instruments begin to play a note.* In sound synthesis, the element of pitch may be stressed less than the elements of tone and volume.

And what is Double mode?

We touched on the concept of layering when we discussed the 05R/W's combinations. The 05R/W also allows you to layer two sounds at the program level. If you look at page 0 of the Edit Program mode display you will find a parameter named OSC Mode. If you set this parameter to DOUBLE, an additional set of parameters will appear for the OSC, VDF, and VDA sections. Double mode lets you combine two different types of sounds at the Program mode level. Or you can have both oscillators (OSC1 and OSC2) play the same sound, but vary the pitch of each slightly to create a thicker sound.

When you create programs in Double mode, be sure to keep in mind that this will decrease the number of simultaneous notes you can play. The 05R/W is a 32-note polyphonic tone generator, which means that it can normally be playing 32 notes at any given time. However, since Double mode programs actually play two notes for

every MIDI note number received, you will only be able to play sixteen notes at a time if you use only Double mode programs.

About the drum kit

If you press the ▲ key in OSC Mode on Page 0 in Edit Program mode, the message DRUMS will appear. Different percussion instruments have been assigned to the various keys: a bass drum, snare drum, hi-hat, etc. This is the "drum kit". Now press the PAGE+ key once to open page 1 "OSC1 SOUND". The following 10 items will be displayed:

Drum Kit1
Drum Kit2
ROM D. Kit1
ROM D. Kit2
ROM D. Kit3
ROM D. Kit4
ROM D. Kit5
ROM D. Kit6
ROM D. Kit7
ROM D. Kit8

In ROM D.Kits 1-8, the assignment of drum sounds (bass drum, snare drum, tom-toms, etc.) to keys is fixed. ROM D.Kits 1 and 2 allow you to create your own original drum kits.

For details, see page 108 of the Owner's Manual.

Effects with programs

The 05R/W also allows you to specify effect settings for each program. However, since the 05R/W only has two digital stereo multi-effect processors, the effect settings you make for individual programs will be ignored in favor of the combination settings when you use programs in Combination mode. Therefore, you should be careful to avoid relying on the effects processors to supplement your sound synthesis when creating programs for use in combinations.

You can set up effects for programs in the same way as we described for use with combinations.

Saving programs

Programs are saved in exactly the same way as combinations. For details, please refer to our description of the procedure for writing combinations.

Creating original programs

In order to create original sounds, it is important to avoid getting caught up in established concepts. (It is also important to form a clear image in your mind of the sound you wish to create.)

For example, don't let yourself be limited by the name of a Multisound. Don't think, for example, that you must put a bass envelope on Multisound 082 simply because it is named "A.Bass1". Try using this bass waveform in a high frequency range, with an envelope that you'd use for slow attack strings. Truly original sounds are born of just this sort of experimentation.

The same holds true for the effects processors. There's no need to believe that overdrive only works with guitars, or that the rotary speaker effect can only be used for organs. Don't be trapped by common sense; instead, be willing to give anything a try.

And while you are experimenting, try to keep in mind the image of the sound you are creating. Even a partial image, such as that of "a soft, spacy sound", will give you at least a few clues; i.e., it should have a slow VDA EG attack, for example, and relatively dull harmonics. With your image as a starting point, you can try VDA EG and VDF EG parameter settings, look for an appropriate Multisound. Eventually, you will come up with the original sound you're looking for.

KORG

KORG INC.
15-12, Simotakaido 1-chome, Suginami-ku, Tokyo, Japan.

© KORG INC. 1994

0610 CFH

Printed in Japan