XG XTRA

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Welcome To Our Premiere Issue!

Welcome to the very first issue of ***XG Xtra***! In these pages, we'll be bringing you hints, tips, and techniques for using Yamaha's exciting new XG format. Whether you're a producer of music files, a multimedia developer or an end user of XG instruments, you're sure to find valuable information in each issue of ***XG Xtra***.

In addition to providing free hard copy to all comers (see the subscription coupon on page 3), we also plan on making ***XG Xtra*** an important "pit stop" on the information highway. Issues will be regularly posted (in Adobe Acrobat™ ".pdf" format) on the Internet as well as on popular online services such as CompuServe and America Online. These sites will also contain copies of the Adobe Acrobat™ Reader. Our online addresses will be posted shortly and will be automatically e-mailed or "snail-mailed" to you when you send in the subscription coupon on page 3.

If you're reading this online and are a newcomer to Adobe Acrobat™, here are a few pointers that will help you navigate through this copy of ***XG Xtra***:

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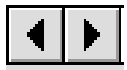

- Use the First Page or Last Page buttons to jump to the beginning or end of the document:

- Use the Go Back and Go Forward buttons to retrace your steps through the document:

- Use the Select Text tool to select text in a document, which can then be copied to the Clipboard using the Copy command:

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- There's also a Find tool, which searches for part of a word, a complete word, or multiple words in a document:

For more information on the use of Adobe Acrobat™ Reader, open the included "Help-Reader.pdf" (Mac) or "help_r.pdf (Windows) file.

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Why XG?

Note: The article below is excerpted from Yamaha's "Introduction to XG" booklet.

General MIDI is a terrific idea that has also proven to be a commercial success. It has opened up the world of MIDI to thousands of musicians who do not wish to get involved in technical intricacies. But GM is limited to basic MIDI functions and is unable to support the full powers of today's multi-timbral tone generators. As we enter the multimedia age, it is time for the introduction of an enhanced format that builds on the foundation laid by General MIDI—and that format is XG.

Yamaha's development of the XG format has focused on the following three key goals:

1. Compatibility - Any XG instrument, regardless of model or manufacturer, will provide faithful reproduction of XG music files—and will also be completely 100% General MIDI-compatible, since it is an enhancement to, and not a replacement for, General MIDI. You can think of General MIDI as being a kind of minimum "building code"—all XG instruments are built "to code" but then add a large number of new features that make them more like luxury condos!

2. Scalability - There are several different levels of XG compatibility. One level is implemented in high-end instruments such as the Yamaha MU80; another is implemented in mid-range instruments such as the Yamaha MU50; and details of additional levels will be announced in the future. These different levels mean that we'll be seeing a wide range of XG instruments in the years ahead, each with its own character and each offering a unique feature set at a different price point. Each, however, will faithfully replay XG data in accordance with its level of sophistication—if a particular instrument doesn't support a variation voice, for example, it will automatically substitute the corresponding basic GM voice.

3. Expandability - The XG format—like MIDI itself—is an "open" architecture, which will allow for the addition of new enhancements as future technology continues to evolve.

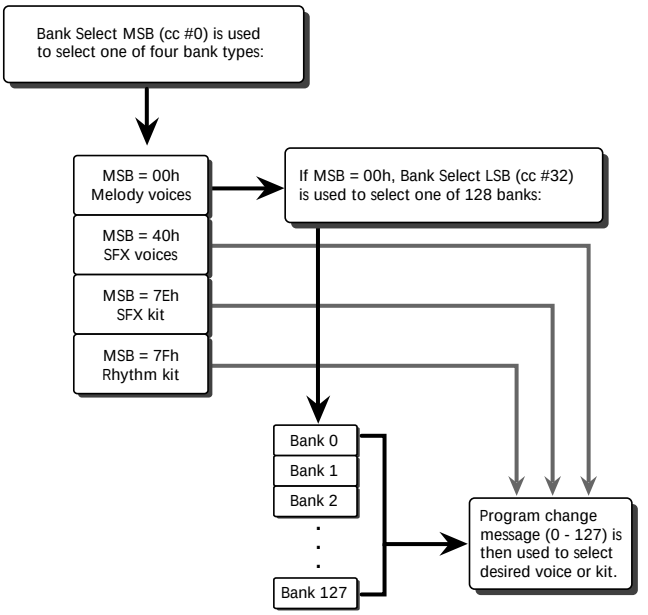
The XG format expands on the General MIDI standard in the following major areas:

• **Number of voices** - GM supports 128 voices (accessed via MIDI program change messages 0 - 127), which seemed like a lot back in 1991. But reduced memory costs enable today's MIDI instruments to store many hundreds (or even thousands!) of voices, giving musicians a much broader sonic palette from which to work. The XG format enables access to literally thousands of voices by utilizing MIDI Bank Select (Control change #0 and #32) messages.

• **Voice organization** - GM stipulates that its 128-voice sound set be organized into 16 groupings of 8 presets each. XG instruments take things many steps further by using the Bank Select MSB (Control change #0) to select any of four bank types: Melody voices, SFX (Special Effects) voices, SFX kit (the SFX voices, mapped one to a key), and Rhythm kit (various drum and percussion voices, mapped one to a key). The Bank Select LSB (Control change #32) is then used to select any of 128 banks of Melody voices, each containing 128 presets (which are accessed by standard MIDI program change messages). Program change messages are also used to select different SFX voices, SFX kits or Rhythm Kits. The illustration below shows how this works.

Note that, in all XG instruments, Melody voices Bank 0 contains the standard GM Sound Set (other banks contain what are known as "variation" voices) and Rhythm Kit #1 utilizes the standard GM note mapping (other "variation" Rhythm Kits are accessed with program change messages). Because these are the defaults selected when a "GM System On" message is received by an XG instrument, you can be sure of complete compatibility when playing back GM music files.

(continued on page 3)



XG Voice Organization

(continued from page 2)

• **Polyphony** - GM instruments are required to have only a 24-note minimum polyphony, while XG instruments are required to have at least 32. This facilitates the creation of dense instrumentations and the use of multiple complex sounds.

• **Optional Support for Additional MIDI channels** - The XG format supports up to 32 MIDI channels, enabling full 32-way multitimbral operation.

• **Additional Rhythm Channels** - Following the GM convention, XG instruments normally use MIDI channel 10 for rhythm parts (though, unlike GM, channel 10 can optionally be designated for melody parts). However, the XG format allows additional channels to be designated for rhythm parts as well, allowing the musician to easily create complex drum and percussion parts.

• **Support for Internal Effects** - GM has no provision for the usage of internal effects processors. The XG format addresses this deficiency by providing support for a minimum of three different internal effects (Reverb, Chorus, and a switchable global or "insertion" effect) as well as for a fourth internal "insertion" effect and an optional internal master graphic equalizer. Standardized MIDI messages are used to set the send levels of each of these effects (per channel, and, in the case of Rhythm or SFX kits, per individual voice) as well as the parameters of internal effects. This allows the musician to create complete, finished productions in one XG instrument, all under complete MIDI control.

• **Optional Support for External Audio (A/D) Input** - The XG format provides optional support for external audio input. XG instruments that utilize this feature have an audio input jack into which you can plug a microphone, electric guitar, or any line-level source. This signal is digitized by a chip called an Analog-to-Digital (A/D) converter and is then routed to the internal effects processors.

• **Voice Modification** - GM specifies the use of only a handful of control sources for the realtime modification of voices. XG supplements these with more than a dozen additional control change messages, including Sostenuto and Soft pedal, data increment/decrement, and portamento time. There is also support for realtime control of voice filter and envelope settings, as well as effects levels. In addition, XG uses a series of Non-Registered Parameter Numbers (NRPNs) for realtime control over variables such as vibrato rate, depth and delay, and for enabling the user to alter filter cutoff frequency, envelope, pitch, level, pan, and effects send levels of individual drum voices within a Rhythm or SFX kit.

XG publications available from Yamaha

- An Introduction to XG
- XG Specifications
- XG Guidebook
- XG Music Production Recommendations

All available online or in hard copy direct from Yamaha

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"XG System On" Initialization Defaults

Probably the most important XG MIDI message of all is the one that alerts the receiving instrument to operate in XG mode. This message is called "XG System On," and the hex code for it is:

F0 (start of sysex)
43 (Yamaha ID)
1n (where n= device number)
4C (Model ID)
00 (Address high)
00 (Address mid)
7E (Address low)
00 (Data)
F7 (end of sysex)

As with the "GM System On" (and "GS Reset") sysex messages, "XG System On" requires approximately 50 msec to execute, so when creating XG music data, be sure to leave adequate space between this message and the start of the next one. As defined in Yamaha's Music Production Recommendations document, "XG System On" should be transmitted following all SMF chunk messages and Meta-Events, approximately 50 msec after the "GM System On" message, and 50 msec prior to all required system exclusive parameter changes, bank select, program change, control change, and RPN/NRPN messages.

"F0H, 43H, 1nH, 4CH, 00H, 00H, 7EH, 00H, F7H" —the "XG System On" message

But what effect exactly does the "XG System On" message have? First and foremost, it causes the receiving XG instrument to enable the reception of all XG NRPNs (Non-Registered Parameter Numbers), as defined in the XG Specifications. Secondly, it causes the receiving XG instrument to initialize, entering default values into most parameters. Here's a listing of the most important default values for the Yamaha MU80 (defaults will be similar for other XG instruments):

- Audio Parts A1 and A2 are both set to "Off"
- All Melody MIDI parts (A01 - A09; A11 - A16; B01 - B09; and B11 - B16) are set to the "GrandPno" voice (Bank 00, Voice 01)
- Both Rhythm MIDI parts (A10 and B10) are set to "StandKit" (Bank 127, Kit 01)
- Receive CH for all parts is set to equivalent (i.e. part A01 receives on channel A01, etc.)
- Volume (cc #7) for all parts = 100
- Expression (cc #11) for all parts = 127
- Pan (cc #10) for all parts = Center (64)
- Rev Send (cc #91) for all parts = 40
- Cho Send (cc #93) for all parts = 00
- Variation send (cc #94) for all parts = "Off"
- Note Shift for all parts = +00
- Graphic EQ type = flat

A floppy disk listing of all MU80 defaults (in SMF format) is available from Yamaha. Remember that, in your setup measure, you only need alter those parameters for which the default value isn't suitable!

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