

# XG XTRA

Vol. I • No. 3 • August, 1995

Presented by the **YAMAHA®** Corporation of America

## In This Issue:

Using SFX Voices and Kits  
Using Multiple Drum Channels

---

*Net-Surfer Alert!!*

Visit our WorldWide Web site at:  
<http://www.ysba.com>

**Editor:** Michael G. D'Amore  
**Associate Editor:** Howard Massey  
**Production by:** *On the Right Wavelength*

Send correspondence via e-mail to  
[news@ysba.com](mailto:news@ysba.com) or [mgdamore@ysba.com](mailto:mgdamore@ysba.com)  
or, via "snail-mail," to:

**XG Xtra**

Yamaha Corporation of America  
Office of Strategic Business Development  
P. O. Box 6600  
Buena Park, CA 90620  
Tel: 714-522-9330  
Fax: 714-228-3913

# Using XG SFX Voices and Kits

**If you've ever worked with MIDI files,**

you're no doubt already intimately familiar with the General MIDI Sound Set. This is a standard collection of 128 sounds, organized into 16 groups of 8 voices each, accessed with MIDI program change messages. Most of these sounds are of the musical variety—there are 8 pianos, 8 organs, 8 guitars, etc.—and only 16 of them (the sounds in the “Synth Effects” and “Sound Effects” groups) are useful for the generation of non-musical special effects such as ambient backgrounds, gunshots, applause, and the like. This limitation is significant since game developers and multimedia producers

requiring extensive sound effects have usually been unable to use MIDI for this purpose and have had to rely instead on digital audio files, which require massive amounts of storage capacity.

All XG instruments provide the basic GM Sound Set (this is Melody voices bank 0) as well as a number of other banks of voices that contain alternate “variation” voices. These banks all organize their voices according to the GM Sound Set rules—that is, piano sounds are located in presets 1 - 8, organ sounds in presets 17 - 24, etc.—so that they are easy to locate. But XG expands greatly on GM by providing dozens of additional voices that fall outside of the constraints of the GM Sound Set. These voices, called “SFX” voices (“SFX” is a traditional film and video post-production abbreviation for “Special

Effects”), are of great importance since they allow complex sound effects tracks to be created entirely in MIDI files, which require a fraction of the storage capacity demanded by digital audio files. In fact, the range and flexibility of these sounds can almost completely obviate the need for digital audio data, except where required for speech and dialog. In this article, we'll take a close-up look at the XG SFX voices (and SFX kits) and present hints, tips, and techniques for using them in real-world applications.

Figure 1 on the following page presents a complete listing of the 40 SFX voices provided by base-level XG instruments (higher-level XG instruments may include additional SFX voices, but, in order to ensure complete compatibility, these should generally not be used when creating

commercial XG MIDI files).

To access these voices, simply transmit a Bank Select MSB (cc #0) of 40h (this calls up the “SFX Voices bank”), followed by a Bank Select LSB (cc #32) of 0h and then the desired program change message. As noted in previous XG Xtra articles, XG instruments do not change banks or voices until the program change message is received. To make your initial voice selection, include these messages in your setup measure. If you need to call up different SFX voices during file playback, simply transmit the appropriate program change message—the part will continue to access the SFX bank if no new Bank Select messages are received.

Apart from falling outside of the categories in the GM Sound Set, SFX voices are almost identical to Melody voices. Many of them respond to key velocity and to control change messages such as modulation wheel or sustain pedal, and so can be

XG SFX Voices					
pc# (dec)	pc# (hex)	Name	pc# (dec)	pc# (hex)	Name
1	00h	CuttingNz	81	51h	CarEngin
2	01h	CttingNz2	82	52h	Car Stop
4	03h	Str Slap	83	53h	Car Pass
17	11h	Fl.KClik	84	54h	CarCrash
33	21h	Rain	85	55h	Siren
34	22h	Thunder	86	56h	Train
35	23h	Wind	87	57h	Jetplane
36	24h	Stream	88	58h	Starship
37	25h	Bubble	89	59h	Burst
49	31h	Dog	90	5Ah	Coaster
50	32h	Horse	91	5Bh	SbMarine
51	33h	Bird 2	97	61h	Laughing
55	37h	Ghost	98	62h	Scream
56	38h	Maou	99	63h	Punch
65	41h	Tel.Dial	100	64h	Heart
66	42h	DoorSqek	101	65h	FootStep
67	43h	Door Slam	113	71h	MchinGun
68	44h	Scratch	114	72h	LaserGun
70	46h	WindChm	115	73h	Xplosion
71	47h	Telphon2	116	74h	FireWork

Figure 1

played dynamically and with expressivity. All SFX voices can access any of the XG effects, and, through the use of control change messages, parameters such as envelope and filter settings can be altered, and in real time. Like Melody voices, most SFX voices are pitch-responsive; that is, as you play different notes, they change in pitch (there are a few exceptions to this rule, and they will be noted in this article) and many of them are looped so that they play indefinitely when a note is held down or when a Sustain (cc #64) message with a value of On (7Fh) is received. Also, SFX voices are completely polyphonic, so it's easy to build lush beds of sound effects simply by playing lots of notes in quick succession.

The first four basic SFX voices (CuttingNz, CttnaNz2, StrSlap, and Fl.KClick) are samples of the initial “attack” portions of acoustic sounds. On their own, they're not particularly exciting, but they really show their value when

combined with Melody voices, adding distinctive “front ends” that enable the selected voice to cut through dense instrumentation. To have multiple voices receive on the same MIDI channel (thus layering them), use the following system exclusive message:

F0h 43h 1nh 4Ch 08h 0mh 04h ddh F7h

where n = device number, m = MIDI channel of the part you wish to change, and dd = new MIDI channel you want the designated part to receive on (a data value of 7Fh sets the MIDI receive channel to “Off,” muting the part).

For example, try selecting the SFX voice Fl.KClick and then assign the Melody voice E.Piano1 (Bank 0, program 04h) to the same MIDI channel. When you now play a note, you'll hear the classic electric piano sound (provided by the Melody voice) with lots of “tine” attack sound (provided by the SFX voice). Other interesting composite

sounds can be created with the following combinations: SFX voice CuttingNz with Melody voice Marimba (Bank 0, program 0Dh); SFX voice CttnaNz2 with Melody voice OrchHit2 (Bank 23h, program 38h); SFX Voice StrSlap with Melody voice NylonGt3 (Bank 19h, program 19h), or, for that matter, with any other bass or guitar sound. These are just a few suggested examples—the best way to discover new composite sounds, however, is to experiment!

You can make these composite voices even more realistic by carefully adjusting the velocity sensitivity depth of the SFX voice. To do so, use the following system exclusive message:

F0h 43h 1nh 4Ch 08h 0mh 0Ch ddh F7h

where n = device number, m = MIDI channel of the part you wish to change, and dd = data value. Note that this message must be sent while the SFX voice is

receiving on its own discrete MIDI channel—otherwise, the velocity sensitivity depth of the Melody voice will be changed also. The best way to do so is to temporarily change the MIDI receive channel of the SFX voice (using the system exclusive message given above) to an unused channel. After setting the velocity sensitivity depth to the desired value, change the MIDI receive channel of the SFX voice back so that it matches that of the Melody voice it is to be combined with.

As their names imply, the Rain, Thunder, and Wind SFX voices enable you to create virtual inclement weather. All three are pitch-responsive, and the Rain and Wind voices are looped so that they will sustain indefinitely as long as a note is held, or as long as a Sustain (cc #64) message is sent with a value of On (7Fh). Because the pitch-shifting in these voices is so slight, you can create subtle flanging effects by playing semitone clusters of these voices (for example, playing a C4 and C#4

simultaneously). Similarly, the Stream and Bubble, SFX voices enable you to create bucolic or underwater tableaux. Both are looped and pitch-responsive.

The Dog and Bird 2 SFX voices provide samples of a dog barking and bird chirping. Both are pitch-responsive, so you can create realistic gatherings of canines and/or feathered friends by playing different pitches. The Horse SFX voice presents the sound of hooves in gallop; these too are pitch-shifted, so you can slow down the gallop speed by playing lower notes (this also gives the hooves a lower pitch) or speed them up (with a higher pitch) by playing higher notes. This looped (but non-sustaining) voice is pre-programmed with an envelope that has a slow attack, moderate decay and slow release. This causes the sound to fade in and out as the horse comes near and then recedes in the distance. If required, these envelope settings can be altered in real time with control change messages—see your XG

instrument's owners manual or the XG Specifications for details.

The Ghost and Maou SFX voices are synthetic in nature and can be used to create spooky ambient effects. Both are pitch-responsive and the Maou voice is looped. The Tel.Dial and Telphon2 SFX voices are similar, with both providing telephone dialtone and ringing sounds, and with both pitch-responsive and looped. DoorSqek and Door Slam (both pitch-responsive) enable virtual characters to enter and exit rooms—and the “size” of these ambient spaces can be altered by manipulating XG Reverb and/or Variation effects parameters. The pitch-responsive Scratch SFX voice will have applications in the creation of rap music, and the WindChm SFX voice (which is pitch-responsive and looped) enables you to add crystalline wind chimes via MIDI—an excellent sound effect to use during scene changes.

The CarEngin, Car Stop, Car Pass, CarCrash, and Siren SFX voices enable you to build complete automotive scenes—including disasters, if you so desire! Because all are pitch-responsive, you can add virtual cars of all different sizes, makes, and models. The Car Pass voice is unique in that it employs a built-in Doppler effect—a special kind of pitch shifting that simulates the acoustic reality of sound waves rapidly approaching and leaving a static object. For a truly realistic Car Pass, try routing the voice into a Variation effect (in Insertion mode) with the AutoPan effect type selected, and effect parameters set as follows: LFO Frequency = 0.75 Hz; L/R Depth = 127; F/R Depth = 127; Pan Direction = L->R (or R ->L, as required). (Editor's note: For detailed information on how to access and customize different XG effects, see the "Spotlight On: XG Effects" article in the previous issue of XG Xtra)

The Train, Jetplane, Coaster, and SbMarine SFX voices all provide realistic samples of their respective sounds (Coaster is a roller-coaster, complete with screams!). All are pitch-responsive, and all except Jetplane are looped (all four voices are pre-programmed with envelopes with long release times). Starship and Burst are highly synthetic samples that add that extraterrestrial touch to your MIDI files; Burst is both pitch-responsive and looped, while Starship stays at the same pitch regardless of key played and is not sustainable.

Laughing, Scream, Punch, Heart and FootStep all allow you to add a human element; none are looped but all are pitch-responsive. The Laughing SFX voice provides a truly wicked laugh; playing lower pitches conjures up images of some evil giant. By playing the Scream voice with different pitches, you can create different shadings; try playing several notes in quick succession to create the impression of crowd terror. The Heart SFX

voice recreates a single heartbeat; higher pitches cause the beat to go faster, while lower pitches slow it down alarmingly. The Punch voice, played at all different pitches, imparts, dare we say, just the right amount of violence and can be useful in action games of all description. And, as different pitches of FootStep are played, you can simulate different walks: from a petite woman in high heels (higher pitches) down to the heavy gait of a large man (lower pitches).

When you need your virtual heroes or villains to go out with a bang, choose from among the remaining four SFX voices: MchinGun, LaserGun, Xplosion, and FireWork. All are pitch-responsive, and the MchinGun voice is also looped. To build really thick effects with these voices, try playing clusters of notes a tone or two apart, and be sure to take advantage of the many XG effects such as flanging, chorusing, and, of course, tons of reverb. *(continued on page 10)*

# Using Multiple Drum Channels

One of General MIDI's most significant limitations is its requirement that key-based percussion (that is, percussive sounds mapped one to a key in "drum kits") be restricted to MIDI channel 10. Although the XG format retains compatibility with GM by defaulting this way, it also breaks through this barrier by enabling any MIDI channel or even multiple MIDI channels to be used for key-based percussion. To do so, simply transmit a cc # 0 (Bank Select MSB) message of 7Fh (127) on the channel or channels you wish to use for "drum part," followed by a cc #32 (Bank Select LSB) message of 00h (00). For example, if you want to designate MIDI channel 15 this way, transmit the following messages:

BEh 00h 7Fh  
BEh 20h 00h

This must then be followed by a program change message; XG instruments do not call up new banks or voices when they receive just Bank Select messages—they always require the instruction to be "completed" with a program change message. There are nine basic XG drum kits, as shown in figure 2, below:

Program Change	Name
00h	Standard Kit
01h	Standard2 Kit
08h	Room Kit
11h	Rock Kit
19h	Electro Kit
1Ah	Analog Kit
21h	Jazz Kit
29h	Brush Kit
31h	Classic Kit

Figure 2

Note that the "Standard Kit" (pc #00h [decimal 1]) utilizes the standard GM Percussion Map (which designates specific sounds for key numbers 35 - 81) but also adds a number of sounds in order to expand the total range from key numbers 13 (C#-1) to 84 (C5). This is the default drum kit selected when an XG System On message is received, thus ensuring compatibility when GM MIDI files are played back. The other eight "variation" kits make assorted drum sound substitutions in order to change the overall character of the kit. Your XG instrument owners manual contains a complete listing of the XG drum sound assignments in each of these nine kits. This information is also included in the XG Specifications.

So why would you ever want to use multiple drum tracks? One important

application is in the creation of MIDI files that contain song medleys. With GM's restriction of just a single drum track, you're forced to insert pauses between songs. In contrast, XG allows you to construct professional crossfades, using the standard MIDI Expression controller (cc #11) to fade out one set of tracks (including a drum track) while fading in another set (with a completely different drum track).

You can also use multiple drum tracks to "fatten" your drum sound, adopting a variation on the "Wall of Sound" production technique popularized by Phil Spector and other professional music producers. These audio wizards often used two or even three drummers in a recording session, having each drummer play the same part but utilizing the slight differences in each to build huge, thick drum tracks. There are two ways to simulate this effect in XG. If you've got good drum programming chops, simply record your

drum part two or three times in real time, each time on a different MIDI channel. Be sure to insert the Bank Select MSB (cc #0), LSB (cc #32) and Program Change messages outlined above in the setup measure to ensure that a drum kit is called up for each of the channels. When all the tracks are played together, the slight differences between each take will make for a distinctly "Spector-ish" sound.

Alternatively, you can take a single completed drum track and simply copy it to another MIDI channel or two (again, be sure to insert the appropriate Bank Select MSB [cc #0], LSB [cc #32] and Program Change messages in the setup measure to ensure that a drum kit is called up for each of the channels). Then use your sequencer's editing features to shift the timing of each copied track forward or backward by a few clocks. If you're into serious tweaking and your sequencer allows single event editing, you can even go into each of the copied tracks and shift

individual events slightly forward or backward by a different number of clocks. With just small amounts of clock shifting, the end result is not sloppiness, but a very realistic "human" imperfection—and the use of two or three kits will make for a very full sound! You can make the effect even more striking by assigning a drum kit to the copied track(s) which is different from the original track's kit. For example, have one "drummer" play the "Standard Kit" and another play the "Rock ~~Rimba~~<sup>Rimba</sup> 7" (which uses totally different bass drum, snare drum, rim shot, and tom tom sounds). Even having one play the "Standard Kit" and another play the similar "Standard2 Kit" will cause some interesting sonic differences by virtue of the latter's alternate bass drum and snare drum sounds.

The use of multiple drum channels also enables you to create some interesting spatial effects by virtue of XG's intensive panning controls. For example, you can use the standard Pan control change message

(cc #10) to pan one drum kit hard left and another hard right. This will make the drums appear to come from around the stereo image, as opposed to originating somewhere at or near the center. Another interesting trick is to have one drum kit panned in the center and another one (playing the identical data, slightly clock-shifted) set to “Random” panning. This is accomplished by including the following system exclusive message in your setup measure:

F0h 43h 1nh 4Ch 08h 0mh 0Eh 00h F7h

where n = device number and m = MIDI channel you wish to have set to random panning.

When the file is played back, the original drum kit will play with its pre-programmed panning (overall center, with individual drum sounds panned as per their factory settings), but the second kit will play with each percussive sound coming from a

different, random area in the left-right spectrum. The sonic result is uncannily dynamic, with various percussive sounds popping out from different places in the stereo image at different points in the music.

These kinds of tricks with multiple drum channels can be taken to the ultimate with the use of NRPNs (Non-Registered Parameter Numbers). The XG format uses NRPNs to enable individual drum sounds within kits to have their level, panning position, filter settings, envelope settings, and effects send levels changed in real time, during MIDI file playback! (*Editor's Note: A future article in XG Xtra will deal with NRPNs in detail*) This opens up the door to creating highly customized dynamic drum kits—not just in terms of their note assignments, but in terms of shaping the sounds themselves. Get two or more of these unique kits playing back together and you can Boldly Go Where No MIDI File Has Gone Before...

Incidentally, the same freedom that XG provides in allowing multiple MIDI channels to be used for drum parts works in reverse—channel 10 can be “freed” up from its GM-ordained role of drum channel in order to play melody or SFX voices. This is accomplished simply by transmitting a Bank Select (cc #0) message of 00h (for Melody voices) or 40h (for SFX voices):

B9h 00h 00h - changes channel 10 to play  
Melody voices

B9h 00h 40h - changes channel 10 to play  
SFX voices

As before, this must be followed by a Bank Select LSB (cc #32) and then a Program Change message in order for channel 10 to change from a drum part to a melody part and a new voice to be called up. If you're creating MIDI files of solely sound effects, you'll surely find this “extra” track useful!

*“Using XG SFX Voices and Kits” article,  
continued from page 6*

The FireWork voice in particular imparts lots of dynamic information and the bang at the end may be too much for some low-end computer speakers, so you might want to avoid having it play with extremely high velocity values.

For added convenience, XG instruments also provide the SFX voices organized into two SFX drum kits. These are similar to rhythm kits in that each key plays a different sound, only here the sounds are the SFX voices rather than drum and percussive sounds. SFX kits are useful if you want to be able to use a MIDI keyboard or controller to quickly create a complex sound effect track in one pass. As with drum kits, the sounds in SFX kits are not pitch-shifted as you play different notes. To access the SFX kits, simply transmit a Bank Select MSB (cc #0) of 7Eh (this calls up the “SFX Drum Kits bank”), followed

by a Bank Select LSB (cc #32) of 0h and a program change message of 00h or 01h (to call up either SFX Kit 1 or SFX Kit 2). A complete listing of the mapping used by these two kits is provided in your XG instrument’s owners manual and in the XG Specifications.

## ***Coming in the next issue of XG Xtra!***

***An in-depth  
comparison between  
XG, GS, and GM.***

### **XG publications available from Yamaha**

- An Introduction to XG
- XG Specifications
- XG Guidebook
- XG Music Production Recommendations
- XG Xtra #1
- XG Xtra #2

*All available online or in hard copy  
direct from Yamaha:*

Send requests via e-mail to:

news@ysba.com

or, via “snail-mail,” to:

**XG Xtra**

Yamaha Corporation of America  
Office of Strategic Business Development

P. O. Box 6600

Buena Park, CA 90620

Tel: 714-522-9330

Fax: 714-228-3913