



XG Guidebook



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The contents of this seminar are also provided as pages on the XG website.
For the sample data that is referred to in this document, refer to the appropriate
web page.

Seminars 1—5 in this document correspond to seminars 4—8 of the web pages.

<http://www.yamaha.co.jp/english/xg/lecture/index.html>

Seminar 1

He who rules the effects rules XG!?

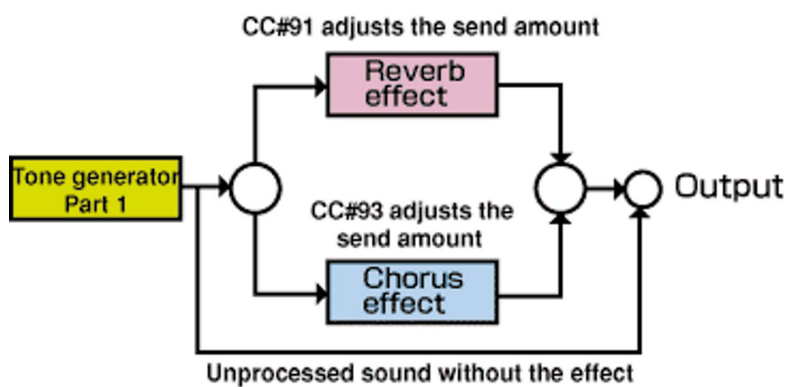
Although the XG format is based on GM, it provides over three times as many sounds, and since each of the sounds can be edited in a variety of ways, this gives you an incredible range of musical potential. And it also provides an unbeatably powerful helper in the area of creating sounds and sound fields — the Effect block. Effects refer to the applying of various changes to the sound. There are many such effects, including for example the “Delay” effect (in karaoke often called “echo”) that adds repeating echoes to the sound, the “Reverb” effect that applies reverberation, the “Distortion” effect indispensable for powerful electric guitar sounds, and the “Chorus” effect that gives depth and spaciousness to the sound.

In the following sections we are going to talk about how you can take full advantage of these effects.

1. “System Effects” — faithfully supporting the background
2. Batter number four — the “Variation Effect”
3. Creating some common sound fields

1. “System Effects” — faithfully supporting the background

To be blunt, GM does not really define anything regarding effects. It is even possible for a tone generator that has no effects at all to call itself a GM-compatible tone generator, and some low-cost models actually do this. Of course most GM-compatible tone generators do provide the “reverb” and “chorus” effects mentioned above, and MIDI GM files generally assume that reverb and chorus will be used. XG tone generators also contain the two effect blocks “reverb” and “chorus,” and these are handled in basically the same way as in GM. These two effects are completely independent, and can be used simultaneously. The way in which the effects apply to each of the 16 instrumental parts is determined by the amount of sound that is transmitted from each part to the effect blocks (the “Effect Send Level”). It is normal for XG as well as for GM to make this adjustment using control changes #91 (Effect 1 Depth; for Reverb) and #93 (Effect 3 Depth; for Chorus).



(Figure 1-1)

In the XG format, effects which are applied to all parts in this way are referred to as “system effects.” Of the system effects, reverb plays an extremely important role in defining the overall feeling of the music and the sense of scale (room size). * Sample data 4-1, 4-2 and 4-3 contain exactly the same performance, but use “no reverb,” “a room about the size of a practice studio” and “concert hall” respectively. Listen to these and hear the difference.

* The sample data can be downloaded from the web pages.

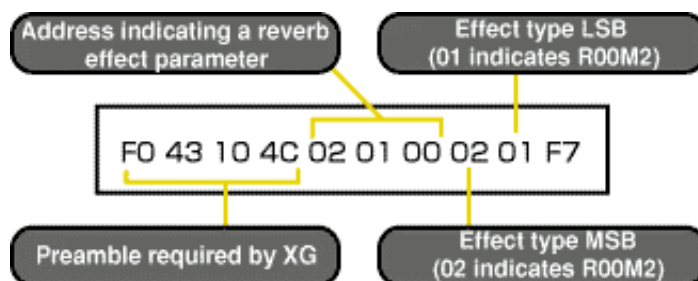
The functionality we have been discussing until this point has been more or less within the scope of GM. However XG lets you edit the system effects in great detail. For example simply by selecting the reverb or chorus type, you have the following options (refer to the XG Specification effect map).

Reverb block
NO EFFECT
HALL1
HALL2
ROOM1
ROOM2
ROOM3
STAGE1
STAGE2
PLATE

Chorus block
NO EFFECT
CHORUS1
CHORUS2
CHORUS3
CELESTE1
CELESTE2
CELESTE3
FLANGER1
FLANGER2

These are the required effects which every XG tone generator must provide. Although actual MU series instruments provide many more types, it is safest to use only the required effects if you wish to ensure that the MIDI files you distribute are compatible. Of course if you are creating data just for your own system, you can use all of the effects provided by your XG tone generator. This applies not only to effects, but to all types of functionality. Check the XG specification to see whether a particular function is required by XG, or is an optional or extended function.

When you actually wish to insert this type of effect setting into your MIDI data, you will need to refer to table 3-3 “Parameter Change” of the XG Specification. For example if you want to select “ROOM2” for the reverb, you would transmit the SysEx message shown in figure 1-2.

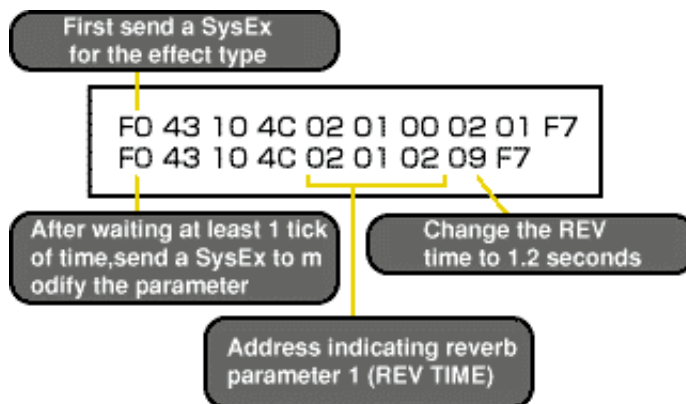


(Figure 1-2)

You can also use SysEx messages to edit effect settings in more detail. For example if you wish to change the reverb time of “ROOM2” from its default (initial) setting of 1.5 seconds to 1.2 seconds, you would transmit the SysEx message shown in figure 1-3. On the MU series tone generators, you can view these SysEx messages in the LCD by setting the desired value and double-clicking the ENTER button. This makes it easy for you to take advantage of the full potential of these messages.

Caution!!

When you change the type of the effect, all of the detailed settings you have modified will return to their default values. This means that you should first input the SysEx message that selects the effect type, and then transmit the SysEx messages that modify the effect parameters.

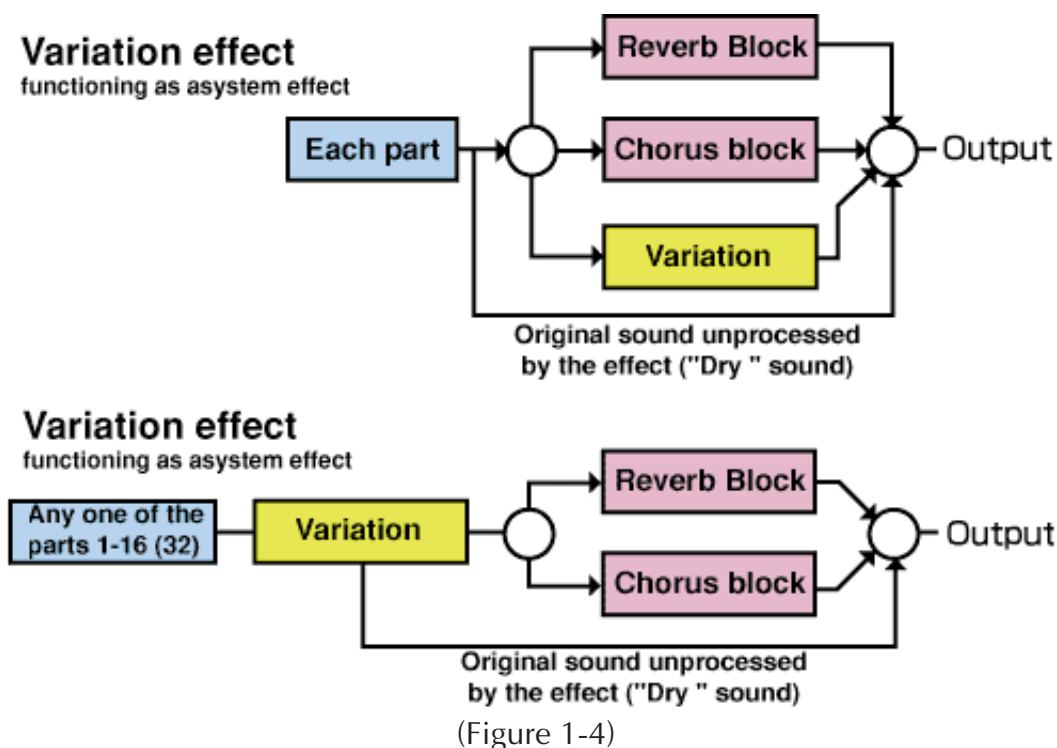


(Figure 1-3)

2. Batter number four — the “Variation Effect”

In addition to the reverb and chorus blocks discussed above, every XG tone generator is required to have at least one “Variation” effect block. This of course means that you can apply an additional independent effect.

As the name suggests, the Variation effect block provides a wide variety of effects, but only one of these can be used at a time. Please remember this point. Also, while the Variation effect can be used as a third system effect, it can also be used as an “insertion effect” that is applied only to a specific part. Figure 1-4 shows the concept of the Variation effect.



Some of the Variation effect types are required by XG while other types are not, so refer to the “Effect Map” of the XG Specification.

By default, the Variation effect will function as an insertion effect. If you wish to use the Variation effect as a system effect, transmit the appropriate SysEx message to select the effect type, and then transmit another SysEx message of

F0 43 10 4C 03 01 5A 01 F7

Then use CC#94 (Effect Depth 4) to adjust the effect send level of each part.

L1	L	L3	Type	Value1	Value2
0001	02	162	XG Prm Efc1 Var Type	Delay L.C.R	43 10 40 02 01 40 05 00 F7
0001	02	164	XG Prm Efc1 Var Prm1 Lch Delay	333.3 ms	43 10 40 02 01 42 1A 05 F7
0001	02	166	XG Prm Efc1 Var Prm2 Rch Delay	0.3 ms	43 10 40 02 01 44 00 03 F7
0001	02	192	XG Prm Efc1 Var Conect	System	43 10 40 02 01 5A 01 F7
0001	02	196	Control	Bank Select MSB 0	Melody 0
0001	02	198	Control	Bank Select LSB 32	Capital 0
0001	02	200	Program	Grand Piano 1	
0001	02	202	Control	Volume 7	100
0001	02	204	Control	Pan 10	64
0001	02	206	Control	Expression 11	127
0001	02	208	Control	Reverb Send 91	40
0001	02	210	Control	Chorus Send 93	0
0001	02	212	Control	Variation Send 94	65
0001	02	214	Control	Brightness 74	64

(Figure 1-5)

Variation effect settings can also be edited in detail using SysEx messages.

The available parameters will depend on the effect type that is selected, so refer to the “Effect Parameter List” of the XG Specification as you work with your XG tone generator. There are effect parameters in addition to those that appear in the display of the tone generator. Numbers 1—10 in the “Effect Parameter List” are required by XG, and the others are optional. If compatibility of your song data is a concern, you should not modify/input parameter numbers 11 or later.

On the MU series tone bers 1—10 in the “Effect Parameter List” are required by XG, and the others are optional. If compatibility of your song data is a concern, you should not modify/input parameter numbers 11 or later.

Parameters for the tremolo effect

No.	Parameter	Display	Value	See Table	Control
TREMOLLO					
1	LFO Frequency	0.00~39.7Hz	0~127	table#1	●
2	AM Depth	0~127	0~127		
3	PM Depth	0~127	0~127		
4					
5					
6	EQ Low Frequency	32Hz~2.0kHz	4~40	table#3	
7	EQ Low Gain	-12~+12dB	52~76		
8	EQ High Frequency	500Hz~16.0kHz	28~58	table#3	
9	EQ High Gain	-12~+12dB	52~76		
10					
11	EQ Mid Frequency	100Hz~10.0kHz	14~54	table#3	
12	EQ Mid Gain	-12~+12dB	52~76		
13	EQ Mid Width	1.0~12.0	10~120		
14	LFO Phase Difference	-180~+180deg	4~124		
15	Input Mode	mono/stereo	0~1		
16					

Parameters numbered 11 and following are optional, so use with caution.

(Figure 1-6)

If you are using the Variation effect as an insertion effect, it can be applied only to one part. This may give you the impression that the Variation effect is better used as a system effect, but this is not necessarily the case. Unless you really need to apply that effect to two or more parts, it is simpler and more effective to use it as an insertion effect.

For example if you wish to apply distortion to a guitar that is panned to the left, using the Variation effect as a system effect would require you to first select the effect type, set the Variation Connection to “SYS,” use CC#94 to adjust the send level, and insert a message of CC#94=0 for all other parts. In addition, you will need to transmit SysEx data to move the pan (stereo position) of the variation effect to the left, so that the guitar that should be heard at the left will not move to the center. This is a fairly complicated procedure.

★ Procedure

1. Select the effect type F0 43 10 4C 02 01 40 49 00 F7
▼
2. Specify variation connection F0 43 10 4C 03 01 5A 01 F7
▼
3. Variation pan settings (full left) F0 43 10 4C 02 01 57 01 F7
▼

4. Set CC#94 for the desired part Desired value



5. Set CC#94=0 for all other parts (all channels)

On the other hand if you apply this as an insertion effect, all you have to do is specify the part to which the effect will apply.

★ Procedure

1. Select the effect type

F0 43 10 4C 02 01 40 49 00 F7

(Since this is set to “Insertion” by default, it is not necessary to specify the connection.)



2. Specify the part to which it will be applied (Example of part 2)

F0 43 10 4C 02 01 5B 01 F7

(Variation Pan need not be set; the pan setting of the part will remain valid.)

We could go much deeper into the connections and settings of the Variation effect, and how it can be used, but since our space is limited, we will save this for another occasion.

3. Creating some common sound fields

You may not be familiar with the term “sound field,” but without being too specific, it refers to the size and depth of the space in which music is occurring, and the location of each instrument within that space. The reverb effect plays a major role in defining the sound field, so here we will be introducing several examples of different reverb settings. You can see the detailed settings by * downloading the sample file and checking the settings in your sequencer or the front panel of your tone generator.

Sample 4-4 Classical orchestra

This is a larger hall. The low pass filter of the reverb is used to cut the high frequency range slightly to create a subdued feeling, and the reverb return is raised somewhat to increase the amount of reverberation.

Sample 4-5 Jazz club

This is a small club for live jazz. Plate reverb is used to produce the impression of a slightly older recording.

Sample 4-6 Heavy metal

The somewhat grandiose reverb on the drum is created by adding Gate Reverb from the Variation effect to get a tighter feel.

Sample 4-7 Fusion live

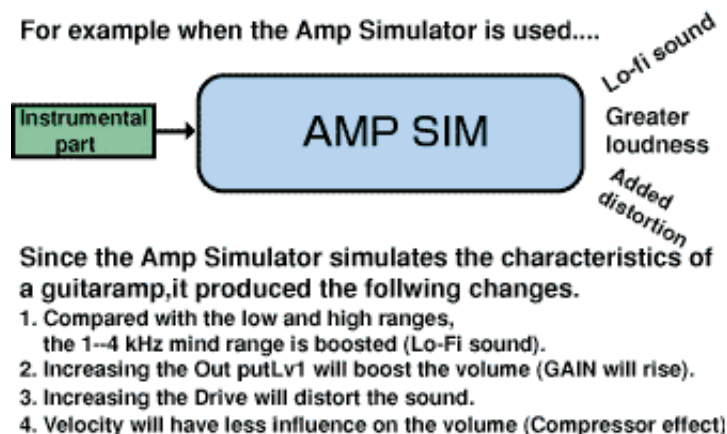
This is a simulation of a live performance. As the name suggests, we use Stage Reverb, and simulate the feeling of a live performance by using the Variation effect to add a bit of delay.

Tip 1. Distortion effects are not just for guitar

One of the most frequently-used types of variation effect are the “distortion” effect such as Distortion, Overdrive and Amp Simulator etc. These are designed mainly for guitar and bass, and make these sounds appear more like the real thing. But that is not the only way in which they can be used.

By nature, these effects can also be used as a kind of equalizer or booster. By taking advantage of this, you can create the kind of old-fashioned (extreme lo-fi ?!) sounds that you will hear in sample 4-8, or you can apply a booster effect to give the overall sound more power.

* The sample data can be downloaded from the web pages.



(Figure 1-7)

Also, you can apply distortion effects to many types of sound other than guitars to create some surprising new sounds. Spend some time trying this out.

Tip 2. What is the secret weapon “Assignable Controller”?

Each type of Variation effect provides one parameter which can be controlled by a specified control change message. This parameter will be marked by a dot in the XG Specification “Effect Parameter List,” and by controlling this parameter you can make your performance come alive.

The control change used in this case is called the Assignable Controller. By default this is CC#16, but you may change this. The sensitivity with which this control is received is specified by the “AC1 VarCtrl” setting in the VAR section of EFFECT mode. This function can be used only when the Variation block is set to Insertion Effect; it is not available when the Variation is used as a system effect.

* In sample 4-9, a rotary speaker effect is applied to the organ, and its speed of rotation is varied in realtime to simulate a performance technique often used in organ playing. If you have an XG tone generator, be sure to check this out!

* The sample data can be downloaded from the web pages.

Seminar 2

Sound editing has come a long way!

In this section we're going to talk about the flexible and effective sound editing that is a unique feature of XG-format tone generators. To appreciate this, let's take another brief look at the GM standard. GM contains no definitions of how sounds are edited. In other words, even if the specifications of each tone generator allow editing, it is not possible to tweak the sounds from within song data that is being created in compliance with GM.

In contrast to this, the XG format allows you to tweak all sound editing parameters that would normally be meaningful to edit, and naturally this data can be embedded in song data to modify the sounds in realtime. For example you can extend the release time of a specific sound to emphasize its decay, or modify the cutoff frequency of the low pass filter to adjust the brightness ... and much more. The true advantage of XG tone generators and the XG format lies in the incredible flexibility made possible by using this type of sound editing in conjunction with the rich array of effects that has already been described.

1. Look what you can do even without effects!
2. Take advantage of the ever-popular CC#71—74
3. Instant wah guitar technique
4. Be careful of extending the release time
5. Don't be limited by the name of the instrument

1. Look what you can do even without effects!

Any tone generator that complies with the XG format provides editing parameters to modify the sound in the following ways. Since these parameters can be embedded in a MIDI file in the form of NRPN or SysEx data etc., you can use them to modify the sound continuously and in realtime.

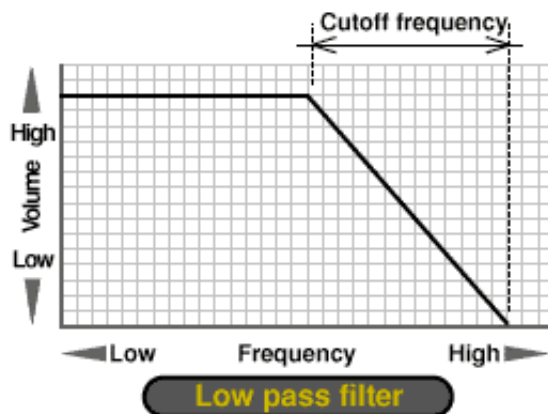
When including these parameters in a MIDI file, you should use NRPN messages as far as possible. Although it is of course possible to use SysEx data (refer to the table 3—7 XG Parameter Change Table (Multi Part) in the specification), SysEx data occupies more data volume and is more trouble to enter, so it is cleaner to use NRPN messages.

■ Parameters related to the brightness of the sound

Here are the parameters that are related to the brightness of the sound, making the sound more or less “brilliant,” “mellow,” or “darkly muted.”

1. FILTER CUTOFF FREQUENCY

Each sound of an XG tone generator has a low pass filter, a type of filter which cuts the frequency components which lie above a given frequency. By adjusting this “given frequency” (= cutoff frequency) you can adjust the amount of high frequency components in the sound, which will increase or decrease the brilliance of the sound (figure 2-1).



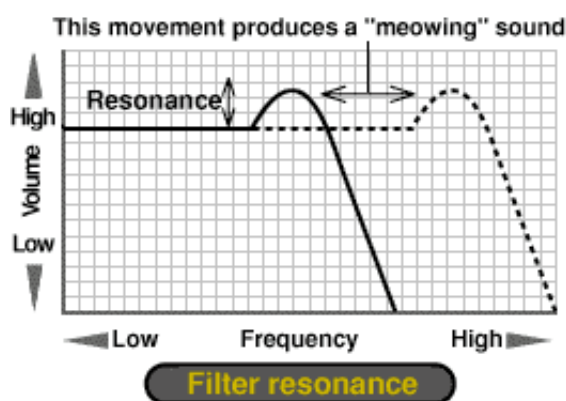
(Figure 2-1)

It is important to realize that this low pass filter is not an EQ (equalizer), and is not able to boost the high frequency components beyond the amount contained in the original sound (waveform). This means that for some sounds, raising the value of this parameter beyond a certain point will have no further effect on the tone.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 32, Data Entry (CC#6)
0—127 (default=64)

2. FILTER RESONANCE

The Resonance of the low pass filter adjusts the way in which the overtones in the region of the cutoff frequency are emphasized. The human ear tends to differentiate different sounds not by their fundamental frequency but by their overtone structure. When the overtones are boosted or cut, the tone will change in obvious ways. If you increase resonance to boost the overtones in this region, the sound will become brighter and harder. If you continue to raise the value toward the maximum, you can produce the “meow” tone that is often heard on analog synthesizers (figure 2-2).

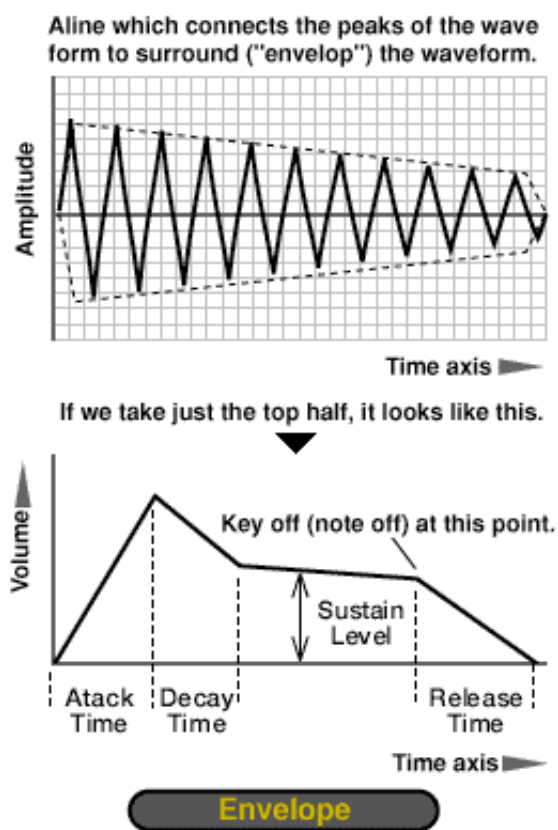


(Figure 2-2)

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 33, Data Entry (CC#6)
0—127 (default=64)

■ Envelope-related parameters

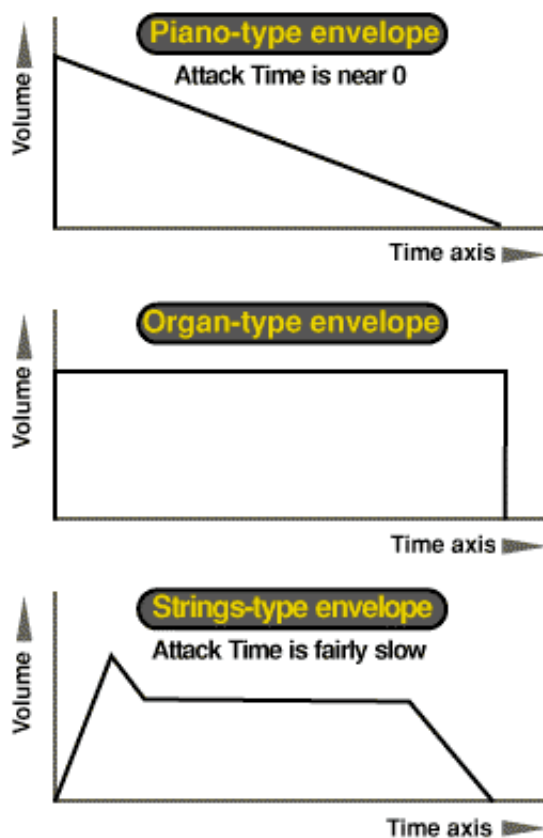
The graphic representation of how the volume changes from the beginning to the end of a note is called the “envelope” (figure 2-3). Along with the waveform and the overtone structure, the shape of the envelope is an important element in determining the character of a sound. The XG format provides the following parameters.



(Figure 2-3)

1. ATTACK TIME

This is the time from when the sound begins until the maximum volume is reached. On instruments such as piano, guitar and drums, this time is relatively short (fast), and on bowed string instruments it is relatively long (slow) (figure 2-4).



(Figure 2-4)

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 99, Data Entry (CC#6)
0—127 (default=64)

2. DECAY TIME

This is the time from when the volume reaches the maximum level until it falls to the level at which it will remain (the System Level). On instruments such as piano or guitar, this is fairly long.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 100, Data Entry (CC#6) 0—127 (default=64)

3. RELEASE TIME

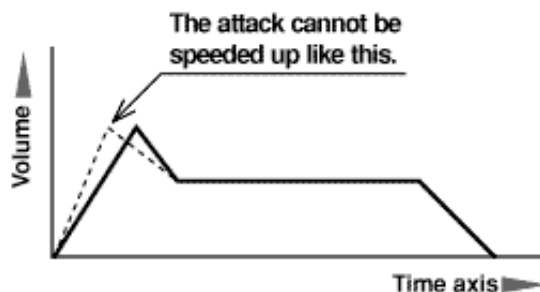
This is the time from when the key is released (key-off) until the sound decays to silence. On a piano this will be 0 or close to it, while on a vibraphone or cymbal it will be long.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 102, Data Entry (CC#6) 0—127 (default=64)

On tone generators such as the MU series, this parameter is found in the “EG” section of Edit mode. You will also find “Pitch EG” related parameters such as “PEGAtakTime.” However since these are extensions of the XG format, it is safest not to use them if compatibility of your song data is a concern.

Tips

As you can see from the fact that there is no Sustain Level setting, the EG-related parameters on an XG tone generator are not intended to be used for creating a sound from scratch, but rather for modifying an existing sound relative to the previously-specified values. Since we are dealing mainly with desktop music systems and PCM tone generators, this is an appropriate method. This means that there will be situations in which, for example, raising the value of the Attack Time parameter will not speed up the actual attack time any faster than the original waveform, or lengthening the Release Time will not prevent the sound from decaying to silence at some point (figure 2-5). It is important to be aware of the original sound as you make adjustments.



(Figure 2-5)

■ Vibrato parameters

Vibrato does not directly have a major influence on the tone, but is an important part of the musical expressiveness of an instrument.

1. VIBRATO RATE

This parameter adjusts the modulation speed of the vibrato. Increasing the value will speed up the vibrato, and decreasing it will slow down the vibrato.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 8, Data Entry (CC#6)
0—127 (default=64)

2. VIBRATO DEPTH

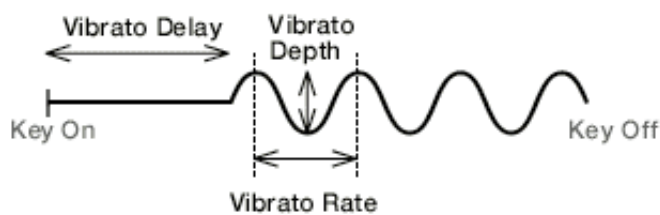
This adjusts the depth (amount) of modulation. Since this parameter is related to the Vibrato Rate, it is a good idea to check the Depth if you have adjusted the Rate.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 9, Data Entry (CC#6)
0—127 (default=64)

3. VIBRATO DELAY

On most instruments, the performer does not begin to apply vibrato immediately from the beginning of each note. Rather, vibrato is applied after a suitable interval, which will depend on the musical context and the tempo. The Vibrato Delay parameter lets you adjust the length of this interval.

Setting method: NRPN MSB (CC#99) 1, NRPN LSB (CC#98) 10, Data Entry (CC#6)
0—127 (default=64)



(Figure 2-6)

2. Take advantage of the ever-popular CC#71—74

We have mentioned that NRPN and Data Entry messages are used to insert the above-described sound editing messages into a MIDI file. However with this method, three control changes must be used to change one parameter. Thus, XG allows control changes 71 through 74 to be used to perform the four most frequently used parameter changes.

- * **FILTER CUTOFF FREQUENCY:** Brightness (CC#74) 0—127 (default=64)
- * **FILTER RESONANCE:** Harmonic Content (CC#71) 0—127 (default=64)
- * **EG ATTACK TIME:** Attack Time (CC#73) 0—127 (default=64)
- * **EG RELEASE TIME:** Release Time (CC#72) 0—127 (default=64)

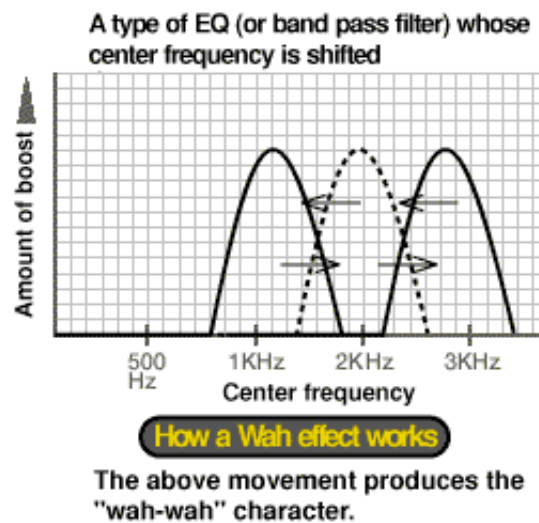
Since by using these controllers you can edit each parameter with just a single message, your data entry task becomes much simpler, especially when you wish to create a curve of continuous change, or create a change that occurs frequently.

3. Instant wah guitar technique

The easiest way to simulate the wah pedal technique often used in rhythm or solo guitar is to use the “AUTO WAH” Variation effect. However if you wish to use the Variation effect elsewhere, or if you wish to apply the wah effect at a complex timing, it’s time to use the CC#74 and CC#71 messages that we introduced above.

The wah effect is actually produced by smoothly modifying the center frequency of an equalizer (figure 2-7). If you wish to simulate this effect without an EQ, you can smoothly modify the cutoff frequency of the filter. That’s where CC#74 comes in.

* Download the sample 5-1 file and check out how it works and how it sounds.



(Figure 2-7)

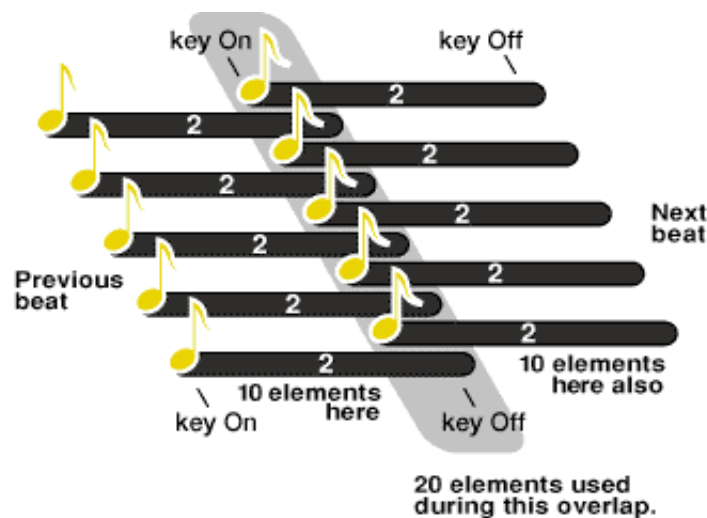
* The sample data can be downloaded from the web pages.

4. Be careful of extending the release time

In particular for classical styles of music, the way in which each note of an instrument decays is important. Skillful use of reverb is the answer to most situations, but extending the Release Time slightly longer than normal is also helpful in producing a more natural decay, and people experienced in creating MIDI data frequently use this technique.

However in DTM setups where a single tone generator is usually called on to play all of the parts, you should know that this technique may cause a serious problem with “stolen notes.” XG tone generators are required to have a capacity of “32 notes or more,” which is fairly generous. However to be precise, this is actually “32 elements or more.”

Some XG voices use two elements to create a single voice, so if each of the voices you are using is a two-element voice, your maximum polyphony will actually be only 16 notes.



(Figure 2-8)

Take a look at figure 2-8. If you are using the two-element voice “S.Strngs,” overlaps in the duration (gate time) and extended release times (as mentioned above) may actually cause 20 elements to be used. If several other parts are also sounding at this time, you can see how easy it would be for more than 32 elements to be used.

Since “last note priority” is the rule for XG tone generators, exceeding the maximum polyphony will cause the first-sounded note to be cut off (“stolen”) while it is still sounding. If this happens, of course, we are not talking about a “natural-sounding decay!” Be careful with duration and release settings. For some sounds, the release is long to begin with, so remember to take this into account.

5. Don't be limited by the name of the instrument

When actually creating MIDI song data, one of the biggest questions is what sound to use for the melody part. True, using an instrument that actually exists — like sax or organ — is usually a safe choice, but as you know if you have any experience with creating song data, it's not easy to create data that brings out the feeling and performance style of the actual instrument.

Might this be the reason that many people muddy the waters (sorry!) by using a synth-type lead sound for the melody? Of course, if this is the most suitable choice for the song, that's fine. We don't want to say that it's wrong to use synth-lead sounds.

But since you are using XG, how about using the sound editing and effect techniques that we have been describing to create a sound that will really make people sit up and take notice?

Tips for creating sounds

1. Slow down a fast-attack sound
2. Try a dramatic lengthening of the release (* sample 5-2)
3. Modify the filter cutoff frequency and resonance
4. Apply a distortion-type effect (* sample 5-3)
5. Play the instrument out of its natural pitch range (* sample 5-4)
6. Use two or more of the above
7. Try layering two sounds

Go ahead and try these out!

* The sample data can be downloaded from the web pages.

Seminar 3

Minimum XG for the compatibility-conscious

The XG format includes a concept known as “scalability.”

“When XG-format compatible MIDI data is played back on an XG-format compatible tone generator, the level of the reproduced result will be commensurate to the grade of the tone generator.”

This is “scalability.” The term may be unfamiliar, but in a sense, scalability may be the greatest advantage of the XG format.

Take effects, for example. Upper-level models of tone generator such as the MU100 and MU90 provide two “insertion effect blocks” in addition to the Variation effect which is standard for XG. If data which takes full advantage of these effects is played back on an average XG tone generator such as the MU50, it is obvious that these insertion effects will not be applied. However, this means simply that the effects will not be applied, and does not mean that the corresponding part will be silent or that the performance will stop. In other words, the music will play “more or less” as expected.

However this also means that MIDI data which was created with an upper-level XG model in mind may not sound quite as good as it should when played on a standard model, or may sound a bit differently than intended. If the data is intended only for a specific model, this is not a problem. But if you want your data to be heard by as many XG tone generator owners as possible, or if you are producing XG format MIDI files for commercial purposes, this is a problem.

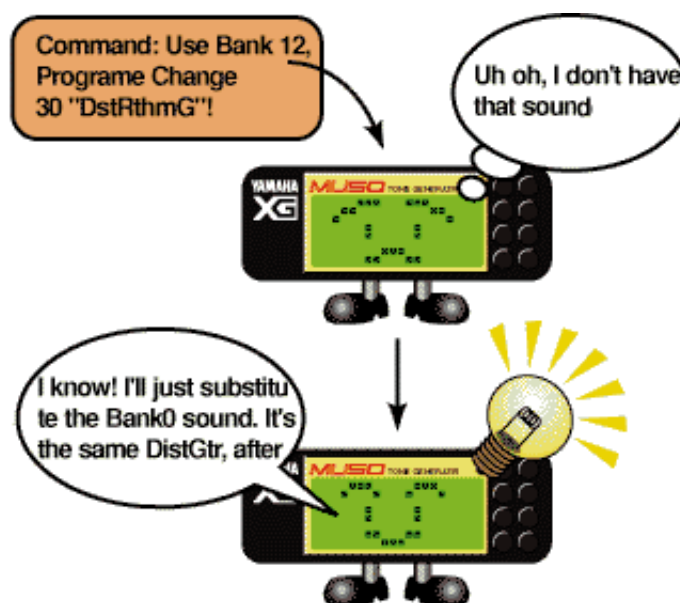
To prevent this, you need to create MIDI data that will sound sufficiently good using only the basic functionality of XG. And if you feel bad about not taking advantage of the functionality of an upper-level model, just be careful to create your data so that the performance won’t be significantly impaired by the lack of that functionality. In this session we’re going to investigate this area in detail.

1. Extension banks can be used thus far
2. Effects can be used thus far
3. Optional areas of multi-part parameter editing
4. Channels and parts
5. Element Reserve and how to use it

1. Extension banks can be used thus far

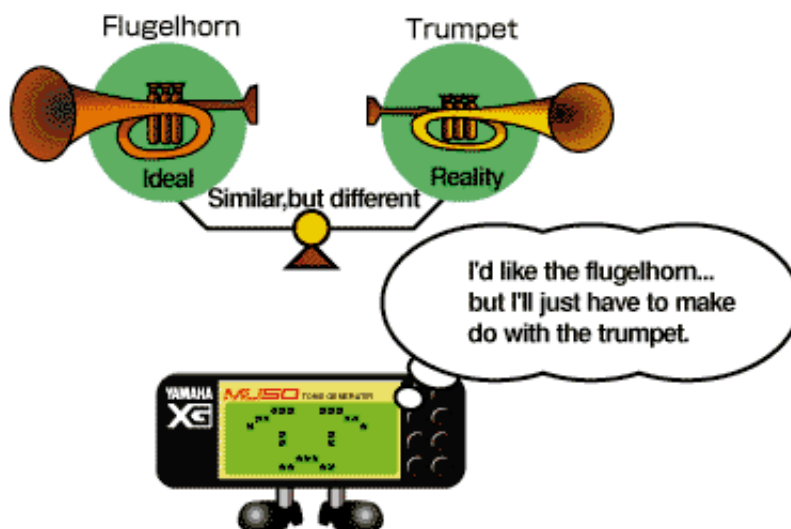
■ Normal voices are basically no problem

In the case of extension bank sounds for normal instrumental sounds (Normal voices) such as found in GM, the capital sounds (the basic GM sounds of bank 0) will be substituted if the particular tone generator does not possess the requested extension bank. (figure 3-1).



(Figure 3-1)

Most extension bank sounds are the same type of instrument as the corresponding capital sound, so the substitution should not sound too unnatural. However some of the sounds are really quite different in character, and if you wish to use such sounds, you will need to make a musical decision. For example “FluglHrn” (flugelhorn) which is found in the trumpet extension bank 96 is a brass instrument shaped the same as a trumpet, and with the same pitch range and performance technique. Naturally, the sound is unmistakably that of a brass instrument, but has a softer character than that of a trumpet. Since the XG standard does not provide the “FluglHrn” sound, the MU50 etc. will sound this using a trumpet. As you create your data, you must make a decision as to whether or not you can tolerate this difference (figure 3-2).



(Figure 3-2)

■ Be resigned to “Silence” when using an SFX voice

In the case of sounds in the SFX bank (Bank Select MSB=064), the LCD panel will indicate “Silence” if the requested sound is not found, and there will be no sound. Since SFX sounds are sound-effects, any substitution of them for a different sound could create a totally inappropriate result. For example if you needed a human voice to scream at some point, but the tone generator substituted a human voice laughing, the audible result would be totally inappropriate, even though the substituted sound was also a human voice. In such cases, it is preferable for there to be no sound at all. If you wish to use SFX sounds which are not supported as standard, you must make sure that the overall result will not be fatally impaired if that SFX sound is not heard. Also, for some of the optional SFX sounds, it is possible to produce the same result by using a normal voice such as “B.Slide” as * shown in sample 6-1. True, it would be easier to use an SFX sound, but perhaps taking time to create your data is part of the enjoyment of desktop music.

* Since some items in sample 6-1 use optional SFX sounds, there will be a portion of silence on models such as the MU50. The same pattern is repeated twice, and if an SFX sound is used on the first time, the second is created using normal sounds and musical data.

* The sample data can be downloaded from the web pages.

■ Drum voices

Care must be taken in the case of drum voices. Upper-level models such as the MU90 and MU100 provide many optional drum voices in addition to the 9 standard XG kits. These are not yet listed in the currently-available XG specification, and are of course optional, so that if data which uses these is played on a standard XG tone generator, “StandKit” will be substituted for all of these voices. Even though they are all drum voices, differences in tone may produce a substantially different musical impression, so please be aware of this situation when using kits other than those listed below.

* The following 9 drum voices are standard for XG

1. Standard Kit (StandKit)
2. Standard 2 Kit (Stnd2Kit)
3. Room Kit (Room Kit)
4. Rock Kit (Rock Kit)
5. Electronic Kit (ElectKit)
6. Analog Kit (AnalgKit)
7. Jazz Kit (Jazz Kit)
8. Brush Kit (BrushKit)
9. Classic Kit (Clasckit)

2. Effects can be used thus far

■ Reverb and chorus blocks

You are safe as long as you are using only the effects which are indicated in the XG specification as “required by XG.” Figure 6-3 shows an example of reverb, and since the lightest shade of gray indicates optional effects, you should use effect types other than these. Take a look at the actual XG specification to verify this.

XG EFFECT MAP

ESSENTIAL EFFECT (XG必須)
 OPTION EFFECT
 NO EFFECT
 same as BASIC EFFECT (LSB=0)

REVERB TYPE

TYPE MSB		TYPE LSB				
DEC	HEX	00	01	02	...	08
000	0	NO EFFECT				
001	1	HALL1	HALL2			
002	2	ROOM1	ROOM2	ROOM3		
003	3	STAGE1	STAGE2			
004	4	PLATE				
005	5	NO EFFECT				
:	:	:				
015	F	NO EFFECT				
016	10	WHITE ROOM				
017	11	TUNNEL				
018	12	CANYON				
019	13	BASEMENT				
020	14	NO EFFECT				

(Figure 3-3)

■ Variation block

As in the case of reverb etc., you are safe as long as you use Variation block effects which are indicated in the XG specification as “required by XG.”

PITCH CHANGE
 AURAL EXCITER
 TOUCH WAH or TOUCH WAH+DIST
 COMPRESSOR
 NOISE GATE
 55 VOICE CANCEL

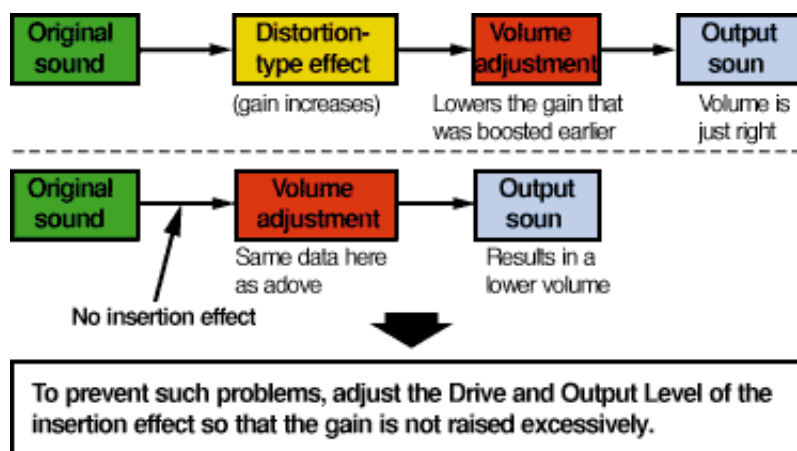
Since these effects are not standard for XG, they will be treated as “THRU” on models which do not provide them, and the variation block will not apply any effect.

CHORUS4
CELESTE4
FLANGER3
PHASER2

When these effects are used, the corresponding type of required effect whose effect type LSB value is closest (e.g., CHORUS3, FLANGER2) will be substituted.

■ Insertion effect block

The insertion effect block itself is an optional part of XG. Even if your settings use these effects, they will be ignored completely by models which do not provide them. Thus, you should be careful about the volume, in particular when using distortion-type effects or equalizer-type effects. Even if the volume is just right when the effect is applied, there may be cases in which the volume is dramatically lower when the effect is not applied. To minimize this problem, you should also check the volume without the effect.



(Figure 3-4)

In general, therefore, insertion effects should not be used when creating XG format data for commercial purposes.

■ Multi EQ block

This block is also optional, but may be used, as we will explain below. Only be aware that if you set the volume balance when this block has been used to perform major equalization, the balance may be disrupted when the data is played back on a model which does not have EQ. If you do use EQ, it is safest to use it only in subtle touches.

■ Part EQ

The Part EQ provided on the MU90 and MU100 is a wonderful tool which lets you apply independent bass and treble equalization to each of the 16 (32) parts. Unfortunately, this functionality is not standard for XG (figure 3-5). Here too, be aware of the potential volume difference when this effect is used or not used.

Address (H)		Size (H)	Data (H)	Parameter	
08 nn	70	1	28 - 58	BEND PITCH LOW CONTROL	[Ext.]
nn	71	1	00 - 7F	FILTER EG DEPTH	[Ext.]
nn	72	1	00 - 7F	EQ BASS	[Ext.2]
nn	73	1	00 - 7F	EQ TREBLE	[Ext.2]
TOTAL SIZE		04			

XG ADDITIONAL PARAMETER CHANGE TABLE (MULTI PART)					[Ext.2]
Address (H)		Size (H)	Data (H)	Parameter	Extension
08 nn	74	1	00 - 7F	EQ MID-BASS	(NOT USED) [Ext.2]
	75	1	00 - 7F	EQ MID-TREBLE	(NOT USED) [Ext.2]
	76	1	04 - 28	EQ BASS frequency	[Ext.2]
	77	1	1C - 3A	EQ TREBLE frequency	[Ext.2]
	78	1	0E - 36	EQ MID-BASS frequency	(NOT USED) [Ext.2]
	79	1	0E - 36	EQ MID-TREBLE frequency	(NOT USED) [Ext.2]

(Figure 3-5)

3. Optional areas of multi-part parameter editing

A large number of multi-part parameters can be edited using system exclusive messages. Some of these can also be edited using control change messages (including RPN and NRPN), and when this is possible, you should use control change messages in preference to system exclusive messages.

7. System Exclusive parameter changes *Non-GMI*

Avoid using System Exclusive parameter changes that are designated as optional in the XG Specifications.

As exceptions, the following three may be used even though they are listed as optional:

Multi EQ parameter change
Display Data parameter change
A/D Part parameter change

(Figure 3-6)

Even in other cases, it is safest to avoid using parameters which are marked [Ext.] in the XG specification. However as an exception, the following three [Ext.] can be used. (Refer to “Guidelines for creating XG song data,” figure 3-6.) Even on tone generators which do not support these parameters, there will be little or no impact on the playback result, so the use of these parameters is permitted.

★ Multi EQ Data parameter change

As described above.

★ Display Data parameter change

This is a parameter which displays text or graphics etc. in the LCD of the tone generator, and will simply be ignored on tone generators which do not have this capability.

★ AD Part Data parameter change

This is a parameter for tone generators which provide an AD part (MU80, 90, 100, DB60XG etc.), and allows the rich variety of XG effects to be applied to a mic input or to an instrumental input such as guitar. As you can imagine, this is extremely convenient for karaoke and when practicing a musical instrument. This setting will simply be ignored by tone generators which do not have an AD part, but for example if you applied the variation effect to this part with a setting of “Insertion,” the variation effect will obviously be unavailable for use by another part.

4. Channels and parts

The section “2. Concerning channels” of the “Guidelines for creating XG song data” describes how MIDI channels and musical parts should correspond. This has to do with the relative note priority of each channel and with the “XF format” proposed by Yamaha, but normally when you create data you do not need to be aware of this. However if you are creating XG format data for commercial sale, you should in principle follow these guidelines. Since nothing is particularly specified for channels 6 and following, you may wish to assign parts with a higher note priority (greater importance) to lower-numbered channels (figure 3-7).

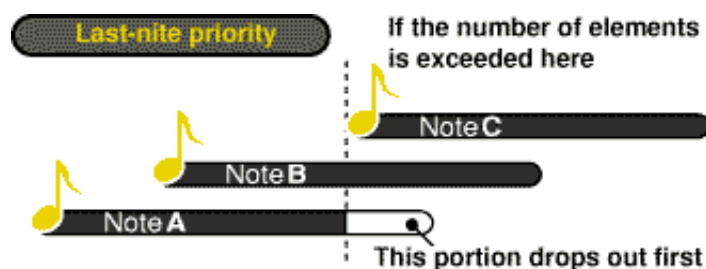
An example of a conventional pop song

1ch	Melody part
2ch	Harmony (chorus), main accompaniment such as piano or solo guitar
3ch	Bass part
4ch	Synth part
5ch	Synth pad / organ / string etc.
⋮	
10ch	Rhythm (drum part)
⋮	
16ch	Less important parts, or parts played in unison with other parts

(Figure 3-7)

5. Element Reserve and how to use it

On XG tone generators, channel 10 (the rhythm channel) is given the highest priority, and thereafter, channels are prioritized with lower-numbered channels having higher priority. When the maximum number of simultaneous notes (32 notes is standard for XG) is exceeded, “last note priority” will be applied to turn off the oldest sounding note, and then the note data which was received later will be played (figure 3-8). At this time, higher-numbered channels will be more likely to experience interrupted notes if notes on two or more channels were played at the same time.

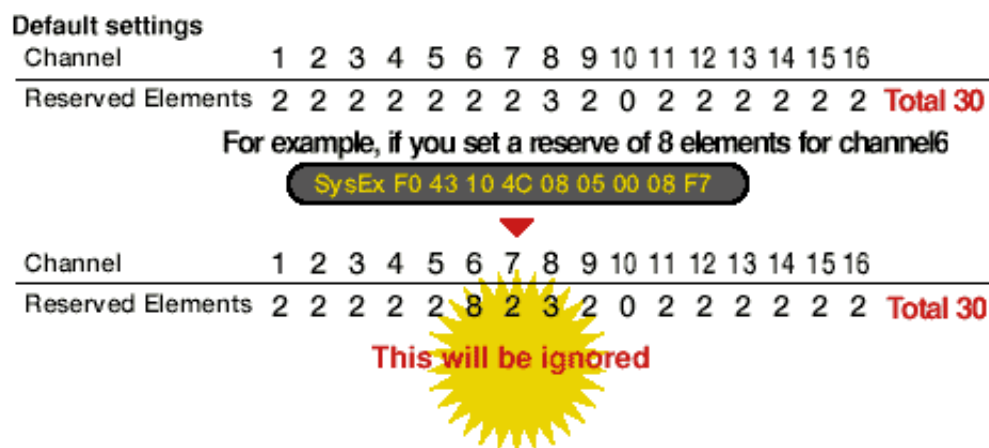


(Figure 3-8)

However if the notes of a certain channel failed completely to sound, a minimum of two notes are reserved for each part other than the drum part. This is referred to as “element reserve,” and it is worth knowing that the user can modify this value for each channel.

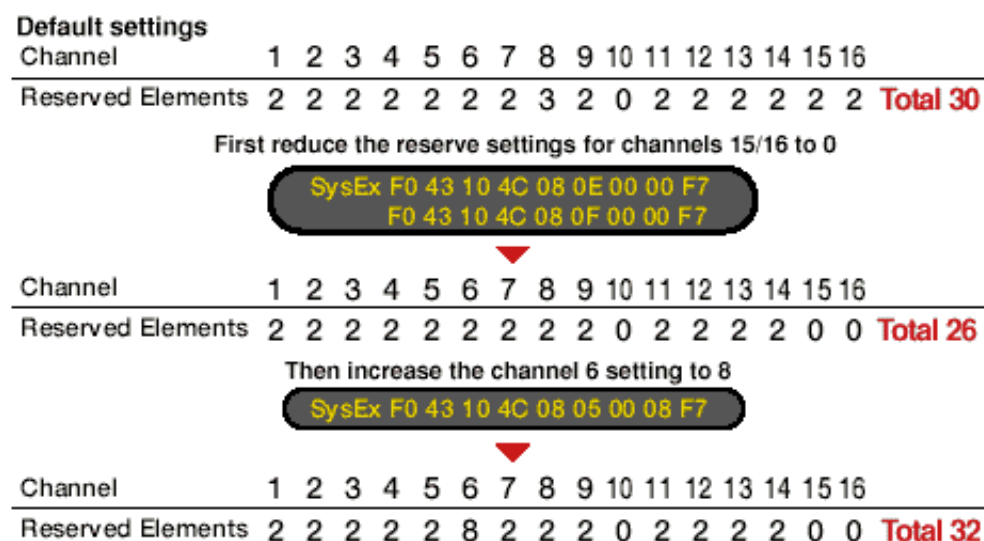
As we mentioned briefly in the previous section (2-4. Be careful of extending the release time), the word “element” refers to a component which is used to create a sound, and “maximum simultaneous notes” is actually the “maximum simultaneous elements.” Since some voices use two elements to produce each note, data that plays only three notes may actually use six elements. The number of elements used by each voice is given in the sound map of the XG specification or in the voice list of your tone generator.

Suppose that you want to raise the element reserve setting of channel 6 to eight elements. With the default settings, channel 10 has zero elements, and the other channels have two elements, meaning that 30 elements are already reserved. If you now simply attempt to raise the channel 6 setting to eight elements, this would mean that a total of 36 elements would be reserved (figure 3-9).



(Figure 3-9)

However since 32 is the maximum number of elements, we have a problem here. In actuality, element reserve will not function with such settings. In order to use element reserve, we must first reduce the reserve setting for a less-needed channel (in other words, the channel of a part whose total absence, in the worst case, would not be a major problem). After making the necessary reduction, we can then insert a system exclusive message to increase the element reserve settings for the desired channels. It is important to observe this order (figure 6-10). Remember that the element reserve function does not increase the available polyphony, but simply reserves a guaranteed minimum number of notes for each part.



(Figure 3-10)

Seminar 4

Mixing techniques add the finishing touch to your music

Whether or not you are using an XG tone generator, mixdown technique (just as when producing a music CD) is always an important part of desktop music, where a single tone generator is used to play all the parts of your song. In this section we're going to introduce some mixing techniques by which the "data" that you created can be transformed into "music."

1. Creating a volume balance
2. Secrets of the pro's for using effects
3. Use universal exclusive messages for a fade-out

1. Creating a volume balance

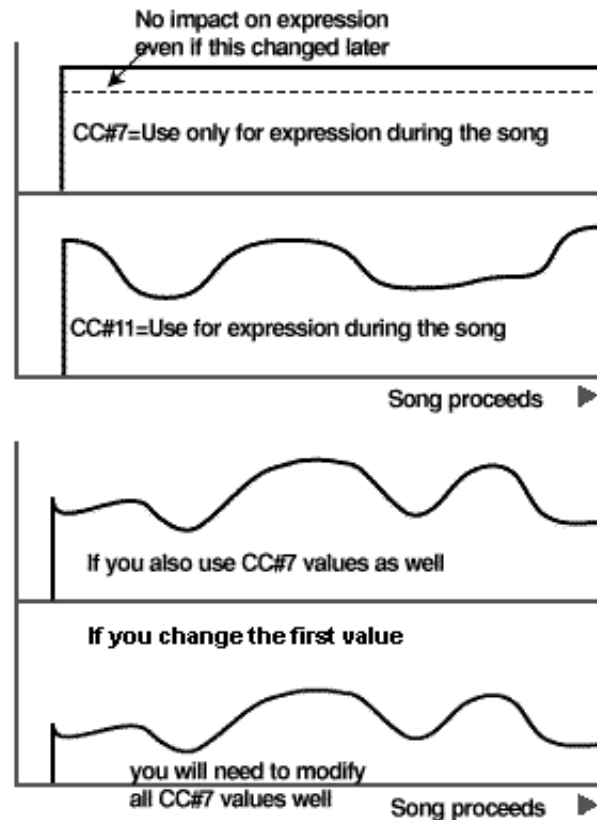
The basic purpose of mixing is to create a volume balance between the parts, and in desktop music, CC#7 (Main Volume) is normally used to make this volume adjustment. This is widely known, but there is another popular control change message that is also used to adjust the volume — CC#11 (Expression) — and you need to be aware that these two messages are not intended to be used as simple replacements for each other.

CC#7: Use this message to specify the volume balance between parts: i.e., normally this will be placed only in the setup measure located before the music actually begins, and will not be used during the performance.

* However, exceptions can be made if the balance needs to be re-created, such as when a program change occurs during a song, or if the mood of the song undergoes a dramatic change.

CC#11: Use this message to create expressive dynamics during a performance (crescendo and decrescendo), or to modify the envelope of notes: i.e., this message is usually used to create continuous change.

Unless you divide the responsibilities of the two messages as described above, you can probably imagine that you will run into real difficulties during mixing (figure 4-1).



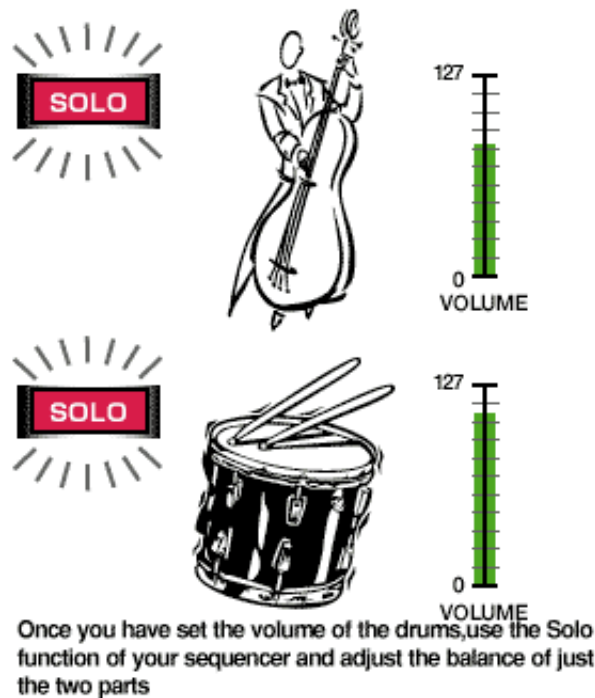
(Figure 4-1)

Tip 1. Velocity and volume

Normally, raising the velocity will also increase the volume. However except for some low-cost tone generators and for some special sounds, be aware that the tonal character of the sound will also be affected. This is easy to understand when you consider the sound of an acoustic instrument. For example, a softly blown note on a trumpet has a mild character, and the tone will become brighter as the note is blown more forcefully. On XG tone generators, this type of tonal change is usually produced by raising or lowering the cutoff frequency of the low pass filter according to the velocity. Thus, it is important that the velocity of the data you create is appropriate for the musical content of that part. Depending on velocity alone to adjust the volume of a part is not recommended. Also, some voices are set up so that the tonal character changes dramatically around a certain velocity value (the sounds of bank 43).

Now let's go through the actual mixing procedure.

1. Select a type of reverb that is appropriate for that song
Set the reverb send level of each part to an appropriate (provisional) level, and decide what type of reverb you will be using. If necessary, edit the parameters of the reverb.
2. Set the volume of the drum part
If your song contains drums, first set the volume of the drums. You'll probably want to set CC#7 to a basic level of 100. In the case of the lively rock song, you might want to set this a little higher. If necessary, use NRPN to set the volume balance, pan and reverb amount of each drum part.
3. Set the volume and pan of the bass
If your song has a bass part, set the bass volume following the drums. For most pop songs, virtually no reverb is applied to the bass, to avoid blurring the sound. At this time, you will need to use the Mute or Solo functions of your sequencer so that only the drums and bass can be heard (figure 4-2). If your song has no drums or bass part, start your volume adjustments with the part that corresponds to the bass part.



(Figure 4-2)

4. Set the volume and pan of the major accompaniment parts

Set the volume and pan (use CC#10 to adjust) of parts which are always sounding, such as keyboard instruments, pads, and rhythm guitar etc.

5. Set the volume and pan for the other accompaniment parts, and for any melodic parts in the introduction or break

Set the volume and pan for obligatos, parts which appear occasionally, and counter-melodies.

6. Set the volume and pan for the main melodic part

If at this time, raising CC#7 does not give you enough volume, re-do steps 1 through 5. Although not recommended, you could also raise the velocity or modify the sound used for the melody.

7. Set the reverb send level of each part

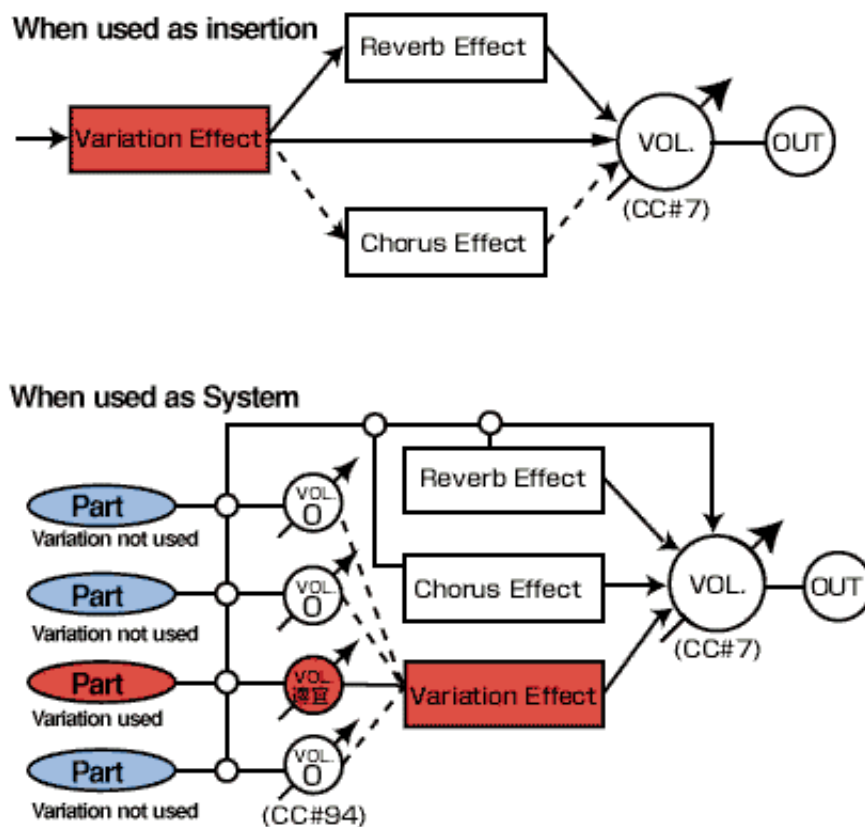
Use CC#91 to set the reverb of each part. Here too, it is best to start with the drums.

8. Set the chorus send level of each part

Use CC#93 to set the chorus send level of each part. This also applies if a different effect such as flanger etc. is selected for the chorus effect block.

9. Adjust the variation effect

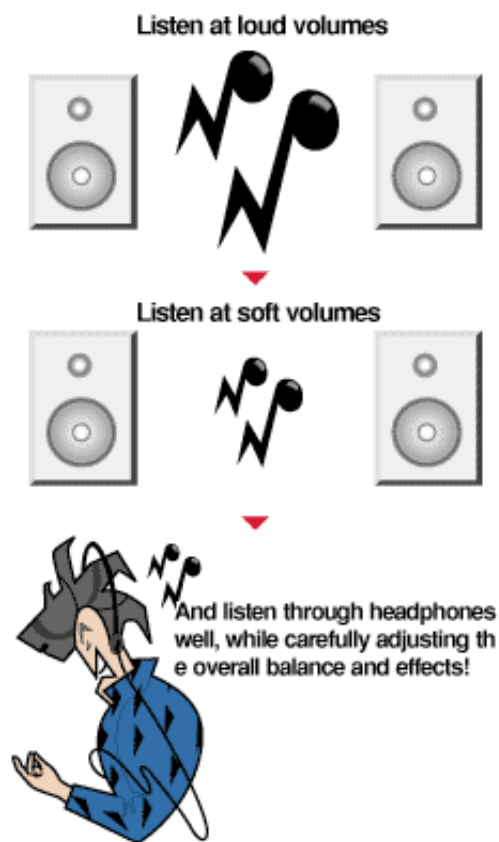
If you will be using a variation effect, the adjustment method will differ depending on whether it is being used as a system effect or an insertion effect. In the case of an insertion effect, set the effect parameters to the appropriate settings, and then use CC#7 to re-adjust the volume of that part. If you are using the variation effect as a system effect, set the effect parameters to the appropriate settings, adjust CC#94 for each part to which you wish to apply the effect (set CC#94 to zero for parts to which you do not wish to apply the effect), and then use CC#7 to adjust the volume (figure 4-3).



(Figure 4-3)

10. Overall adjustments

Once the effect-related settings have been made, you can make fine adjustments to volume, effects and pan. At this time, try listening to the song at both loud and soft volumes as well as through headphones, and make adjustments so that the song sounds good in all conditions (figure 4-4). As far as possible, avoid changing the volume of the drums or bass at this time, since this will essentially mean starting over from the beginning.



(Figure 4-4)

2. Secrets of the pro's for using effects

The basics of mixing have been outlined above, but in actual mixing, the way in which effects are used is one of the most important topics. In particular, XG offers a very rich variety of effects, which means that you can create sound on a much higher level than with previous desktop music systems, but also requires a corresponding level of know-how to take advantage of the possibilities. The paragraphs below will give you some tips and know-how to help you get the most out of effects.

1. Don't forget the return level adjustment for reverb

In general, you will use the Send Level to adjust the reverb depth for each part. However for classical orchestral pieces, or when creating special sound fields, there may be situations in which raising CC#91 all the way does not produce sufficient reverb. In such cases, you can adjust the Reverb Return parameter to get an even deeper effect.

* Sample data 7-1 and 7-2 have the identical reverb-related settings, but the reverb return has been increased for sample 7-2. Listen to the two and compare.

SysEx for setting Reverb Return

F0 43 10 4C 02 01 0C mm F7 (mm is the data; default value is 40H)

- * The return level can also be adjusted for the chorus effect block and for the variation effect (if it is being used as a system effect).
- * You can also adjust the volume of the sound which is not processed by the effect (the "dry" sound). (Refer to table 3-7 DRY LEVEL in the specification.)

2. Don't overdo the reverb

It's important to avoid excess when applying any effect, not just reverb. In particular, excessive use of system effects such as reverb or chorus will impair the overall clarity of the sound, cause it to feel less powerful, or produce unwanted resonances which will muddy the sound. However there are times when you will want to use effects boldly, so it's difficult to make hard-and-fast rules here.

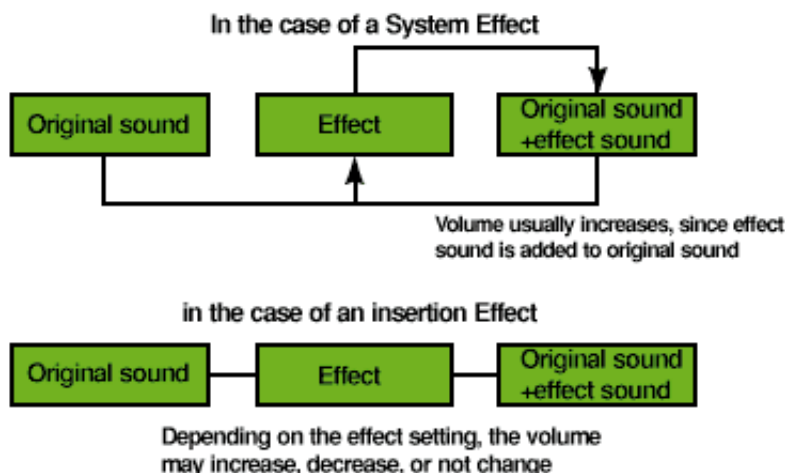
3. Watch out for the gain when using distortion or EQ!

When an effect is applied, the volume of that part will generally be increased or decreased (figure 4-5). In particular in the case of distortion-type effects such as overdrive and equalizer-type effects, the effect itself produces amplification (gain), so after applying the effect you will need to re-adjust the volume balance with the other parts.

* Sample file 7-3 will let you experience the volume difference that results with or without the 3-band EQ variation effect. EQ is applied to the first half, and not applied

* The sample data can be downloaded from the web pages.

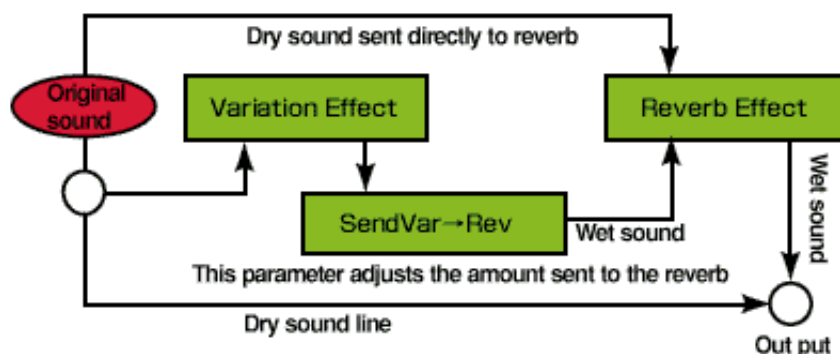
to the second half. If this song used the insertion effect block that is provided on tone generators such as the MU90, and was played back on a basic XG tone generator, there would be absolutely no effect at all. Naturally this would mean that the volume of that part would be insufficient. Be aware of such situations.



(Figure 4-5)

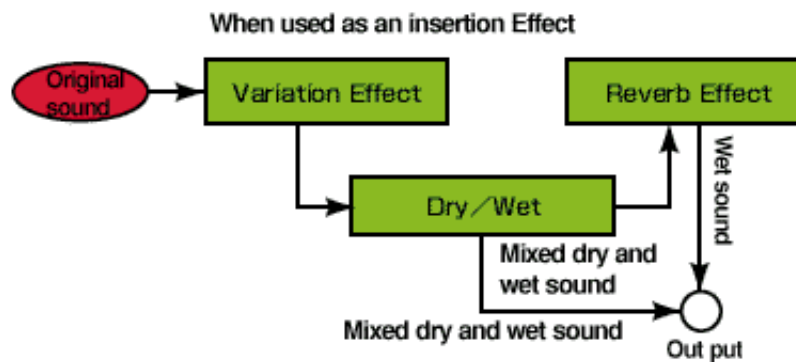
4. What are SendVar → Rev and SendVar → Cho?

“SendVar → Rev” is one of the parameters that can be set when the variation effect is used as a sensitivity stem effect. This parameter specifies the amount of the effect sound (wet sound) from the variation effect that will be sent to the reverb or chorus block. For example if you used the variation effect to apply distortion, reverb would be applied to the dry sound in the amount specified by CC#91, but no reverb at all would be applied to the wet sound. This is because SendVar → Rev is initially set to zero. If you want the sound to appear more natural, you should apply reverb to the wet sound as well (figure 4-6). Of course, the same can be said for the chorus effect (refer to table 3-3 of the specification).



(Figure 4-6)

Note that when using the variation effect as an insertion effect, the signal is routed through a “Dry/Wet” parameter which adjusts the ratio of the dry and wet sounds before it is sent to the reverb or chorus blocks, so this setting is not necessary (figure 4-7). Nor will it appear in the display screen of the tone generator.

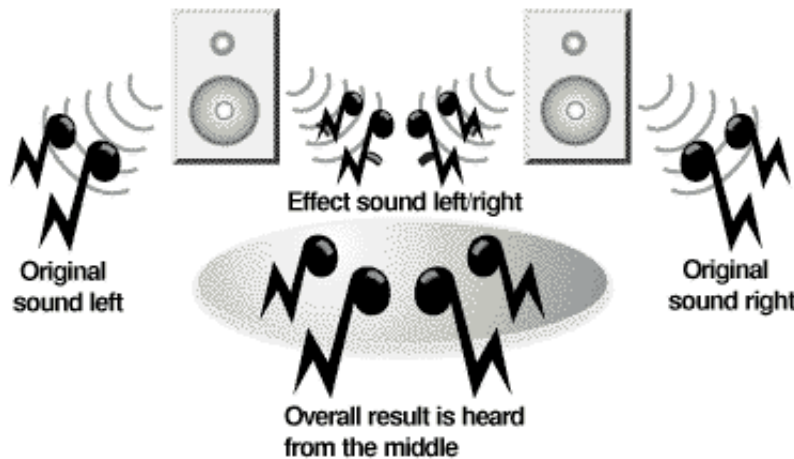


(Figure 4-7)

5. Effects have a pan setting too

A certain heavy metal freak pulled three all-nighters creating data for a song that featured some beautiful twin-lead guitar work. Naturally, he wanted the guitars to be distorted to the max, so he used the variation effect in the system position, and used CC#94 to adjust the effect for each of the two guitar parts. But the two guitars, which had been panned to opposite sides using the Pan message (CC#10), were both heard from the middle! Was all his hard work in vain?

The short answer is that unfortunately, there is no basic solution to this problem. Since distortion is a monaural effect, the effect sound will be output at the location specified by the pan setting of the effect itself, regardless of the panning of the original sound of the part. This means that in the case described above, while the dry sound will be output from both sides, the effect sound will be output from the center by default, causing both guitars to be heard together from the center (figure 4-8).



(Figure 4-8)

To avoid this, you might consider reducing the send level to the variation effect as far as possible, or reducing the drive or output level as well. However this may mean that you don't get enough effect, and the sounds will still not be panned completely left and right. If you want to give priority to the effect, you will have to put up with the panning problem, and if you want to give priority to panning, the best you can do is to use the variation effect in the insertion position and apply it to only one of the guitars. Of course this problem will not occur if you are using a tone generator such as the MU90 which provides an additional insertion effect, but ...

The variation effect provides 2-band and 3-band EQ. Naturally the 3-band EQ lets you make settings in greater detail, but the 3-band EQ is monaural while the 2-band EQ is stereo. This means that if you are using the effect as a system effect, the 2-band EQ will not affect the pan.

For the reverb and chorus blocks, you can also make pan settings for the effect itself. Including cases when the variation effect is used as a system effect, you may wish to adjust the effect pan as well.

3. Use universal exclusive messages for a fade-out

Most mixes involve a fade-out or fade-in. These can be created by decreasing or increasing CC#7 or CC#11 values for each channel, but the simplest way is to use the “Master Volume” universal realtime exclusive message. This method lets you increase or decrease the overall volume while preserving the volume balance between parts, and does not require you to input control changes for each channel.

MIDI master volume SysEx.

F0 7F 7F 04 01 ll mm F7

(mm is the MSB of the data, with default value of 7FH; ll is the LSB, and is normally input as 00H)

Tip 2. Handling distortion-type effects

When using a distortion-type variation effect, the volume of that part may not decrease in the same way as other parts when a fade-out is performed. In such cases, you can gradually lower the Variation Return to produce a natural fade-out.

Variation Return Level SysEx.

F0 43 10 4C 02 01 56 mm F7

(mm is the data; default value 40H)

In some cases, you may want to create a special fade-out in which certain parts remain. The “Guidelines for XG song data production” say that this should be done using CC#11 to create the fade-out. However there may be cases in which using CC#7 may be more musically effective, so you should feel free to make your own decision.

Seminar 5

Onward! Exploring the XG extensions

In the previous four lessons, we have given a basic coverage of the XG format and XG tone generators. Since this eighth lesson will be the final one in this series, I'd like us to take a step beyond basic XG, and talk about extended XG and the future of XG.

As we have already mentioned several times, the XG format allows for expansion to include future technologies.

Some of these new technologies and extended functions are already available as products, and you may already know of these.

It goes without saying that Yamaha's development team continues to dream up even more new ideas which they are working to bring into reality.

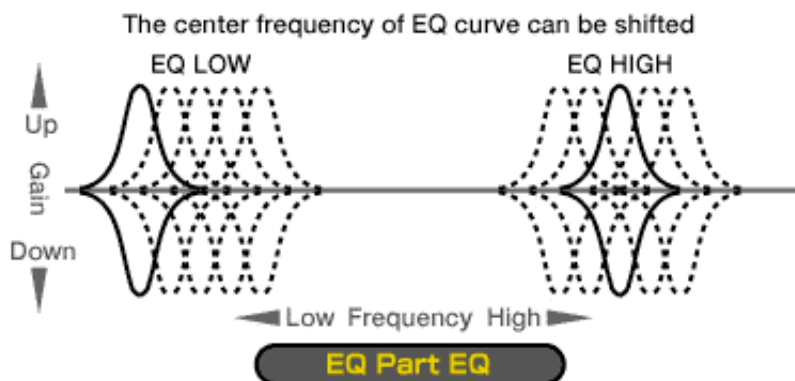
While we look forward to the day when these new wonders will see the light of day, let's take a look at the technology that's available now.

1. Using the Part Equalizer to transform sounds
2. Here's what you can do on models that provide an AD part
3. Optional parameters that the pro's will love
4. VL-XG goes beyond DTM!?
5. A new "singing synth" that will change the future of DTM!

1. Using the Part Equalizer to transform sounds

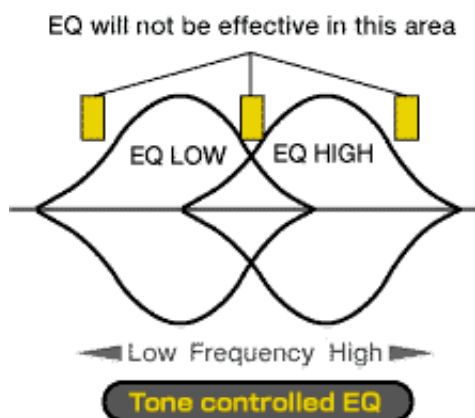
The most attractive aspect of the “Part Equalizer” (Part EQ) that is featured on the MU90 and MU100 is that it can be applied independently to each of the 16—32 parts. In the world of musical professionals, EQ plays an important role at each stage of the recording process. This is clear from the fact that most recording engineers prefer to use mixing consoles that have good EQ. At the risk of overstatement, EQ can have a decisive impact not only on the sound, but even on the music itself.

The part EQ provided on the MU90 and MU100 is a simple parametric type which allows you to adjust the gain of the LOW and HIGH ranges independently, and also lets you freely change the LOW and HIGH center frequencies (figure 5-1).



(Figure 5-1)

Since the range and frequency components will naturally differ depending on the voice that you are EQ'ing, a simple tone control EQ that just boosts or cuts the gain at a fixed point is obviously not going to do the job (figure 5-2). That's why you need a parametric type EQ that lets you freely adjust the center frequency.



(Figure 5-2)

In the same way as for other multi part parameters, the Part EQ can be edited using SysEx messages.

(figure 5-3, refer to specification table 3-7-3)

XG ADDITIONAL PARAMETER CHANGE TABLE (MULTI PART)					[Ext.2] Extension	Description	Default value(H)
Address (H)	Size (H)	Data (H)	Parameter				
08 nn	74	1 00-7F	EQ MID-BASS	(NOT USED)	[Ext.2]	-64 - +63(-12 - +12[dB])	40
	75	1 00-7F	EQ MID-TREBLE	(NOT USED)	[Ext.2]	-64 - +63(-12 - +12[dB])	40
	76	1 04-28	EQ BASS frequency		[Ext.2]	32-2.0k[Hz]	0C
	77	1 1C-3A	EQ TREBLE frequency		[Ext.2]	900-16.0k[Hz]	36
	78	1 0E-36	EQ MID-BASS frequency	(NOT USED)	[Ext.2]	100-10.0k[Hz]	22
	79	1 0E-36	EQ MID-TREBLE frequency	(NOT USED)	[Ext.2]	100-10.0k[Hz]	2E
	7A	1 01-78	EQ BASS Q	(NOT USED)	[Ext.2]	0.1-12.0	7
	7B	1 01-78	EQ TREBLE Q	(NOT USED)	[Ext.2]	0.1-12.0	7
	7C	1 01-78	EQ MID-BASS Q	(NOT USED)	[Ext.2]	0.1-12.0	7
	7D	1 01-78	EQ MID-TREBLE Q	(NOT USED)	[Ext.2]	0.1-12.0	7
	7E	1 00-01	EQ BASS shape	(NOT USED)	[Ext.2]	00: shelving, 01: peaking	0
	7F	1 00-01	EQ TREBLE shape	(NOT USED)	[Ext.2]	00: shelving, 01: peaking	0
TOTAL SIZE	0C						

(Figure 5-3)

At this point, we'd like to direct your attention to the areas marked "NOT USED." A bit earlier, we used the phrase "simple parametric type EQ." This is because we plan that some future models will have "full parametric EQ," with four bands (high, high-mid, low-mid, and low) and adjustable bandwidth (called Q) for each band, and we have allocated addresses for controlling these parameters. Addresses which are not currently used are marked "NOT USED." This is yet another point where you can glimpse the future of the XG format.

Tips

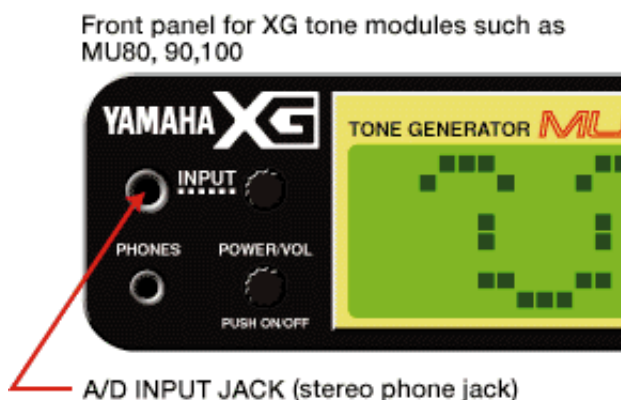
If you have some experience with music production, you know how convenient EQ can be. But that doesn't mean that EQ is a cure-all. No amount of EQ can affect frequency components which do not exist in the original sound. For example if you want to strengthen the ultra-low range of a bass, the original sound must contain at least some components at that frequency. If not, no amount of raising the gain will have any effect.

Surprisingly, the frequency range which we normally sense as ultra-low is often the 60—120 Hz range, which is higher than the actual ultra-low range (in the vicinity of 30—60 Hz). Likewise, what we perceive as being “transparent highs” is often determined by the amount of frequency components in the 4 kHz — 10 kHz range. Try taking these factors into consideration as you edit the EQ settings.

2. Here's what you can do on models that provide an AD part

The A/D input jack (figure 5-4) provided on models such as the MU80, 90, and 100 is not just a supplementary input.

A/D conversion means that an analog signal is converted into a digital signal for processing. If, for example, a mic is connected to this jack, its audio signal will be converted into digital form, and will be handled as one or two additional parts (the A/D input is a stereo jack!) which are added to the 16—32 conventional parts of an XG tone generator. I can hear someone out there saying “So what?,” so I’ll just list what this functionality lets you do.



(Figure 5-4)

- ☆ The reverb, chorus, variation and insertion effects can be applied just as for the other parts
- ☆ A MIDI channel can be assigned, and control changes on that channel can be used (some will have no effect)
- ☆ A program can be preset to select the optimal sound for the instrument etc. that is connected to the A/D input
- ☆ In the case of the MU100, a mic can be connected to the A/D, and used in conjunction with a special effect provided by the VH (vocal harmonizer) board, etc.

By default, no MIDI channel is assigned to the A/D part, but this can be set using SysEx messages. You can also use SysEx to select a preset program for each instrument (refer to table 3-8 in the specification).

The VH board adds harmony to your own voice so that you can sing a duet with yourself, and is a wonderful asset for karaoke applications. The original sound from the A/D part is used to create this harmony.

(product photo of the VH board)

Another way of looking at the A/D part is to consider it an all-purpose amp that will accommodate any input source from mic to guitar or keyboard.

In addition, the rich variety of effects available is probably more extensive than the average multi-effect unit.

This one little unit and a set of headphones is all that you need practice guitar or another instrument anytime anywhere!

3. Optional parameters that the pro's will love

Several times during the previous lectures, we mentioned that you should avoid using the extended portion of the XG format if compatibility of song data is important. However if song data compatibility is not particularly an issue, you would probably like to take full advantage of the functionality of your tone generator.

Since we have already discussed the effect-related format extensions, let's talk about the parameters that are marked as [Ext.].

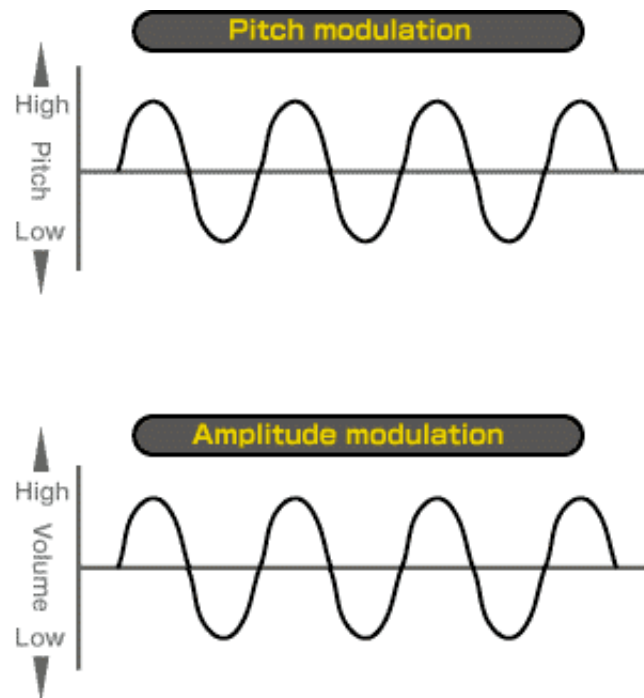
■ Amplitude Modulation Depth

In table 3-7 of the specification, there is an item of

(F0 43 10 4C) 08 nn 22 1 00 -7F MW LFO AMOD DEPTH [Ext.] 0 -127 0

This is related to the vibrato settings, and will affect the result when modulation is applied.

Vibrato differs considerably in its character depending on the instrument and on the performer, and skillful use of vibrato is an important part creating a sound. The preset sounds use fairly conventional vibrato, but on instruments such as flute (in particular during a solo), not only the frequency (pitch modulation) but also the volume changes significantly. In synthesizer terminology, this type of cyclic change in volume is referred to as Amplitude Modulation, and the above-listed parameter is what sets its depth (figure 5-5).



(Figure 5-5)

By default, this will be zero, but as appropriate for the character of the song and the type of instrument, you can raise this value, and then use CC#1 to create some realistic performance expression. (If CC#1 is not used, there will be no change.) However caution is needed, since if an inappropriate setting is used, the sound may appear unnatural or crude, and in some cases noise may even occur. It is also possible to use this to produce a tremolo effect for electric piano or guitar, so it's worth trying in cases when you are not able to use the Tremolo variation effect. In this case, set the MW LFO PMOD DEPTH value to zero so that the pitch will not be modulated, and use the vibrato rate to adjust the frequency of modulation.

■ SCALE TUNING

The SCALE TUNING parameters listed in table 3-7 of the specification allow you to create non-equal tempered tunings such as just intonation (figure 5-6).

nn	41	1	00-7F	SCALE TUNING C	[Ext.]	-64 - +63[cent]	40
nn	42	1	00-7F	SCALE TUNING C*	[Ext.]	-64 - +63[cent]	40
nn	43	1	00-7F	SCALE TUNING D	[Ext.]	-64 - +63[cent]	40
nn	44	1	00-7F	SCALE TUNING D*	[Ext.]	-64 - +63[cent]	40
nn	45	1	00-7F	SCALE TUNING E	[Ext.]	-64 - +63[cent]	40
nn	46	1	00-7F	SCALE TUNING F	[Ext.]	-64 - +63[cent]	40
nn	47	1	00-7F	SCALE TUNING F*	[Ext.]	-64 - +63[cent]	40
nn	48	1	00-7F	SCALE TUNING G	[Ext.]	-64 - +63[cent]	40
nn	49	1	00-7F	SCALE TUNING G*	[Ext.]	-64 - +63[cent]	40
nn	4A	1	00-7F	SCALE TUNING A	[Ext.]	-64 - +63[cent]	40
nn	4B	1	00-7F	SCALE TUNING A*	[Ext.]	-64 - +63[cent]	40
nn	4C	1	00-7F	SCALE TUNING B	[Ext.]	-64 - +63[cent]	40

(Figure 5-6)

If you wish to accurately simulate various types of early music or ethnic music which should not be played in equal temperament, you can use these parameters to adjust the tuning of each note of the scale. However, you need to be knowledgeable about these types of music before making these adjustments. These parameters are not something that you can change blindly. To be honest, I myself am not very knowledgeable in these areas, and don't have much experience with these parameters. However DTM experts who are classical music aficionados do seem to be taking advantage of this functionality.

There are many other parameters of which effective use can be made in subtle ways, such as effect parameters number 11 and following. It is also fairly common to see screen bitmaps used to display characters and images.

4. VL-XG goes beyond DTM!?

VL series synthesizers use Yamaha's own VA (Virtual Acoustic) tone generation technology to produce incredible sounds that range from ultra-realistic simulations of existing musical instruments to ultra-impossible sound effects. VL sounds can now be fused with XG systems by using a VL70-m or a VL tone generator plug-in board for the MU100, and parameters for using these in conjunction with a conventional XG tone generator are defined in table 3-7-4 of the specification (figure 5-7).

Address (H)	Size (H)	Data (H)	Parameter	[Ext.] Extension	Description	Default value(H)
09 nn	00	1 00-01	NOTE ASSIGN	[Ext.]	OFF/ON	1
	01	1	reserved			
	02	1 00-0F,7F	NOTE FILTER	[Ext.]	ch1 - ch16,THRU	7F
	03	1 00-62	PRESSURE CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	04	1 00-7F	PRESSURE CONTROL DEPTH	[Ext.]	-64 - +63	40
	05	1 00-62	EMBOUCHURE CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	06	1 00-7F	EMBOUCHURE CONTROL DEPTH	[Ext.]	-64 - +63	40
	07	1 00-62	TONGUING CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	08	1 00-7F	TONGUING CONTROL DEPTH	[Ext.]	-64 - +63	40
	09	1 00-62	SCREAM CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	A	1 00-7F	SCREAM CONTROL DEPTH	[Ext.]	-64 - +63	40
	B	1 00-62	BREATH CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	C	1 00-7F	BREATH CONTROL DEPTH	[Ext.]	-64 - +63	40
	D	1 00-62	GROWL CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	E	1 00-7F	GROWL CONTROL DEPTH	[Ext.]	-64 - +63	40
	F	1 00-62	THROAT FORMANT CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	10	1 00-7F	THROAT FORMANT CONTROL DEPTH	[Ext.]	-64 - +63	40
	11	1 00-62	HARMONIC ENHANCER CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	12	1 00-7F	HARMONIC ENHANCER CONTROL DEPTH	[Ext.]	-64 - +63	40
	13	1 00-62	DAMPING CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	14	1 00-7F	DAMPING CONTROL DEPTH	[Ext.]	-64 - +63	40
	15	1 00-62	ABSORPTION CONTROL NO.	[Ext.]	off-95,AT,VELOCITY,PB	0
	16	1 00-7F	ABSORPTION CONTROL DEPTH	[Ext.]	-64 - +63	40
TOTAL SIZE	17					

(Figure 5-7)

The parameters listed here are unique to the VL-XG configuration, but otherwise can be thought of in the same way as the conventional XG tone generator parameters. You can see lots of unfamiliar parameter names, but these are used to produce the performance expressions characteristic of the VL. There's no requirement that you use all of these, so relax! (photo of the VL70-m)

The sound of the VL70-m is, in a word, distinctive. In contrast, DTM tone generators would not meet their intended purpose if they produced nothing but highly distinctive sounds: their job is to produce an ensemble in which the sound of all the parts blends well together. This means that while the sounds of XG tone generators such as the MU series are designed with this in mind, VL series tone generators need to be able to produce distinctive sounds unlike any other tone generator. This distinctive personality can either be wonderfully realistic, or totally unlike any sound that has ever been heard before. This means that when the VL is used together with XG, the important

thing is deciding which part will be played by the VL tone generator. In general, it is best to use the VL to play the part of greatest musical importance for that song, such as the melody. However the VL is not yet the answer to all needs. Although it depends on the musical genre or type of instrumental sound, there will be cases in which using a conventional XG tone generator sound (rather than the VL) will produce a much more natural result. In some cases, using the VL for a backing part is best. This is something that you will have to decide for yourself, relying on your own musical judgment.

Closing

This has been the fifth and final web page in our rapid coverage of XG. To those of you who have stayed with me all the way to this point — thank you! Perhaps we'll meet again. Goodbye for now!

YAMAHA