
SW1000XG
PCI AUDIO MIDI CARD
ADVANCED GUIDEBOOK

The SW1000XG advanced guidebook

Prologue

This user guide aims to de-mystify Yamaha's multi-award winning SW1000XG PCI audio & MIDI production card, no mean feat in itself, and also to clearly show you, the user, how to get the best results with the SW1000XG in 'your' sequencer of choice.

Due to the number of pages in this guide, we cannot promise to cover every single application or question, but we aim to set out some general guidelines and rules, which with a little thought, can be applied to almost any situation.

Yamaha have a comprehensive web presence, so if you feel that you need to know even more than this guide can tell you, please visit our dedicated SW1000XG website at www.xgfactory.com.

Here you will find the very latest in driver downloads, many of the applications that we will feature in this guide, a full FAQ which is being constantly updated, and links to the many sequencer sites around the world that support the SW1000XG. Here you will also find our dedicated technical support web address of Xgfactory@emi.yamaha.co.jp.

We hope you enjoy this guide, and learn something about the power in your hands. As always, don't be afraid to try things out for yourself, and most of all, try to be creative with your sounds and compositions. That's why we built the SW1000XG in the first place!

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Contents

Chapter 1: What is the SW1000XG, and how do I get it all hooked up and working? ….Page 5

Chapter 2: A brief outline of XG, system exclusive data, controllers and what it all means to the SW1000XG…Page 9

Chapter 3: Essential tools and why they are so important. (Hubi, MIDI-OX, MIDI-Yoke, XGEDIT)…Page 13

Chapter 4: Getting started with the bundled copy of XGWorks …Page 17

Chapter 5: Getting it all to work in…Cubase VST….Page 24

Chapter 6: Getting it all to work in…Emagic Logic Audio….Page 29

Chapter 7: Getting it all to work in…Cakewalk Pro Audio….Page 34

Chapter 8: Getting it all to work in …any Windows audio or MIDI application….Page 39

Chapter 9: All about PLG….Page 42

Chapter 10: Audio overview of the SW1000XG….Page 46

Chapter 11: The DS2416 linkup…Page 50

Chapter 12: Living in the new age. ASIO & NT…Page 56

Chapter 13: Installing in the Macintosh, and using the bundled XGEditor….Page 59

Chapter 14: Applications support…On the Macintosh….Page 64

Chapter 15: Hardware control options (Control Freak and the Phatboy)…Page 67

Chapter 16: Common Questions and answers, and troubleshooting…Page 69

Credits and links.

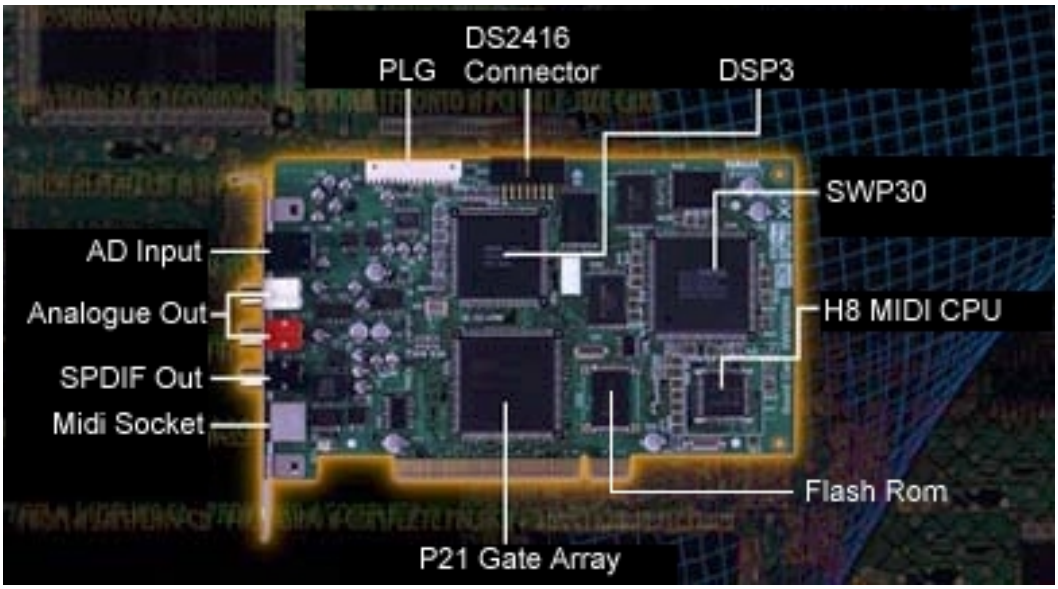
Chapter 1

What is the SW1000XG, and how do I get it all hooked up and working?

So you have opened the box, and inside is a PCI card with the words Yamaha SW1000XG printed on it. The first thing you should do before you put the card inside your computer is make sure that you don't touch any of the contacts on the card with your bare fingers. Static can cause damage to most electronic components, so please be careful. You should also at this point make a note of the serial number for your card. This can be found on the back of the card, in the form of a white stick on label. It will save you having to open up your PC again when you come to registering your SW1000XG online.

So what is the SW1000XG?

The SW1000XG is a new type of expandable audio production card for the PC and Macintosh. It uses the high-speed PCI buss to allow multi-track hard disk recording and simultaneous 64-voice/32-part hardware level MIDI synthesis. It features a hardware mixer and multiple buss effects processor system utilising the core SWP30B processor found on the A3000 sampler and flagship EX series synthesisers, and also the DSP3 processor technology employed on Yamaha's state of the art 02R digital mixing console. The card has the huge benefit of being able to perform all of its functions using little or no CPU power. As all of the DSP power is already on board, there is no need to buy anything else, or invest in expensive multi effects processors or software based 'plug in' style effects which can run into hundreds of dollars each. It features a digital buss connector for linkup to the Yamaha DS2416 DSP Factory card. The two combined cards will run in the same machine and in perfect sync, and again when running in tandem use little to no CPU power. The combination of the DS2416 and the SW1000XG - in Yamaha's opinion - offers the most powerful audio production system ever seen inside a computer. During the course of this guide we will aim to explain some more of the terms used here, and what they really mean when using the SW1000XG.



So, now that the card is in your hands, you may want to take a look at what is on it, in essence 'What makes it tick"

The SW1000XG Laid Bare

The back plate of the SW1000XG features 5 physical connectors. From top to bottom, these are:

A: Stereo mini-jack (3.5mm) audio analogue input connector. This is where you would plug in your microphone, guitar etc. This connector is designed for dynamic microphones or line output from mixing desks. It is not designed to supply phantom power (A power supply system used with condenser type microphones), unlike some low cost 'games' cards which do have this feature. So you may find that your low cost gooseneck style microphone that came with your SoundBlaster card, will just not work when plugged into the SW1000XG. The connector is designed to either have a dynamic microphone plugged into it (such as the universally popular Shure SM58), or to be connected as we have said to the outputs of a mixing desk. You can also plug a guitar straight into the back of the SW1000XG, using a standard guitar cable with a stereo mini-jack adapter at the SW1000XG end. This input is connected to the 20bit Burr Brown analogue to digital converter. This chip is capable of some truly superb results, and is one of the reasons why the SW1000XG is rated as quite a noise free card, when it comes to audio recording (it has a measured

signal to noise ratio >94dB). As ever though, it pays to use good quality cables to plug into your SW1000XG, as the old saying goes 'GIGO – Garbage In - Garbage Out'. If the output of your microphone is not good, or your mixer is noisy, then don't blame the soundcard.

B: Phono analogue outputs left & right. These are marked in white and red, and are line level audio outputs. This means that they have to be plugged into an amplifier or amplified speakers for you to be able to hear any sound at all. Some low cost soundcards have a headphone output or a pre-amplified output stage. This is something you rarely find on professional audio cards such as the SW1000XG. A good hi-fi amplifier is recommended unless you have access to proper monitoring equipment, and again, as with the input, the final quality of sound that you hear will be determined by the quality of your equipment. If you have a cheap pair of multimedia speakers, don't expect to hear the SW1000XG at its best.

C: SPDIF Digital output. SPDIF (Sony/Phillips Digital Interface) is a standard audio connector used widely in the music industry. The coaxial type found on the SW1000XG is used on many synthesisers, soundcards and even hi-fi equipment. It carries the cleanest possible signal from the SW1000XG. The output from the SPDIF connector is exactly the same as from the analogue outputs, in that the information you will eventually hear is the same. You may find however that the clarity of signal from this connector is better than the output clarity of the analogue ports. This can be especially true in a pro studio environment where every subtle nuance can make a difference. If you are fortunate enough to have equipment that can connect to the SPDIF output on the back of the SW1000XG such as a DAT recorder (Digital Audio Tape) or mixer such as Yamaha's 01v, then use this connector. Do not attempt to connect this digital output connector to any analogue audio equipment inputs, as you will at best just hear noise.

D: MIDI I/O. Right at the bottom of the card is the MIDI interface connector. Looking slightly odd for a MIDI connector, it is where you should plug in the MIDI adapter cable that accompanies your SW1000XG. This interface connector supports MIDI in and out to and from the SW1000XG. Although it looks similar to the Yamaha 'to host' adapter ports, or the ports found on most Macintosh computers, please only use the supplied cable that came with your SW1000XG in this socket, as the connections are specific to its use.

Moving in….

E: Gate Array. The largest processor on the SW1000XG card is the P21 custom gate array processor. It is with this chip that the SW1000XG can run at the incredible speeds it does. This chip handles MIDI processing, audio data transfer across the PCI buss, digital clock information, and many other functions at very high speed. This custom processor is also found on the DS2416 card from Yamaha, which we will discuss, in a later chapter.

F: DSP3. Above the gate array is another large chip. This is the DSP3 processor. Again a core chip found in many Yamaha products like the 02R digital mixer, Pro R3 effects processor, and many others, its function on the SW1000XG card is to handle the audio I/O routing. Once more this is a very high-speed processor custom made by Yamaha.

G: DSP RAM: Surrounding the large chip towards the rear of the SW1000XG are RAM (Random Access Memory) chips. These handle buffering of data to and from the main processors and also memory space for some of the DSP processes.

H: Flash ROM: One of the key aspects of the SW1000XG is the flash ROM chip. This allows Yamaha to constantly update the features, and functions of the SW1000XG, and also to make adjustments and repairs to the operating system on the card, without you ever having to open up your computer. Flash ROM is a special type of 'Read Only Memory' that allows itself (using specialised code) to be updated, and unlike RAM based systems, will not forget anything when it is switched off.

I: SWP30B: The heart of the SW1000XG is this awesome processor that found its way into a huge range of Yamaha products, such as the A3000 sampler, CS2s synth, EX series keyboards and many more besides. It contains the huge 20 megabytes of voice sample data, the synth engine and the primary effect processors that allow the SW1000XG to do its job.

J: Connector CN101 – Unlike 'Room 101' from the novel '1984' This connector is no Orwellian nightmare, more like a dream come true for many people, as it in effect means that the SW1000XG will never go out of date CN101 is 'The PLG interface connector socket'.

We mentioned in the introduction to this chapter that the SW1000XG was expandable. This capability comes in the form of the 2 sockets located along the top edge of the card. The first of which is the smaller CN101 connector (white) which is where we can plug in a whole host of new synthesisers, effects processors, and other goodies using a technology known as PLG. PLG (**PL**u**G** in) technology was a system designed by Yamaha for a wide range of our products. It allows totally new engines to be bolted onto (well clipped onto) the host device (in this case the SW1000XG) to give a totally new character or set of features, without affecting any of the existing ones. Unlike some systems by other manufacturers that literally just add new waves to the original sound-set, the PLG system can add a totally new synthesiser. These can be based around such diverse technology as analogue physical modeling, acoustic physical modeling, FM, or even new effects processors such as our harmony effects found on the PLG100-VH card. To cover this is more depth we have dedicated an entire chapter to the PLG range which hopefully will help you make the right choice as to which PLG card is right for you.

K: Connector CN102. Serial Digital output connector. This is a multi-channel digital output connector that can be plumbed into our DS2416 card (more in a later chapter on this). It basically can carry up to 8 discreet channels of data over a proprietary Yamaha digital format, and can also provide master clock information (important in the digital world) for the DS2416 card so that the 2 cards can lock together in perfect sync. It can carry not only audio data, but

also the audio playback from MIDI parts as well, which means that you can (if you are lucky enough to own a DS2416 card as well) process even further your signals without ever going near the analogue domain. The SW1000XG comes with a small ribbon cable that allows you to attach the 2 cards together, don't lose it, as one day it may become your best friend!

Of course there are a lot more discreet components on the SW1000XG (several hundred in fact) that help to keep it ticking over. Needless to say they all play an important role in the card, and whilst to some people, may be very nice to look at, we shall leave it there, and move on to getting the card installed and running.

Stand by for action!

Once you have familiarised yourself with the SW1000XG, it is now time to put the card inside your computer. This is covered in depth in the user manual, but just to summarise a few points that are worth noting.

1: Make sure the power is off to your computer before plugging the card in, and you have earthed yourself to avoid static from your hands affecting any of the components on the card.

2: Make sure that you have a free PCI slot, and at least 1 free IRQ (Interrupt request) if possible. Whilst the SW1000XG under Windows 98, and Windows 95 OSR2 will share an IRQ using PCI-IRQ Steering, we do recommend that the card is sitting on an IRQ all of its own. To check that you have an IRQ free just go to your device manager in control panel, and select 'view devices by type, and then click on properties. This will list all of the IRQ's used by every hardware device in your system. If you do not have one free, you may need to disable some of the non-essential or non-used features in your computer (maybe you don't have any USB devices installed for instance?). If you are using a Macintosh, just plug it in!

3: Make sure that your SW1000XG is fitted firmly, and that you have screwed the card to the PC via the back-plate screw. Common mistake that people make is to leave a card half way in a slot, and unscrewed. The earth connection for the SW1000XG is via the back-plate on your PC, so to avoid potential noise, make sure it is screwed firmly in, and the card is seated correctly inside your computer.

4: Try to avoid putting the SW1000XG next to 'noisy' cards. Some makes of video card and SCSI card can leak excessive amounts of 'RF noise' from their processors. It is always a good practice to keep your video card and audio cards as far away from each other in the PC as possible (slot 1 & slot 4 for example in a typical PCI system).

5: Try to remember that if you plug in a PLG card at a later date, you will need the extra bit of space next to the SW1000XG. Yamaha are not the only company to make upgrades for PCI cards. Some video cards can have RAM boards added to them which can increase the amount of width that they use inside a PC. Try to avoid putting your SW1000XG next to such cards, as it will only mean having to unscrew one of the offenders and moving it!

6: If you intend to integrate the DS2416 card at a later date, make sure one of the adjacent PCI slots is free, as the connecting cable that links the 2 cards together is quite short.

7: Check your motherboard for the chipsets that Yamaha do not recommend. Whilst the SW1000XG is designed to work with almost every type of motherboard, there are one or two that we have found will not work at all or can be problematic. An up to date list can be always found on our **/.com** website, but to summarise here is a list of motherboard chipsets as of time of writing that we do not recommend when using with the SW1000XG.

SiS 5596
SiS 5598
OPTi viper

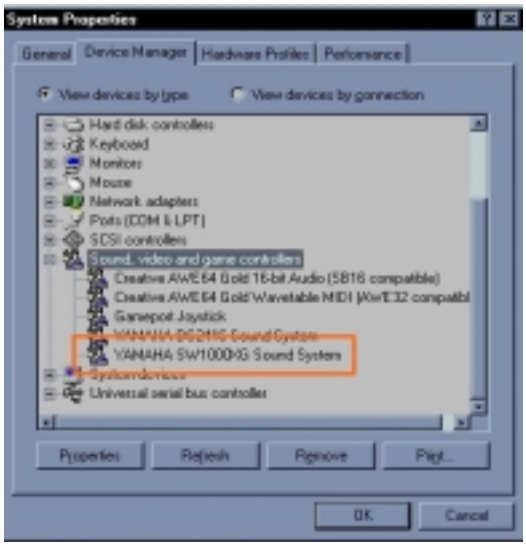
Your motherboard manual will tell you what you have in your PC. It is worth noting also at this point that over-clocking of motherboards with the Intel Celeron processors is fine, so long as the buss speed itself is not over-clocked. The PCI2.1 spec to which the SW1000XG adheres stipulates that the PCI interface speed should work in divisions of 33mhz (a 66mhz PCI slot should be able to drop to 33mhz if required). If you are over-clocking your PC, and find that the SW1000XG is acting up, then the simple solution is to stop the over-clocking in many cases!

8: Make sure your PC is up to the job. The SW1000XG is a powerful card. Its processors and synth engine do not use any of your PC's own CPU power. It is worth noting though that whilst it won't use any CPU power, it also won't give you any that you don't already have. One of the common misconceptions behind the SW1000XG is that it will enable you to run a lot more 'Active Movie' effects, or enable you to run applications that you couldn't previously. Whilst the SW1000XG will help reduce the load on your software by providing hardware mixing and effects, your software's minimum requirements will still be the same. So don't try running something like Cubase VST on a Pentium 90 and expect to get top-notch results. It just won't happen!

With the cost of RAM and CPU prices being at their lowest for years, we do recommend that for any kind of serious audio work you should try and get as fast a machine as you can. Whilst a P166 will work, many faster processors are on the market from Intel, AMD and Cyrix amongst others, and the SW1000XG is happy to work with any of them. Also remember that however much RAM you think you need, you will always need more when the next big software application arrives, as software companies don't code around the slowest chip, they almost always code around the fastest so that their program shines above the others. Bear that in mind!

The SW1000XG itself isn't processor dependent, so you are free to choose your CPU.

Now it's time to turn the PC on!



If everything now goes according to plan, you will see Windows launch and its plug and play system detect a PCI Multimedia Device. This is your SW1000XG saying 'hello' to Windows. (Mac users can skip the next bit!) It is at this point that you will need to feed the CD-ROM or floppy disk of drivers that came with the card into your PC. As the user manual again covers this, we shall not go into too much detail. At this point (or even before you install the card) it may be a good idea if you have Internet access to visit the **xgfactory.com** website. Here you can register your card, and check the 'downloads' section to see what the latest version of the driver is. It may be a good idea to download it even if you think that the one supplied with your card is the most current, as a backup is always good to have.

Once you have installed the drivers, now comes the moment of truth. You reboot your machine and are ready to go. If at this point you are faced with a BLUE SCREEN saying something like: **VSWXGVXD Error**, or **MIDI TX time out.** Then it means that the IRQ (Interrupt Request) the SW1000XG is trying to use is already being used by another card. There are 3 few ways around this. One is to update the driver to the latest driver version using Windows Safe mode. Your local Yamaha dealer will be able to tell you the latest driver number, and it will always be on the xgfactory.com website. The second thing to try if this fails is to move the SW1000XG to another PCI slot. Sometimes the PCI slot may have a problem with IRQ allocation. The third is to reserve an IRQ for the SW1000XG or PCI slot in question in your system BIOS or via Windows. It really pays great dividends to learn more about how your computer works, how the BIOS works, and how devices can be set-up correctly, so if you haven't yet read your manuals that came with your PC, now is a good time to start. The SW1000XG will only ever use 1 IRQ location, and a small amount of memory mapping for input and output. Thankfully the days of IRQ hogging ISA cards are almost gone.

Speed demon?

The SW1000XG is designed to function equally on all good speeds of PC, and all types. Unlike some soundcards which have functions, which simply do not work on Cyrix or AMD, based processors, or that only work on the very latest Pentium machines, no aspect of the SW1000XG relies on the processor type or speed.

The problem with speed mainly falls down to the applications software package you are using. Some of the applications software we will discuss in this guide will only comfortably run on high class Pentium or Macintosh machines. We recommend that before you make your software choice, to contact the manufacturer of the application package. You should tell them what it is you wish to achieve from your software (multitrack audio & MIDI) and let them recommend a speed of machine that their software will comfortable run on, not their minimum system requirements.

So to conclude, if your new SW1000XG equipped PC in Windows boots normally (99.999% of all cases) then congratulations you are now ready to enjoy the audio ride of your life. To check that it is all working well just open up your Windows Control panel, look at *'System'*, and check '*Sound Video and Game controllers'*. You should see Yamaha SW1000XG Sound System with no error marks or exclamation marks next to it. If this is the case, then it's time to fasten your safety belts as we take the journey through what this marvel of technology can really do.

Hardware Note: The SW1000XG does not have an internal connector for CD-ROM audio output, as is common with most professional audio cards. Your games card (should you have one installed) will normally have adapter sockets for CD-ROM audio connection.

Chapter 2

A brief outline of XG, system exclusive data, controllers and what it all means to the SW1000XG.

As we discussed in chapter 1, the SW1000XG is a multi function card that is in summary the following.

1: A multi channel digital hardware mixer
2: A multi channel multi effects processor
3: A 48-channel MIDI interface
4: A comprehensive and expandable hardware synthesiser
5: A digital interface adapter

If you think that only a few years ago, buying a multi-channel digital mixer could cost several thousand dollars, and add to that 6 independent 24 bit effects processors, a synth, a MIDI interface, and everything else the SW1000XG can do, you begin to realise why it won so many awards including soundcard/hardware product of the year in 1999. The key to the SW1000XG however is in the software used to control it. Without software it is pretty much just a plain and simple soundcard. Luckily Yamaha provide almost all the software tools you will ever need free with the card in the form of XGWorks (Windows 95 only as of time of writing). However we also recognise that many of you have your own favourite bits of software, and wish to carry on using them. This chapter begins by explaining just how the SW1000XG is controlled, and covers the basics behind XG, MIDI and all of those mysterious words that you hear 'tech types' come out with.

So what is MIDI?

Many books have covered this subject in far more depth than we will. Needless to say that if you don't understand MIDI, then why have you bought the most powerful MIDI-card in the World? MIDI is a communications standard that all musical instrument manufacturers agreed to support in the early part of the 1980s. It defines a way of 2 or more devices communicating with each other, such as a drum machine and a keyboard for example. There are many levels to the MIDI standard, needless to say the SW1000XG is conversant with all the good ones including the General MIDI standard, The GS standard, and the XG standard. XG is Yamaha's approach to the limitations of the original GM spec.

The Yamaha XG format is basically a set of rules describing how a tone generator will respond to MIDI data. The current GM (General MIDI) format is a similar concept, allowing GM music data to be reproduced accurately on any GM tone generator from any manufacturer. GM, however, applies only to a limited set of parameters. XG significantly expands on the basic GM format, providing many more voices, voice editing capability, effects, external input, and other features that contribute to enhanced musical expression. And since XG is totally upwardly compatible with GM, GM data can be accurately reproduced on any XG tone generator.

The whole basis behind the XG system revolves around 3 key concepts

1. Compatibility

XG data will play accurately on any XG tone generator. And, since XG is upward compatible with GM, GM data will play accurately on any XG tone generator.

2. Scalability

Although the XG format defines an extensive range of parameters and allows exceptionally fine musical control, not all XG devices need to conform to the full XG specification. The XG format allows features and capabilities to be "scaled" according to price and target applications. When music data is played on a scaled-down XG device, playback is adapted to the capabilities of the device used. If, for example, a specified voice is not available for a certain part, that part will be played using a similar basic voice. On the other end of the scale, models equipped with a graphic equaliser can be automatically set to play hard rock pieces or classic compositions with appropriate overall EQ. The SW1000XG is tight up at the top of the XG ladder, and as such supports everything that XG currently offers.

3. Expandability

The XG format has been designed to allow future expansion whenever needed.

Now the SW1000XG as you will see conforms to this, and is also at the pinnacle of what XG is about. It takes the concept of scalability to new heights, and as far as expandability goes, it doesn't get much better.

But what makes XG work? Well MIDI has several fundamental instruction event types. The most obvious ones are things like note data. When you press the key on a keyboard, your sound module or card plays the corresponding note. Program changes allow you to choose which sound is playing, and modulation from things like a pitch bend wheel or mod wheel can alter the sound, but this is only scratching the surface of the SW1000XG, as we will now show. XG relies on several other data types, which at first may seem terrifying but once mastered can transform your music, and thankfully you don't really have to know too much about them, as later chapters will demonstrate.

Anyhow, on with the show. Let's start by explaining some of the common MIDI terms used in this guide.

Controller Numbers.

The MIDI standard defines a list of 128 controller numbers, many of which have been fixed and in use for many years. Controllers such as controller 7, which determines the volume of a MIDI part, and controller 11 which can affect the expression level of a sound. All XG instruments respond to the standard controllers of the GM and GS spec, but add a few extras such as effect sends using controllers 91.93 and 94. Yamaha's free 'XG Guidebook Volume 2' which is available from all good Yamaha subsidiaries, goes into great depth via a series of lectures the importance of controllers and lists specific examples. Most of the power of the synth engine of the SW1000XG (all 32 parts of it – a part being a unique synth sound or voice) can be controlled using controller numbers. A common effect used in most dance tracks is the 'squelch acid sound' of a bassline synth. Using the controllers 71 and 74, which are filter resonance and cut-off respectively can accurately mimic this. This guidebook will not go into depth on the principles of synthesis, however our XG Guidebook does cover the basics, and many other manuals have varied explanations of what 'resonance' for example is all about.

It is at this point maybe worth noting some of the synthesiser parameters you do have access to with the SW1000XG.

The key elements behind the sound of SW1000XG can be summarised as follows

1: The basic soundset – You have over 1300 on board basic sounds on the SW1000XG. Ranging from acoustic pianos, brass, string, woodwind, synthetic, drum, basic waveforms, ethnic, percussion, organs guitar, bass pipe and sound effects. So without even adjusting a single parameter, you have a palette of sounds that every synth player on Earth would have killed for only a few years ago.

2: Each sound can comprise of more than 1 element. Each sound on the SW1000XG can be made up of a single element or 2 elements. These can provide intricate soundscapes where one sound forms the attack (beginning) or the sound, and morphs into another for the main part of the sound. We shall go more into the possibilities of sound layering in future chapters.

3: The synthesis parameters – You have full control over a wide range of 'modulation' parameters (parameters that adjust or modulate the sound). These include.

Low pass filter cut-off, Resonance, Attack, Decay, Sustain and release (for the amplitude envelope), Pitch Envelope, High Pass filter, Vibrato rate, Delay, and Depth, Tuning, EQ (for each sound), Keyshift panning, Portamento, the list just goes on and on. All of this and we haven't even started on the effects processing section yet! It responds to a myriad of controllers all in real-time, thus making it possible to change the character of a sound as your song is playing. Thus lies the key to 'real' music, and to XG. Real instruments are not static samples, or snapshots. They change with time, or with how hard you play them (the expressive element), or how you use effects on them. It is this that makes the SW1000XG so powerful

4: 6 independent effects processors. A lot has been said about effects processing by many books over the years. It can add so much to a sound, just to add a bit of subtle reverberation for example makes a sound come alive. With the SW1000XG you get access to hundreds of pro studio quality effects (not an idle boast. Yamaha practically invented the studio multi effects processor, and our effects units are found in almost every professional studio in the World!). Effects can make the difference between a boring sound and a crunching 'in-your-face' sound that can transform your tunes. In total you have 12 reverb types, 14 chorus types, 70 variation types, 42 Insertion types (x2). So in total, you have 12+14+70+42+42+1(eq) = any six from a Palette of 181 different 24 bit effects available to you at any one time. And that's just the presets!

When you consider that every effect can be modulated with up to 16 parameters, and that effects can also be sent into each other (Chorus send to Reverb Depth for example), then you get the picture of the mind-blowing amount of DSP that this card has. We shall go into the effects, their routing and bussing options later in this guide.

NRPN'S – Non registered parameter numbers

Think of these as additional controller types. You send out an NRPN controller number MSB (known as the Most Significant Byte), followed by the number of the parameter you wish to control (E.G 24 = Drum Pitch Coarse). Followed by the NRPN LSB (Least significant byte) which for example could be 38 = snare drum. Followed by the data value controller number (CC#6) and give it a value of 127 (maximum value for all NRPN and controllers is 127 (7 bit). If this is too quick and loose a description, then it is intended to be, as the mission of this book is not to explain MIDI in great depth, but to cover the workings and methods of working with the SW1000XG.

Needless to say, the SW1000XG works extensively with NRPN data, which again when mastered can bear great fruits.

This is covered again, in great depth in the XG Guidebook mentioned earlier.

The BIG ONE..SYSEX (System Exclusive Data)

Known to reduce grown men, and hardened MIDI programmers to jelly, sysex is a powerful friend when mastered. It forms the heart of all devices and is the one set of parameters that when a device is sent sysex, no other device (unless programmed to do so) will understand. This is why sysex is such a powerful weapon for XG.

Every manufacturer has a sysex ID number. These are set out by the MIDI Manufacturers Association, and as system exclusive works in the Hexadecimal form (Base 16 for counting as opposed to your standard base 10), we will use HEX values from now on for all sysex notation.

Yamaha's value is 43H, and as you will see. This is one of a few sysex numbers that you will see a lot more of. (43H = 43 Hex)

The world of sysex is very daunting at first. We have all been though it here at Yamaha, and once you have grasped the main concepts it is a very rewarding way of working.

Before we go into some typed examples we will try to explain the fundamentals of SYSEX data.

SYSEX is a way of talking to the SW1000XG at one of its most basic levels. The SW1000XG is a computer, and to talk to a computer you need to learn how to program it. As with computers, application packages are designed to help make things easier to use, and the excellent XGEdit by Gary Gregson, is one such program. We shall go into much more detail on XGEdit later in this guide, if however you wish to modify things at a real base level then sysex is the way to do it.

Sysex is comprised of a series of data bytes, they have a specific order and mean specific things when typed in that order. When typed in incorrectly they will either do nothing at all or will give an unexpected result.

If you think as we said, of the SW1000XG as a computer, then as any programmer will know, computers work based upon the operating system code that they have embedded or loaded into them. A computer will have an amount of memory dedicated to this function, and the locations within this are known as memory addresses. Sysex allows you to feed data into these memory address slots by giving you the memory areas (that complex bit in the back of the user manual) that each parameter lives in. This is a simplified way of thinking about it, but it works!

The following data bytes are as we mentioned in what is known as Hexadecimal. This is a 2 byte alphanumeric format which basically is a number anywhere between 0 and 255 (e.g. 00 = 00 OA=10 7F= 127).

To manually edit a parameter using sysex you should familiarise yourself with the way in which your sequencer of choice or application allows you to do this. It is then just a case of typing by hand the data in. The way in which data is entered using the sysex editor or event list editor in your sequencer (more of which is discussed later) can be shown by the following example.

F0,43,10,4c,02,01,00,7f,f7

Some editors require a 'comma' between hex values, some do not. Some require you to enter with the letter 'H' after the value denoting a hex value, some do not. It is up to you to investigate how your specific software works.

Anyway, a breakdown of the above string is as follows.

The first data byte (F0) is known as the start of sysex, all sysex will begin with F0
Byte 2 (43) is the Yamaha ID code
Byte 3 (10) is the device number for the SW1000XG by default
Byte 4 (4C) is the XG native control parameter (other devices attached to the SW1000XG by the PLG socket may have a different control byte, for example the PLG150-AN responds to 5C for it's control byte)

The last byte (F7) is always F7. This indicates the end of the sysex stream

The centre 4 data bytes (it can be sometimes more than this) will correspond to the command specific data. If you imagine these data bytes are saying 'OK now I want to call up a reverb and set it to Room 2', then the complete data stream would be as follows:

F0 43 10 4C (This is required by all XG units) **02 01 00** (Address indicating a Reverb effect parameter) **02 01** (Room 2) **F7** (end of sysex)

So when you go ploughing through the DATA LIST manual for the SW1000XG and start to go cross eyed with the barrage of numbers being thrown at you, it's ok. (Funny story – When we were younger, and all had DX7's etc, the last thing any of us used to look at was that mindless mess of numbers in the back of the user manual…now it's the first thing we at Yamaha look at!) Remember, don't panic if you look at it with this section in mind, it may start to make some sense.

If you remember the key points that almost every XG unit responds to F0 43 10 4C……..ended by F7, and that the bits in the middle can be found in the user manual for every parameter, then your life with XG will be so much more fulfilling.

As we said earlier Yamaha have a free guide to XG in general and have also published their XG specification sheets, and earlier guides online at www.yamaha-xg.com and www.yamaha.co.uk/xg. Well worth looking into if you want to know even more about XG.

QS300 Mode

Some of Yamaha's earlier XG devices such as the DB50XG and SW60XG supported a so-called secret mode, known as QS300 mode. This was a 2 element implementation of our acclaimed 'Ravers Babe' synth the QS300. Sadly the SW1000XG doesn't support this mode. However, as you will see in the forthcoming chapters, the amount of power it does have is more than ten-fold greater than that offered by our level 1 XG devices, and with some of our PLG cards, the immense synthesis power craved by some, is already on offer. If you really need to keep QS300 mode, and are thinking of adding the SW1000XG to your system, then do just that…add it!. Keep your existing DB50XG/SW60XG inside your PC, and get even more synth power than you would/could ever need (almost!)

TG300B Mode

The SW1000XG along with all other XG hardware synths from Yamaha supports TG300B mode. Yamaha prior to the release of the XG range released a module known as the TG300. This basically responded in the same way that GS instruments worked and as such this mode can be used to support GS compatible playback. The scope of this guide is insufficient to cover the ins and outs of TG300B mode, needless to say there is a lot of information on the internet relating to GS and TG300B mode should you wish to research this further.

MU Native Mode

Some XG compatible MIDI files are arranged and composed using XG level 1 devices such as the DB50XG, our SYXG50 software synth or the MU50 module. Playback of MIDI files that work in this way can sometimes sound different to when they were originally composed. This can be remedied on the SW1000XG by placing the SW1000XG into MU native mode. This is a sysex string that should be inserted after the GM and XG reset commands in the event list of your sequencer.

The sysex string is.

F0 43 10 4C 00 00 12 00 F7 – MU NATIVE
F0 43 10 4C 00 00 12 01 F7 – Switch back to SW1000XG native (this is not needed as an XG reset will perform the same task)

Now after scaring yourself half to death with the fundamentals of sysex, we are about to show you ways of never having to enter a single byte of data in your life, and some secrets as to how we all appear to be Einstein when it comes to sysex.

Chapter 3

Essential tools and why they are so important. (Hubis loopback, MIDI-OX, MIDI-Yoke, XGEDIT)

If we had to say why is XG now used by over 10 million people, why is it so acclaimed in the industry, and why is it so powerful, we could just say 'Because Yamaha are cool!" One of the key reasons though behind the success of XG is a man by the name of Gary Gregson.

When we first starting working with XG back in the early 90's many of the original data programmers (the guys who slaved over the demo tunes) had to manually type in sysex data. Then manually check that it was in the correct order (XG is very fussy about data order), and then make sure that the MIDI-file or voice we were working on would work in every sequencer. Now to say that this was time-consuming and tedious would be like saying that Albert Einstein was 'A bit of a bright chap!' It would be the understatement of the decade.

So we began to hunt the Internet for some decent editing software, the hunt didn't take very long!

XGEDIT

Gary Gregson had already made up a nice little editor for the GS range of instruments, known as SCEDIT. Yamaha sent Gary a polite little email asking him if he would be interested in writing a similar application for the (at that time) brand new DB50XG card (another hugely successful XG device), to which (thankfully) Gary said 'Go on then!' Thus the legend that is XGEDIT was born. We cannot understate the importance of XGEDIT with regards to XG, as its superb GUI (Graphic User Interface) and simple layout has made controlling the power of XG a pleasure for literally tens of thousands of people. XGEDIT supports a wide range of Yamaha's XG modules and soundcards.

At the top of its supported products tree proudly sitting and looking down at the others is the SW1000XG.

XGEDIT is shareware, Gary Gregson wrote this application and retains the full rights to it. As with all good shareware (which anyone will confirm, this is very good!) it should be registered after 21 days of use. This can be done with Yamaha via the virtual shop at www.yamaha.co.uk/shop. At only £25 (around 40 dollars) many have said it's the best investment they have ever made. The shareware version does everything that the full version will do, except save your edits, so you can get a full feel for how it all works, and how much control you can get over the SW1000XG. For the purposes of this guide, we recommend you have a copy of XGEDIT, unless you are exclusively using the bundled XGWorks application, which has the functionality of XGEDIT but embedded within a sequencer engine of its own.

XGEDIT can be downloaded from http://www.yamaha.co.uk/xg/html/software/s_XGEdit.htm It will form the basis of many of the chapters in this guide, so please try and get hold of a copy if you can.

XGEdit comes with a comprehensive user guide/help file. This allows you to really get to grips with how it works, what it can do, and what levels of support are offered for each Yamaha module and soundcard. It runs on several operating systems including Windows NT, and forms an essential part of Yamaha UK's editing toolkit for XG.

As of August 1999 XGEdit is supplied on the SW1000XG CD-ROM (Windows 95/98/NT/2000)

HUBIS LOOPBACK

The second of our essential tools set is Hubis loopback MIDI driver. As most people would want to be able to use the SW1000XG inside their sequencer of choice (such as Cubase or Cakewalk for example), the use of a MIDI piping system with the SW1000XG became essential. This is due to the fact that the MIDI driver originally supplied with the

SW1000XG was not multiclient. This means that whilst one application such as XGEDIT is talking to the SW1000XG, no other application can do so at the same time. (Even Yamaha can't get everything right!). The solution to this was Hubis loopback. This small driver basically works as a kind of piping system for MIDI devices. You connect one pipe to another to form a link within your computer, analogous say to plumbing 2 wires together between different rooms in a house to allow power to flow between 1 room and the next. The principle works like this.

When you install the SW1000XG it's MIDI ports appear (or should) in all MIDI applications as follows

MIDI IN = SW1000 MIDI IN
MIDI OUT 1 = SW1000#1 Synthesizer
MIDI OUT 2 = SW1000#2 Synthesizer
MIDI OUT 3 = SW1000 MIDI OUT

So for example should you wish to communicate using XGEDIT with the SW1000XG's first 16 parts of its internal synth engine (remember that the SW1000XG supports a total of 48 MIDI channels), then you would select **SW1000#1 Synthesizer**, and then select a channel between 1-16. For parts 17-32 your selection would be **SW1000#2 Synthesizer** and then a channel between 1-16, and for external connected devices your selection would be **SW1000 MIDI OUT**, and channel 1-16 giving a total of 16+16+16 = 48 MIDI channels.

Now if you try to access the same MIDI ports in, for example Cubase VST whilst having XGEDIT still running, you will find that the following message appears

MIDI ERROR – DEVICE ALREADY ALLOCATED

Or

DEVICE ALREADY IN USE

Which poses a bit of a problem. So what do you do?

Well, with Hubis loopback you get a set of up to 4 new MIDI pipes labelled LB1, 2,3 and 4 which can provide a communications link between applications such as XGEDIT and Cubase by replacing the MIDI output assignments inside your controlling app (XGEDIT) with the following

MIDI IN - None
MIDI OUT 1 – LB1
MIDI OUT 2 – LB2

And then in Cubase (for example)

MIDI In 1 – LB1
MIDI IN 2 – LB2
MIDI IN 3 – SW1000XG MIDI IN

(You see that your keyboard (which may be connected to the **SW1000XG MIDI IN**) port still plays fine due to the fact that Cubase has one of its ports assigned to **SW1000 MIDI IN)**

We will cover much more of the finer points of this set-up with regards to each application in later chapters, but needless to say, that for Windows 95 and 98 users, Hubis loopback (or MIDI Yoke (see later)) is 100% essential unless you plan to work totally inside XGWorks.

To install Hubis loopback, first get hold of a copy (xgfactory.com), then read the text file that came with it. It explains how to install the driver (Windows actually thinks that it is a new piece of hardware!)

A word of caution at this point though. It is very easy to create infinite loops with Hubis that can cause your machine to crash. Read the notes that come with the driver, and also check out the diagrams in each chapter, which explain how to configure Hubis and the HWDCABLE application that comes with it for error free enjoyment.

A second word of caution applies to Windows 95 owners!

Microsoft (in their infinite wisdom) decreed that 'no-one would ever need more than 10 MIDI devices in their computer', and so set a limit inside Windows 95 of exactly that, which with hindsight now seems a little strange, but hey, we all make mistakes!. Thankfully this problem never occurred in Windows 98, so Win98 users can skip this bit.

The Windows 95 device limit problem

Most game compatible cards will install between 3 and 4 MIDI devices. The AWE64 for example (being a popular card) would install a driver for its hardware synth the software waveguide synth, its external MIDI port, and also the FM synth. Now if you add an SW1000XG with its 3 MIDI ports, you get 7, and then if you install Hubis 4 ports you get…11

CRASH!

Now there has never been a better time to upgrade to Windows 98. (Note: NT does not suffer from this device limit, and Macintosh users will just be laughing at this point, as they have never suffered from any device limits). It is also worth noting at this point that the SW1000XG isn't games compatible in DOS at all, if you want to play games, getting a game compatible card is a good idea. The SW1000XG is a professional music production card.

To get around this limit you can selectively disable ports in your sequencer, but then with most pro PC users having at least 2 cards in their machines (one for games and 1 for music), and sometimes many more (this author has 4), you begin to see the limitations. So, what is the solution? Answer There isn't one. You either disable ports, or you get Windows 98/2000. **(Note: As of August 1999 Hubis loopback was included on the SW1000XG CD-ROM)**

The last point is that Hubis doesn't work under operating systems like Windows NT4 (as of time of writing anyway), which in itself isn't a problem, until you try to run XGEDIT (which runs fine under NT) and say Emagic Logic Audio (ditto). The solution to this comes in the form of

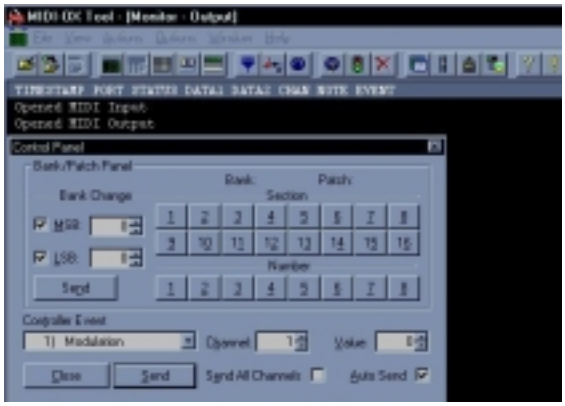
MIDI-YOKE

MIDI-YOKE runs under 95/98 and NT, and works in a very similar way to Hubis in that it is a cabling system for piping application A into application B. Again this is a freebie to download, so if you are planning to run NT or just fancy a change from Hubis, you can get MIDI-yoke at

www.xgfactory.com

For reference in later chapters, we will be using Hubis almost totally, but the methods applied will be the same for MIDI-Yoke. MIDI-Yoke again comes will good documentation, so please read it if you plan to use this driver.

MIDI-OX



Now we told you at the beginning of this chapter that we would let you into a secret. Well this is it, MIDI-OX.

MIDI-OX makes us appear like the genius's that we are, when we get email from users asking for sysex code specifics, we can turn around in the blink of an eye, and respond with the correct code line…HOW?

Now we have already talked about XGEDIT and HUBIS, MIDI-OX forms the final part of the 'Unholy Trilogy' for technical support. MIDI-OX can best be described as a 'Swiss Army Knife' for MIDI.

MIDI-OX is a Windows 95/NT program. It is a 32-bit program, which will not operate under earlier versions of Windows (such as 3.1, but then nobody seriously still uses that ..do they?). MIDI-OX is a multi-purpose tool - it is both a diagnostic tool and a 'System Exclusive' librarian. It can perform filtering and mapping of MIDI data streams. It displays incoming MIDI streams, and passes the data to a MIDI output driver or the MIDI Mapper. You can generate MIDI data using the computer keyboard or the built-in control panel. You can also record and log MIDI data and then convert it to a Standard MIDI File for playback by a sequencer.

What this means in plain English is that if you connect XGEDIT up to MIDI-Ox via Hubis loopback in the following way.

XGEDIT

MIDI IN - None
MIDI OUT 1 – LB1
MIDI OUT 2 – LB2

And then in MIDI-OX

MIDI In 1 – LB1
MIDI IN 2 – LB2
MIDI IN 3 – SW1000XG MIDI IN

You can monitor every little tiny drop of data being sent out by XGEDIT. You need to make sure you have the latest version of MIDI-OX, which is at.

http://www.yamaha.co.uk/xg/html/software/s_MIDIox.htm

And make sure that in the menu option you select *'PASS SYSEX'* but apart from that, it's really easy. You move a knob or dial in XGEDIT, and up on the MIDI-OX window appears the appropriate sysex or controller number for the parameter you have just edited.

It's so simple, but wickedly effective, and enabled us to write all sorts of mixer maps for the SW1000XG in record time. How? Well it enables anyone to read what data is being sent out by an application like XGEdit, and also allows copy and paste of this data into your software or into a user guide such as this one.

So instead of picking up the phone to Yamaha next time you get stuck with a parameter, just download MIDI-OX (which will work with all of the rest of your studio gear as well!) and become your own 1 man MIDI-sysex tech support expert (that is once you understand sysex).

There are a host of other tools available for XG devices on our Yamaha.co.uk/xg website. Many of them are designed to make life easier in terms of voice selection, or effects editing. The ones we have covered in this chapter though are truly essential.

Yamaha's websites are always on the look out for new and innovative editing tools, and sequencers that support XG, so if you know of one, why not email us (details in the back) and nominate your application of choice.

So now that you are armed with this knowledge, and hopefully have downloaded the tools we will be featuring in this guide, it's time to move on and start covering the applications packages that most of you will be using with your SW1000XG.

Common Questions:

1: Where can I purchase XGEdit and how much does it cost?

www.yamaha.co.uk/shop and the cost is £25 UK (Around 40 US Dollars). Registered users get full technical support and free updates. If you do not have web access you can call +44 (0) 181 987 9485 (0181 987 9485 UK). This number is for sales orders of XGWorks and XGEdit only, and not for technical support.

2: Is XGEdit compatible with Windows 96/98/NT and Windows 2000?

Yes fully.

3: Do I have to pay for MIDI-OX?

MIDI-OX as of time of writing is freeware, so no you do not have to pay for it.

4: Do I have to pay for Hubis loopback?

Again this is freeware.

5: Do I need to use the Hardware Cable tool with Hubis for it to work?

No, as you will see in future chapters, Hubis can be connected in a variety of ways to your sequencer.

6: Can I use XGEdit with XGWorks?

Yes, but it would be slightly pointless to do so, as all of the features of XGEdit are covered by XGWorks, albeit in a different way.

7: Will the MIDI player in XGEdit playback 32-part MIDI file arrangements?

No, but we would expect you to use your professional sequencer for this anyway.

Chapter 4

Getting started with the bundled copy of XGWorks

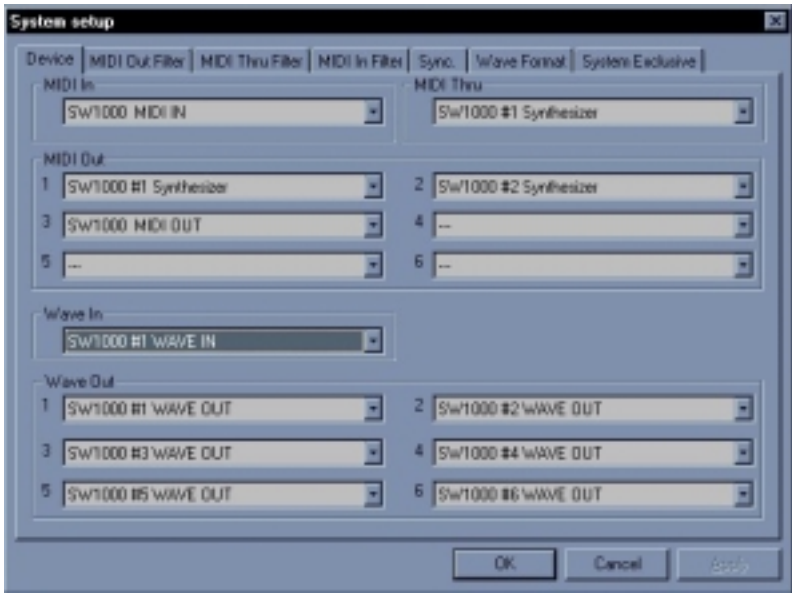
XGWorks is Yamaha's first attempt at writing a Windows based sequencer program. Most of the key information relating to its use can be found in the PDF file and user manual that accompanies the SW1000XG itself. This chapter aims to clarify a few points, and hopefully get your system all set up and running smoothly. We do recommend that you read your XGWorks manual thoroughly first to familiarise yourself with the software, as with any application package, the user manual can answer many of your first time questions. We admit though that many people, in a hurry to get playing and writing music, just don't bother to study their manuals, shame on you!

Ok so once you have XGWorks installed by following the instructions in the user manual. It is time to begin.

A first word of caution relates to the manual itself. One of the opening chapters seems to imply that you have to install something called the CBX serial driver for Windows to make anything work. This is simply not the case with the SW1000XG. It has been a source of many tech support phone calls, and so we can quite simply state here that unless you have another module that uses the Yamaha 'To Host' serial port connector and wish to install the CBX serial port driver to talk to and connect to this. That '**you do not have to install the CBX serial driver at all'**. The standard set of Windows MIDI drivers that accompany your SW1000XG are fine for all of it's operations.

XGWorks is designed to help make XG easier. It has the most complete set of editing functions for XG of any sequencer program on the market today. Many people, even if they are hardened users of other applications such as Cubase, Cakewalk or Logic, may begin the composition process in XGWorks if they are using an XG module or soundcard, simply to get the correct edits and voices.

The use of drivers such as Hubis loopback isn't really applicable to XGWorks, due to the fact that it has all of the parameter support you will even need to get at the SW1000XG embedded within it. You can just use the standard SW1000XG mappings for MIDI in and out in the XGWorks system setup. These are normally as follows.

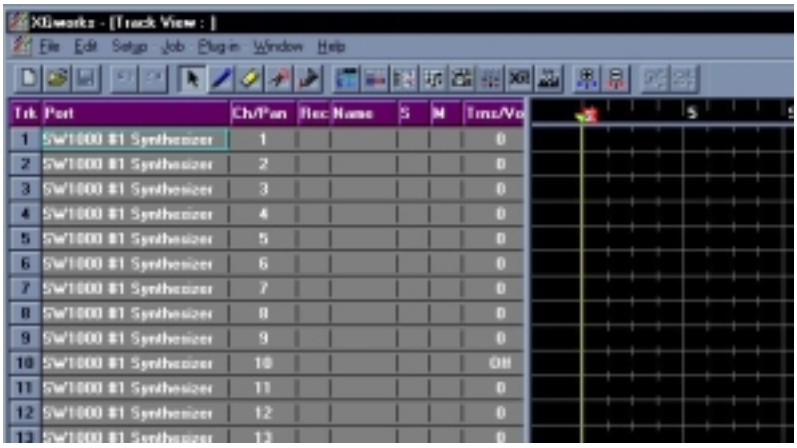


'Typical setup of the SW1000XG inside XGWorks'

MIDI thru can be set to any of the available ports, should you so wish to play other modules in your system, but the common setup for people just using the SW1000XG typically looks like the diagram above.

With regards to the other tabs inside the setup menu, such as MIDI filtering for OUT, IN and THRU, it is very sensible to check these are not accidentally filtering out information such as note data, or sysex data (vital for the SW1000XG). You should also check that you have sync set to internal clock unless you are driving your copy of XGWorks from an external sequencer device (such as a Yamaha QY tone module for example!). If XGWorks reports a port is already in use when you close this page, then check that your ports are not assigned to more than 1 output at the same time.

You will know that all is well and working when you go back to main arrange page, and it looks like this!

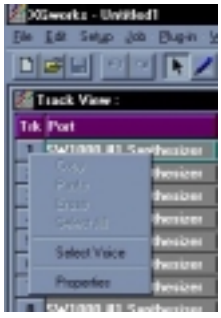


When you have your MIDI keyboard attached to the MIDI in of the SW1000XG, and you select a track to record that has its port set to **SW1000 #1 Synthesizer** or **SW1000 #2 Synthesizer**. You should initially be able to hear a Grand Piano sound play. If you cannot, it may be time to check that your SW1000XG MIDI cable is securely plugged in, that you have the connections the right way around, and that your keyboard is sending data out correctly. A good way to check this is by using something like MIDI-OX (now you begin to see why it is so useful, as it also acts as a diagnostic tool as well).

A common mistake many people make in XGWorks is when they have edited a voice, or even selected a voice, and then saved their song, they find that on re-loading and playback, all of the voices saved have gone, and just a big set of grand pianos are playing. The reason for this is that to correctly edit a voice in XGEDIT and set it up for a track, you actually need to perform a task known as *'Insert XG parameter'*

If we go through the process of setting up a track with the correct sound, and performing a few edits on it, you will begin to see what we mean.

For example: Let's say that on MIDI track 1 we want a bass sound, with loads of filter and resonance. Well we could quickly call up this sound using the right mouse button on the track marker, to select a voice as shown below.



But this would not actually store the voice in a track. The proper way to call up a voice, edit it, and store it in a track is by going to the XGEditor screen, and following the simple rules shown below.

1: Select your voice from the XGEditor screen by clicking on the part number (MIDI track), and then from the voice list box that pops up, select your sound.
2: If you wish to edit this sound, click on the detail button at the bottom of the XGEditor window (next to where it says MULTI PART, and edit away.
3: When you are happy with your sound, click on the *"Insert XG parameter"* option at the top of the XGEditor Window (The small green arrow pointing down onto a red line, and select the track that you wish your sound to be on)
4: If you have not as yet recorded anything onto this track, you will be asked if you wish to create block, click 'yes', and hey presto, you will be able to see a new little block of data on your track. This will contain not only the correct program change message to call up your voice, but also all of the parameters that you have just edited.

You can verify this for yourself, by using one of XGWorks most powerful features: The event list!

Now remembering what we said about sysex, and all those horrible codes that you may have to learn, well in XGWorks you don't have to remember a single one of them. This is because XGWorks has a very clever event list system, which can (unlike every other sequencer) understand all those little codes, and translate them into plain English as is shown in the following diagram.

List:2

Block1

L1	L2	L3	Type	Value1	Value2
0001	01	000	XG Prm Sys XG System On	XG System On	43 10 4C 00 00 7E 00 F7
0001	02	000	XG Prm Prt001 Bnk Sel Lsb	24	43 10 4C 08 00 02 18 F7
0001	02	010	XG Prm Prt001 Prg Num	39	43 10 4C 08 00 03 26 F7
0001	02	020	XG Prm Prt001 Fltr Cutoff Freq	-45	43 10 4C 08 00 18 13 F7
0001	02	030	XG Prm Prt001 Fltr Res	33	43 10 4C 08 00 19 61 F7
0001	02	040	XG Prm Prt001 Eg Dcy Time	48	43 10 4C 08 00 1B 70 F7
0001	02	050	XG Prm Prt001 Pch Eg Releas..	39	43 10 4C 08 00 6B 67 F7

As you can see on the left-hand side is the **BAR/BEAT/MEASURE** number. Then the **TYPE** of event in English, followed by its value, and then the **SYSEX** code that it corresponds to. Our Bass voice is Program 39, in Bank LSB 24, and we have moved the filter down by a value of 45, and the resonance up by a value of 33. In plain terms, this is a feature that you should really get to know, as when you are composing or mixing a track. The ability to be able to see exactly what is going on via the event list is going to save you hours of work. As you can see in the Value 2 field we have the Yamaha 43 10 4C followed by the data bytes and F7 to finish as discussed earlier in the guide. Now it should start to make some sense.

You can also edit within the event list, just by clicking on one of the fields, and changing the data. You could for example click on the **Fltr Cut-off Freq**. value in the event list itself, and make it higher or lower. The changes made will only become apparent when the song has actually played past the data value however. You can also just step through the event list with your mouse or arrows on your computer keyboard to listen to notes or hear the changes one at a time.

Now you can go to another voice, or track, and do the same, selecting a sound, editing it and placing it in a track. If you make a mistake, you can always undo it or edit the data out of the event list. And when you are happy with your overall track or song you can save it either as a native XWS file or as a standard MIDI file.

This brings us on to our next point, AUDIO!

Audio tracks within XGWorks are explained in the supplementary guide in the SW1000XG user manual. A few points of note though will help make life with Audio so much easier.

Point 1: Saving a song as a MIDI file if it contains Audio tracks is not a good idea!
Audio tracks in XGWorks are only saved within an XWS file, not in a MIDI file, so if you have slaved for hours on a great vocal take, only to find that it is not saved in your song, then you **should have read the manual**! Only save songs with Audio as XWS files.

Point 2: You cannot control the input gain of the SW1000XG from the SW1000XG Audio mixer in XGWorks.
This is a limitation of the SW1000XG driver. MME input gain control is just not featured in the driver code. You can switch the input gain between **MIC LEVEL** and **LINE LEVEL** using the AUDIO editor in the XGEditor Window. Just click on the detail tab for an audio part in the XGEditor, and you will see the range of options present for Audio parts

Point 3: If you wish to record your vocals or other audio part with effects, then select 'SW1000 #2 Wave in' as the default record input option in the XGWorks SYSTEM SETUP menu.
However, this option is also the loopback record option, and as such will also re-record anything that the SW1000XG is currently playing back also, be it synth parts, or other audio tracks. The correct way to record your audio parts with effects (as any studio owner will tell you) is to monitor with the effects on and actually record the signal dry. With this option, you can play around with different effects, and then when you are happy with the end result 'Print the effects to the track' using the re-record option.

So how does one go about this?

Here is a quick guide to recording with effects. The methods here apply to all users of the SW1000XG.

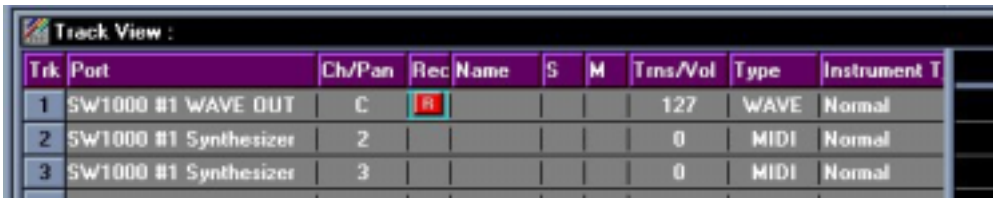
Decide if your track is to be recorded as mono or stereo. The SW1000XG is a 12-stream card. This basically means that it can independently process up to 12 streams of audio data at the same time. This isn't the number of tracks it can play back (a popular misconception), as the SW1000XG can easily handle hundreds of audio tracks. It refers to the individual wave parts that you have control over at hardware level.

The SW1000XG wave outs are set up as follows

SW1000 Wave out #1
SW1000 Wave out #2
SW1000 Wave out #3
SW1000 Wave out #4
SW1000 Wave out #5
SW1000 Wave out #6

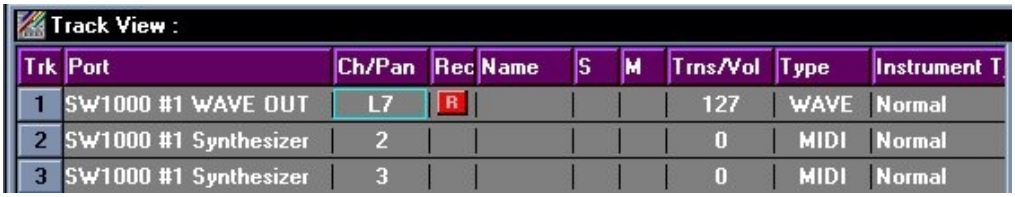
This corresponds to 6 stereo pairs of MME wave audio ports. This gives us our total of 12 wave streams. As each of these ports when panned correctly can act as an independent mono wave track.

So for example, if we wished to record a stereo part on track 1. We would set it up as shown in the next image.



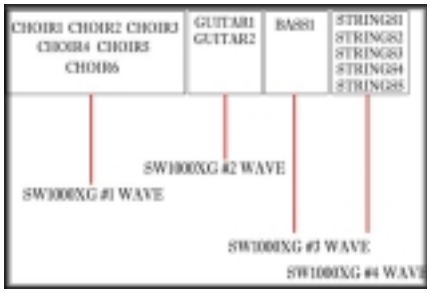
Notice the Pan position is set to C for Centre. This means that SW1000 Wave record and playback to SW1000 #1 Wave out will be equally split between the left and right channels of SW1000 Wave Out #1. If you record a track on this, and then open it up in the TWE editor that comes with the SW1000XG, you will find that the track is stereo.

To record a pseudo mono track to SW1000 #1 Wave, you could set up your panning as shown in the next image.



This would force all of the audio data to the left channel of SW1000 #1 Wave Out, and allow you to record another track to this port with the panning set to R7 on the next track. Thus giving you 2 discreet mono tracks (well actually 2 stereo tracks with audio info not present on 1 side). If you open up the wave parts in the TWE menu (Tiny Wave Edit) you will see them as stereo tracks with just the one side being blank. Now in the SW1000XG mixer, you will be able to mix the individual volumes, effects levels etc of each of these 12 wave streams. The difference between tracks and streams is easy to describe, and so to avoid further confusion I shall endeavour to do so.

Imagine a gospel choir comes into your studio, and you wish to record them and a group of other musicians. You may want to record 6 people in the choir individually to build up a thick harmonious sound, but then when they are mixed to your satisfaction, control their overall volume level as a single block against any other instruments that you have recorded. By the time you are finished, you may have perhaps 20-30 tracks of audio with the 6 choir parts, maybe a couple of guitars, a bass, strings, piano etc. (all audio tracks). The way that you would control the audio playback streams would be to group the choir onto say SW1000 #1 Wave out, and perhaps group the string section onto SW1000 #2 Wave out. You would still have all of your audio tracks, but now would be able to using the SW1000XG audio mixer, control the overall amount of volume for each group of tracks
This is simple to see in a diagram. Basically you can have as many tracks as your software will allow, sub-mixed down to 12 discreet wave ports.



So in this example we have 6 choir tracks passing to SW1000 #1 Wave, 2 guitar tracks passing to SW1000 #2 Wave, A bass track on SW1000 #3 Wave, and 5 string tracks passing to SW1000 #4 Wave. This still leaves us with 2 wave ports, which we can have a few dozen more tracks of audio playing through if we wish.

So why would we do this?

Well, aside from the control of the overall volume level for each set of tracks, this method also allows you to add block effects. As discussed in the introductory chapter, the SW1000XG has a huge number of effects which are configured to run across a total of 5 busses + the master EQ. The effect busses and the way they are accessed and controlled are as follows

CC =Controller no.
Reverb Buss Send– CC#91
Chorus Buss Send– CC#93
Variation Buss Send – CC#94 (In SYS Mode, Sysex in INS mode)
Insert Buss 1 – Sysex
Insert Buss 2 - Sysex

Now the **Reverb** and **Chorus** busses are easy to understand, and to set up for either audio or MIDI parts. To select a reverb type in XGWorks, go to the XGEditor Window, and click on the detail tab for reverb. This also allows you to edit all of the parameters with respect to that reverb type, such as time, decay etc.

Now, using the SW1000XG mixer window, you can adjust the amount of reverb being 'sent' to each of the wave parts, by simply adjusting the 'reverb send' knob for the wave part you wish to adjust. The same rules apply for the chorus buss, where again you can select your chorus type, and 'send' amount to each audio or MIDI track.

The trickier stuff comes when we get to the Variation and Insertion busses.

This guide isn't designed to explain all of the complexities of the XG effects system, needless to say Yamaha produce a full guide to XG discussed earlier called **XG Guidebook 2**. This goes into far more detail, but for the purpose of this chapter we shall try to cover the basics.

The Variation buss can be configured to be either a global effect which, like the chorus and reverb busses can have a 'send' amount (the amount of effect present on the track relative to the dry signal) by putting it in what is known as **SYS** or System Mode. The default mode for the Variation effect buss however is **INS** or Insertion mode. This is where an effect is **INSERTED** into a single track, be it audio or MIDI and can as is the case with an insert, can only apply to 1 track at a time.

You may ask 'Why would I ever bother using the effect like this?' Well the reason is that in insertion mode, the effect can have certain additional control parameters applied to it. For example should you should wish to use the modulation wheel on your controller keyboard to adjust say the rotation speed of a Leslie Cabinet effect, you can assign a parameter inside the effect in insertion mode to do so.

Most people (around 99% of all XG users), never use the variation effect in this way, preferring SYS mode.

The Insert effects, (1&2) work only as insertion effect types, and as such can only apply to 1 part at a time. This is great for things like electric guitar tracks, where you may want to set up an **AMP SIMULATOR** on just the guitar part, and no other, with perhaps INSERT 1, and then for example add a **COMPRESSOR** effect to a bass track using insert effect 2.

Again, the XGEditor window is the place to be as it will determine which effect type is selected (you can see in the previous diagram that the Variation is currently in INSERT mode.

So for any audio or midi track, when the Variation effects buss is set to SYS mode, you get the additional dial option (working!) of Variation send. Seen here in the SW1000XG Mixer in XGWorks.

To assign Insert effects to Audio Parts however you need to go to the XGEditor Window, with an audio channel highlighted, and click on the detail tab, at the top you will see part number, which can be set to any MIDI or audio part. The fact that your need to drop back to this window rather than add the effect from the SW1000XG mixer windows is a bit tedious compared to for example XGEdit, but it works! Don't forget though, that for these parameters to be remembered you have to record them or insert them into your event list!

The fundamental points to remember in XGWorks then are.

1: Always save Audio tracks as XWS files or you will lose your data
2: Always remember to INSERT PARAMETERS that you have adjusted into the event list
3: Audio tracks do not equate to audio ports. You can have many more tracks playing back through the 12 ports than just 12.
4: Remember to check your SYSTEM SETUP menu to make sure you have the correct MIDI and audio ports assigned, and that you are not filtering out any vital information.

The bulk of what we have covered in this chapter is also to be found in the XGWorks user manual and addendum. Please take some time out to read it, as XGWorks comes free with your SW1000XG it really is worth a look.

The Loopback Trick. (Nothing to do with Hubis BTW!)

One of the SW1000XG's coolest features is the internal audio loopback record option, discussed earlier. This allows anything being played by the SW1000XG either MIDI or audio to be re-recorded back to a stereo wave file. The principle behind this is that inside the SW1000XG is a tap off point from the digital mixer output that allows re-recording of all data being played.

The usefulness of this is obvious, in that with effects busses limited (limited being said very tongue in cheek!) to 5 with EQ, you can with the loopback option add more effects than your SW1000XG actually has.

Should you have a set of audio tracks that you are happy with, and want to commit the effects send levels assigned permanently to the tracks, then you can loopback re-record the audio and MIDI data back to a new stereo or multiple sets of stereo tracks. Thus freeing up the effect processors to use on new tracks.

It also means that if you run out of polyphony with the SW1000XG, for MIDI work, then you can create a stereo wave mix, totally in the digital domain of all your MIDI parts, and again free up all your synth engine and polyphony for new MIDI tracks.

The best feature though is that, once your entire track is complete, and you want to make a stereo master of the whole lot for pressing to CDR, all you need do is select SW1000 Wave #2 Record in your system setup. Select a new stereo track, and then save this out as a wave file, which can be opened in any good CDR audio mastering software such as EZ CD Creator by Adaptec or WaveLab by Steinberg for burning.

We shall cover this more in further chapters, but now onto the next chapter where we start to get into the nitty gritty of the major sequencer applications.

Chapter 5

Getting it all to work in…Cubase VST

Cubase VST can safely be called one of the most popular music programs of all time. From its humble beginnings on the Atari ST right through to the VST (Virtual Studio Technology) versions on the Macintosh & PC it really did grab the imagination of the music industry. So much so that its user GUI style is now common on almost all other sequencer applications.

The SW1000XG is lucky in that so far as VST goes. There are lots of methods of controlling and supporting its many features, and whilst there are limitations to how much some of them can do, hopefully this chapter will explain how to work around most of them and get the best out of the SW1000XG inside VST.

Using Hubis and VST to run XGEDIT in tandem

Most people using VST with the SW1000XG so far have tended to run in this way. As we said earlier, the SW1000XG's MIDI drivers (as of August 99) were not multiclient, so we have to run Hubis loopback or MIDI-Yoke drivers to allow applications like XGEDIT to talk directly to Cubase. How do we set this up.

XGEdit as we discussed earlier is fully conversant with the SW1000XG, as it supports every single function on the card, plus it supports most of the available PLG daughterboards. XGEdit has a very simple to use GUI and easy to use setup options. This chapter is not a guide to using XGEdit itself (Gary has written a superb user manual and help file) just an overview on how to set it up with VST.

First things first, lets make sure all the right options in VST are turned on or off!

In the Cubase VST File/Preferences menu make sure that AUDIO & MIDI are set to both play in background (ticked), if you don't do this, then switching to the XGEDIT main windows will stop all playback in VST
In the VST Options/MIDI Filter menu make sure that sysex is **NOT** ticked, as this will stop most of what the SW1000XG wants to hear from getting through
If you plan to use XGEdit with VST then, in the VST options MIDI Setup menu, make sure that SW1000XG MIDI in, LB1 and LB2 (Hubis Loopback drivers) are all active (ticked). This will allow you to edit, hear the edits, and also play the SW1000XG inside VST.
Now save all of this in your DEF.ALL file for VST, as it will then Autoload with the settings you have just made.
Now for the setup with XGEDIT

Run up XGEdit and set the MIDI ports in XGEdit as follows

INPUT – None (this is because VST is handling the MIDI in from the SW1000XG)
MIDI OUT 1 – LB1
MIDI OUT 2 – LB2

XGEdit has the ability to 'float' on top of any window, which is quite nice, as it allows you to mix inside VST using the XGEdit mixer rather than the VST mixer should you so wish (shown in the next image).

Run up Cubase VST, set up your ASIO multimedia driver to wave profile the SW1000XG on all ports if you are using the older MME driver for Windows (the standard MME one that comes with the SW1000XG). If you are using the latest Yamaha ASIO driver and have installed it correctly (see the section on ASIO in chapter 12), you can skip this. We shall delve deeper into ASIO and the issues of latency later in this book.

Make sure you have the number of audio tracks in VST set to a sensible level (minimum should be 12 to take full advantage of the SW1000 wave ports). This is set up from the audio system menu (number of channels). Go to your VST audio master mixer, make sure that all of the SW1000XG output wave ports are active (green light on each).

Go to your monitor mixer, and set your 12 (or more tracks) to Master, Buss 1, 2, 3, 4, 5, and 6 respectively (tracks 1&2 to master, 3&4 to buss 1, 5&6 to buss 2 etc). This will assign your VST channels in the Cubase arrange page to the master outs (which you have previously made active).

Make sure that you pan the monitor mixer tracks hard left and right so that they pass over to the SW1000XG individual audio channels (1-12) in the XGEdit analogue mixer.

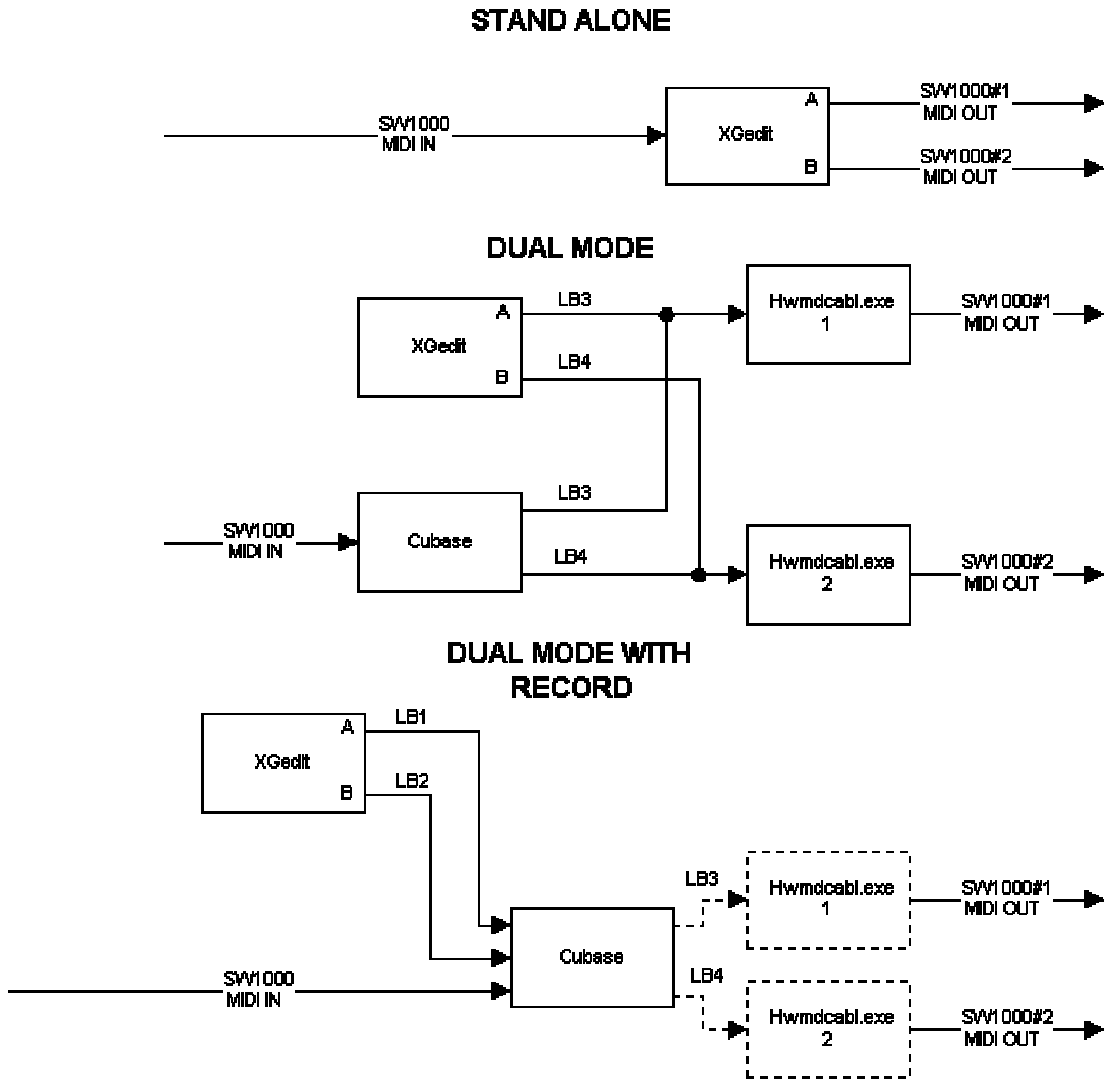
Now, set up a MIDI track, and call it SW1000XG Control. Make sure that the channel status of this track is set to **all**, and that when you move a slider in XGEDIT, the MIDI input led in Cubase VST (on the transport bar) lights up. If it doesn't then you need to check all your settings again. Basically if the LED indicating MIDI input activity lights up when you move a slider in XGEdit (make sure you set XGEdit to stay on top, as it makes it easier to work with!) then your 2 applications (XGEdit and VST) are talking to each other.

If it does, then you can safely record all your audio parts in VST as you would normally, and when you come to mixing them, just make sure that the track you have selected in the VST arrange page is the SW1000XG Control track.(The mixer in XGEDIT as you will have seen if you had followed our tips with regards to MIDI-OX earlier in this guide, is sending out pure sysex data, so VST needs to see this incoming data, and hence you need a MIDI track highlighted).

The advantages of using the XGEdit mixer as opposed to the Cubase VST ones are as follows

1: Instant response: Latency on playback doesn't come into it as you are talking directly to the SW1000XG at a hardware level, you will find that the mixer responds instantly
2: You get easy access to all the effects sends (make sure that Variation connection in XGEDIT is set to system mode or you won't be able to use the variation send control in the XGEDIT analogue mixer)
3: No CPU use. VST's own mixer for audio is using CPU power to update, move and do its thing. Use the XGEDIT mixer and your CPU will love you!
4: No need to ever use the VST mixer again. Once set up correctly, you can literally just use the XGEdit mixer should you so wish. For VST style and Active movie plug in effects and VST EQ however you will still need to use the VST mixer, as this passes its data to the XGEdit mixer (think of the XGEdit mixer as the last point in your mixing chain)
5: Full automation. Due to the fact that XGEdit is sending MIDI sysex data to VST to control the audio levels (and everything else) on the SW1000XG, it means that in the VST event list for the SW1000XG Control track, you will find that you have a complete record of all volume changes, pan settings, effects send levels etc. The bonus as well is that if you get the full registered version of XGEdit you can also save set-ups as MIDI files, and post them straight into VST as a setup bar. The XGEdit mixer doesn't move with your edits however, so if that is important to you, you will still have to use the CPU intensive VST mixer (more CPU intensive than the XGEdit one anyway!)

Gary Gregson has posted some diagrams, which cover the various options available for configuration of Hubis loopback and also the HWDCABLE program that comes with it. The VST routing map is shown in the following one.



You can try these options should you so wish, the one we have detailed, we feel is the easiest to set-up, and the setting which we use here at Yamaha when doing demos at shows.

And that as far as the Audio editing and mixing side is pretty much all that there is to it. Now when you have audio tracks playing back inside VST, you can in effect (should you so wish) ignore the VST monitor and master mixers, and just use the XGEDIT analogue floating window to control all of your audio track playback levels, pan settings and effects levels (for the SW1000XG's effect busses).

Voice selection.

A bit trickier this one, as most sequencers only support selection of the first 128 voices of devices conforming to the GM spec. The SW1000XG has over 1300 voices, so how do you get at them.

Well, method 1 is simple, register XGEDIT. Set up all your voices in XGEDIT before you start, on all tracks, and then export the setup as a type 1 or type 0 MIDI file, which you can then paste into VST using the import MIDI file option. This is by far the best way as it creates a correct (in terms of sysex order and data order) 1 bar setup file. Which you can then record all your tracks after starting at bar 2. This is the way that we at Yamaha UK work.

The second method is to record the program changes using the VST record option, whilst calling a program change from XGEdit itself. This will record the data in real-time though you will then have to perhaps position it in the correct location within your file. This also applies to edits that you have made in your sound. This is a tiresome and long-winded way of selecting a voice, and is only recommended to those of you who like to make life difficult.

The third method is to learn all that long-winded sysex, and controller stuff. And also work out the MSB & LSB bank select messages for every single SW1000XG voice (which may run into several thousand when you take into account the PLG cards as well).

Shall we just say that, if you are running VST & XGEdit, then register XGEdit! It truly will be the best £25 you ever spend. Many people ask us about the Cubase studio module option. This has a limitation (as of time of writing) to only be able to access 16 banks of sounds, which for the SW1000XG is just not enough.

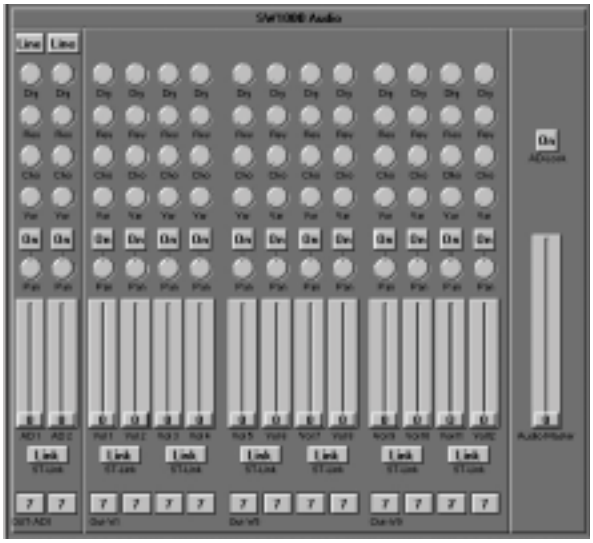
Other options inside VST for Windows.

Steinberg Cubase has for many years now supported a feature which can at first seem a bit difficult to master, but which gives many people the ability to write editing packages within the Cubase environment. These are known as mixer maps.

Mixer maps are user definable editing tools which can be set to look like the knobs and sliders of a conventional mixing desk or synthesiser.

The SW1000XG has a very complete set of mixer maps, which we shall discuss here in brief, as the maps themselves come with a comprehensive user manual.

Mixer maps bypass the need for applications such as XGEdit in a way, as they reside within Cubase itself, and don't need Hubis loopback driver to run. They talk directly to the hardware, and write their data using a special mix track to the Cubase event list. Whilst they are flexible, problems can occur when taking things like snapshots of the data, as mixermaps can sometimes jumble up the order of the data. Also, due to the limited number of objects and inability to display graphics as such (like envelope windows), they are not as easy to use as a dedicated editing package such as XGWorks or XGEdit. However they are a start, and when used wisely can be a useful tool in your mixing or editing arsenal.



You can see here the Yamaha SW1000XG Audio mixer provided free on our CD-ROM and website. It gives as much control as the editor inside XGWorks, and also can be modified (as can all mixer maps) by you, the user to add or remove features that you may or may not require.

Again with mixer maps, remember that you must not be filtering sysex data, and make sure that you are pointing each mixermap object to the correct MIDI port (double click on an object to open it up and you will see the port that it is assigned to)

To summarise and make a few important points.

The SW1000XG is a little too complex to be supported by a DEV file in VST (a maximum of 12 sliders, and only 16 banks which is way to few to support the SW1000XG),

As of VST release 3.7, The VST Studio modules (such as MIDI Arpeggiator and delay) in Cubase will actually filter sysex being passed through to the SW1000XG, so don't use them when trying to record anything if you wish hear it.

Keep on top option in XGEDIT is good, but try to get your screen resolution as high as possible. Yamaha recommend that VST should be run at a minimum resolution of 1024x768 when used with XGEdit.

If you have a PLG100 or 150-synth card and you have edited it in XGWorks, be careful when saving the voice data out as the size of the bulk dump of voice sysex may be too big for Cubase to handle.

If you install more than 2 Hubi pipes (LB1 & LB2 is normal – LB3 & LB4 is for the more complex set-ups above) be careful that you don't have an infinite loopback happening inside VST and XGEDIT. Make sure that pipes feeding one way are not looping back on themselves (the diagram in this chapter show how they should be configured)

The SW1000XG will not help with you running VST effects or Active movie style effects. It will help by reducing the CPU load for mixing, and audio data processing (track playback) and using the on board effects instead of some of the VST ones will obviously lighten your CPU use.

The SW1000XG will work as a 24bit audio device inside VST. This is due to the mixer section of the card outputting in unpacked 32-bit mode (as does our DS2416 card). The option to use it at 24 bit is up to you, but you may find that on slower machines the 16-bit option is preferred.

If the latency figure for the MME/ASIO driver is too high for you, then download the Yamaha ASIO driver, which reduces the overhead by a factor of 5. Remember though that lower ASIO figures generally increase the amount of work that the host CPU has to do. The default setting for the Yamaha ASIO driver should not however increase the amount of CPU used in VST, as this is an optimal setting for the card.

If you use the loopback record option, make sure that when you go to playback your stereo track, you don't pass it back through the same effects you just printed it with. The best way is to play all audio back via a correctly panned (hard left and right) pair of audio ports, that have the volume set to full, and do not have any effects send levels applied to them. Also make sure your master EQ setting is flat when playing back tracks you have re-loopback-recorded (The EQ can be set flat in XGEdit for example) so that you don't overload the output stage of your card, and don't re-apply the EQ.

Another option that you should check is in the Cubase File/Preferences window. Marked 'Leave MIDI File track data as is' This will stop Cubase from throwing all of your data into the Cubase inspector track, which can corrupt XG sysex data ordering.

Be careful with the options for reset of controller data in Cubase also, as they can affect NRPN and controller based drum edits. These can be found in the MIDI options dialog box of Cubase.

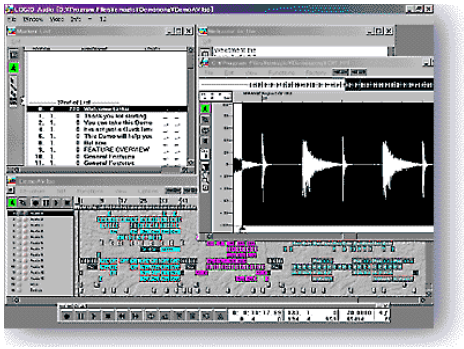
In the section on linkup to the DS2416 we will cover more aspects of the SW1000XG under VST, but for now, that is about it on VST.

Chapter 6

Getting it all to work in…Emagic Logic Audio

Logic Audio for Windows and Macintosh is regarded by many as the 'serious power-users sequencer'. It has a more complex learning curve than many other applications, but is hugely rewarding to work with when you grasp the huge number of features that it offers.

With the SW1000XG in mind, how do we go about setting up Logic to work with it? There are several ways, which we shall examine to getting the best out the SW1000XG with Logic, the first of which involves our old friend XGEdit once more.



XGEdit and Logic

Well as we have seen in previous chapters, running XGEdit with most applications is one of the best ways to control the SW1000XG functions. To do this as we have seen on the Windows platform, it is necessary to install Hubis loopback driver. Emagic Logic Audio however has a unique way of handling MIDI ports (both physical and virtual) that it finds in your computer, in that it will attempt to 'grab' all available ports. Users will be required to make a few fine adjustments to the Windows *win.ini* file to get around this, which can seem a bit daunting, but really is quite simple.

To open up the *win.ini* file use your windows sysedit.exe file to open up in a text editor format your system specific details. It is wise before doing this to make sure you have backups of all of the files that you intend to modify.

Scrolling through the *win.ini* file you will come across an entry for Emagic Logic, which will list all active MIDI ports in your machine. You will have needed to run Logic at least once prior to opening up the *win.ini* file, after your SW1000XG is installed of course!

So, if you have not yet done so, close down sysedit, open Logic and exit it again. Now the *win.ini* file entries for all existing MIDI drivers will be created.

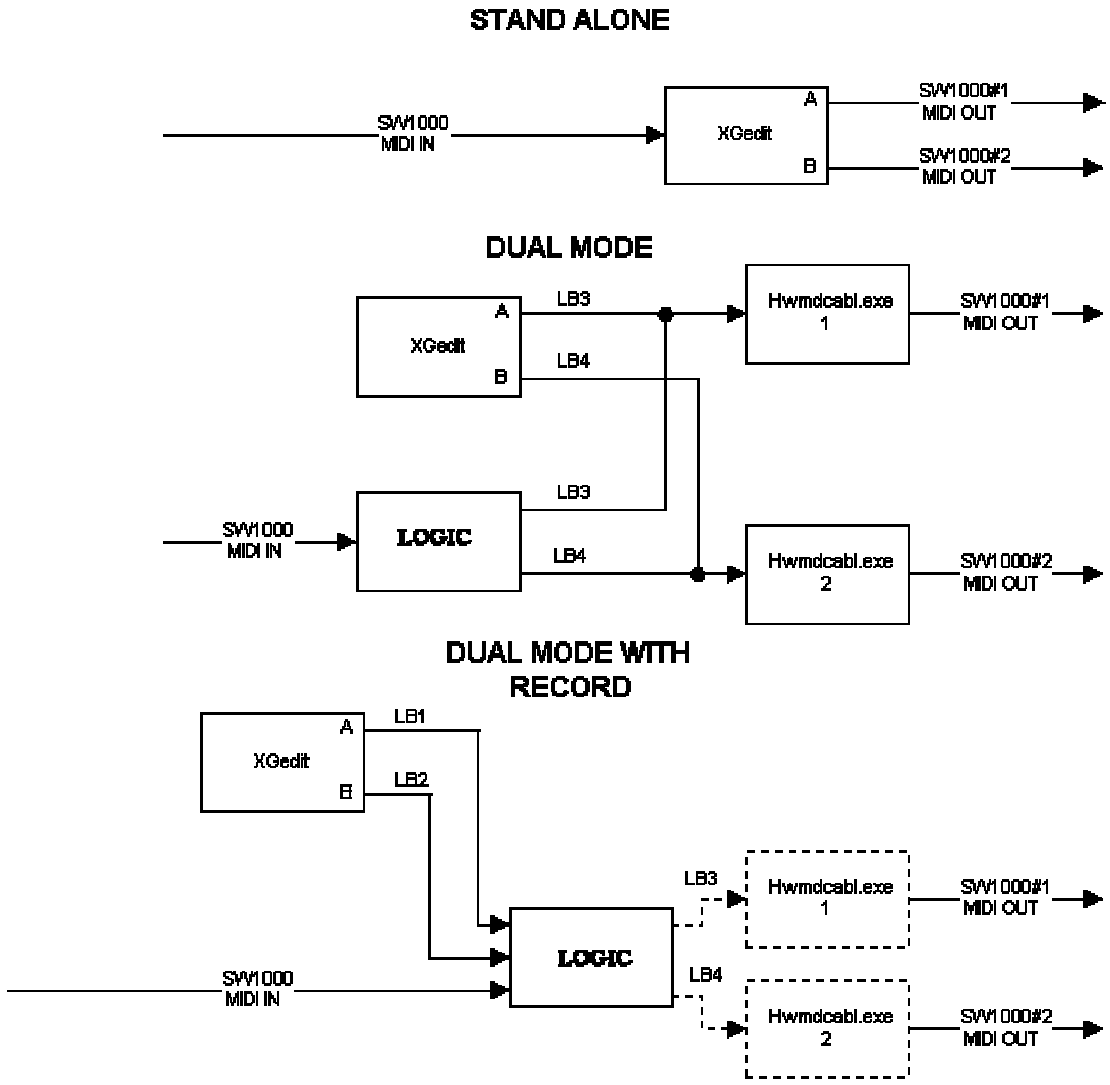
Open the *win.ini* file and go to the [logic] sub heading.
This is just an example so use your imagination as to how your setup will look!

[logic]
...
MIDIIn_SW1000XG MIDI IN=1
MIDIIn_Hubis Loopback device LB1 =1
MIDIIn_ Hubis Loopback device LB2 =1
MIDIIn_Unitor_In_02=1
MIDIIn_Unitor_In_03=1
MIDIIn_Unitor_In_04=1
MIDIIn_Unitor_In_05=1
MIDIIn_Unitor_In_06=1
MIDIIn_Unitor_In_07=1
MIDIIn_Unitor_In_08=1
MIDIIn_AWE64G_MIDI_In__330=1
MIDIOut_Unitor_Out_0__all=1
MIDIOut_Unitor_Out_01=1
MIDIOut_Unitor_Out_02=1
MIDIOut_Unitor_Out_03=1
MIDIOut_Unitor_Out_04=1
MIDIOut_Unitor_Out_05=1
MIDIOut_Unitor_Out_06=1
MIDIOut_Unitor_Out_07=1
MIDIOut_Unitor_Out_08=1

MIDIOut_SW1000 MIDI Out =1
MIDIOut_SW1000 MIDI Synth1=1
MIDIOut_SW1000 MIDI Synth2=1

Logic will grab and thus disable access to all drivers with a value 1 for applications like XGEdit; so just change the value to 0 to stop Logic from accessing the drivers you need to use. The ones you want to stop it from grabbing are the Hubi LB1 & LB2 pipes, as these will be required by XGEdit to send data into Logic.

Once this has been modified you will need to restart your PC, and configure XGEdit with Hubis loopback as shown in the following diagram

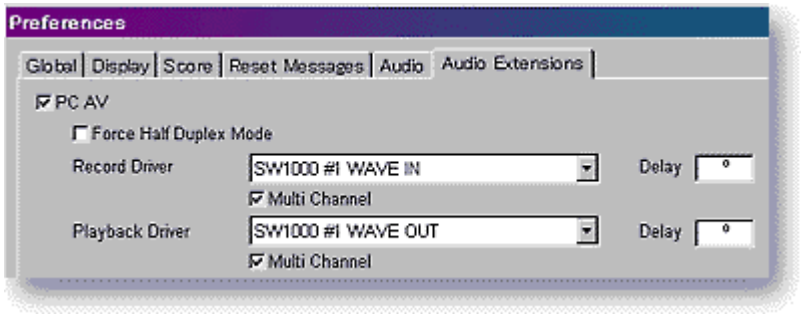


Logic configurations with XGEdit routing diagram.

Again it is wise to check your Logic MIDI settings to ensure that you are not actively filtering out sysex data or resetting controllers on stop. This is done from the **project global options** menu in Logic.

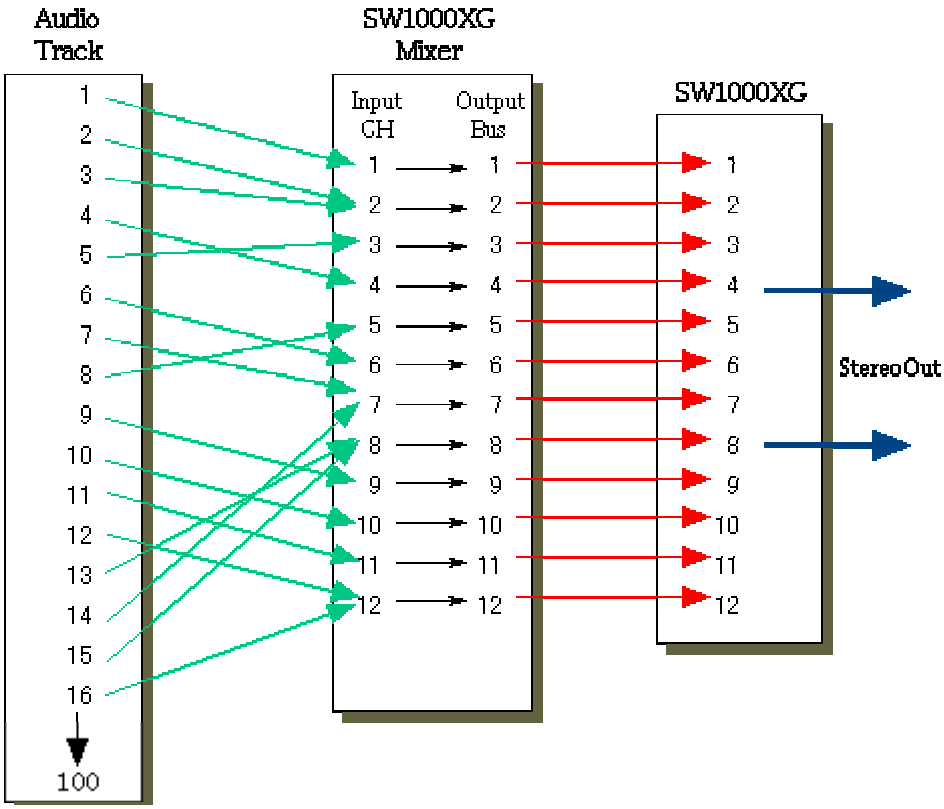
Setting up Logic for Audio recording with the SW1000XG

Quite a simple task as Logic can support multiple wave-out MME based cards like the SW1000XG. Just got to the **AV Extension** settings in the **Preference** menu. Then set the record driver to **SW1000 #1 WAVE IN** and the playback driver to **SW1000 # 1WAVE OUT**. It is also worth noting that if you set the **Playback Driver** to a setting higher than "**SW1000 #2WAVE OUT**," that the number of sound drivers that can be handled by Logic will decrease correspondingly. When you change a setting in this page, Logic will ask to be restarted. It is wise to follow this before you go to record your Audio files.



Logic Audio is designed as a high-level MIDI + audio workstation. This means that it has untold possibilities when it comes to mixing and audio processing. Supporting its own effects processor plug ins, along with many third party active movie style plug ins. Again, the use of the SW1000XG will not offload the amount of CPU required by these plug ins. However with the SW1000XG's effects processors offering so much, you may never need to use a third party plug in again.

As you can see from the following conceptual diagram, you can create as many input channels as there are audio tracks in your sequence. This applies to any software being used with the SW1000XG. (In Logic there will be as many channel faders as there are tracks.) The output of each channel can be freely assigned to an output bus, and you can have up six stereo output buses (a total of twelve channels; the number of audio outputs provided by the SW1000XG.



This design means that these "output buses" are similar in concept to the "Group Buses" which one sees on in-line mixing consoles. Each channel can be assigned to the desired output bus for grouping. For example, output buses 1-2 might be used for the overall vocals, and 3-4 for the overall effects.

The final stereo output from the SW combines these group buses. So if you use XGEdit's analogue control mixer as the last stage in your mix, then you will get the real-time response that it offers, the zero CPU hit that it offers, and also a simple way of controlling effects sends on the card.

Once you have XGEdit communicating with Logic correctly via Hubis loopback, you should select the 'float on top' option for the analogue mixer in XGEdit, so that mixing within Logic becomes easier to manage. Again full automation from the XGEdit window can be recorded to a MIDI part in Logic, for both Audio and MIDI data is controlled using sysex and controllers as we have seen in previous chapters with the SW1000XG, making it very easy to carry mix-downs over from sequencer to sequencer.

All of this applies to both Logic Audio for Windows 95, and also now with Logic Audio version 4, to NT users also.

Environment Page control of the SW1000XG in Logic Audio

Without a doubt one of Logic's strongest features is the Environment editor. This takes the concepts of mixermaps to another level, with a multitude of definable objects, and mappings available to the user. It is a powerful tool indeed, and one which when mastered provides the key strength of Logic in a working studio setup.

Yamaha provide a series of environment pages for the SW1000XG on the CD-ROM, which accompanies the card, and also on our xgfactory website. These environment files, stored in layers in a Logic song allow control over the audio and MIDI/synth editing functions of the SW1000XG, and negate the need to use Hubis loopback or XGEdit. As with all other similar systems though, you need to be aware of the problems that can be caused by Environments with regards to snapshot data ordering (data will not come out in the right order for XG). Another note of caution applies to the amount of sysex data that can be produced and written to the Logic event list. Fortunately, Logic is more than capable of handling huge amounts of sysex being passed through it without so much as a hiccup.

Yamaha provides a very comprehensive manual in PDF format for the environment pages for SW1000XG. This is available on the SW1000XG CD-ROM, and also via download from our xgfactory website. For the purposes of this guide we shall not go into too much detail on environments, but just cover the main points on setting up and configuring the environments in Logic.

For each environment layer that you load in to your song (via the import layer option) you may need to assign the MIDI port that the sliders or knobs within the environment are assigned to. To do this, click on the port select option in the menu shown in the following diagram.

Depending on which MIDI or audio part you wish to control from the slider/fader object (which will depend on the layer you have loaded), you should select the appropriate SW1000XG MIDI port. For example: Should you wish to control an audio part volume level for playback mixing, you should assign the port to SW1000 #1 Synthesizer. This is also the option for MIDI parts 1-16 on synth 1. SW1000 #2 synthesizer is for parts 1-16 (17-32) on the SW1000XG.

It is worth noting that if your PC has a limited amount of RAM, importing layers from the SW1000XG environment setup to a song file, may fail and the edited song data may be lost. This is due to the large amount of memory a layer can use. We recommend you save the currently edited data before importing the Layers. If you are using "Audio Extension" in Logic, you can increase the amount of free memory by quitting the use of the "Audio Extension" and restarting Logic. However, if this procedure doesn't solve the problem, you need to increase the memory of your computer. (Time for some more RAM!)

You also cannot import the all Layers of the Console Environment for SW1000XG to a single Logic song file because of the limitation of the number of layers allowed in Logic. Import only the layers you actually need to use in each song.

Points to note.

Logic audio currently as of time of writing can only support 1 multi-port mme audio card at a time. This can lead to problems when users wish to add a second card like the DS2416, as the audio functionality of one will have be forgotten about (not fun if you have just spent 500 bucks on a new card to find that you can't use it to its full).

Hopefully future versions of Logic will address this limitation. There is also a problem with the DS2416 using its own effects in Logic when trying to use any Active movie style effects at the same time. This can't be achieved as of version 4. Again Yamaha hope that Emagic will address this issue in later updates. This does not apply to the effect engine of the SW1000XG, which will happily run at the same time as any third party plug-in effects you may have installed.

Also be aware that songs saved out of higher versions of Logic (i.e. version 4) sometimes will not work on lower versions. This is something that you should be aware of if you intend to publish your masterpiece on the web in Logic song format, or intend to create your own environment layers.

SoundDiver note.
As of time of writing, the XG support in the Emagic SoundDiver application was getting better and better, with a release supporting the functions of the SW1000XG. SoundDiver supports the Emagic **'Autolink'** system where patch changes and edit parameters can be easily incorporated into Logic from the SoundDiver window whilst running Logic at the same time. This will provide yet another alternative way of editing the SW1000XG and controlling it in the future. We discuss SoundDiver in greater detail later in this guide.

Chapter 7

Getting it all to work in…Cakewalk Pro Audio

The Cakewalk range of software packages is one of the longest standing and most widely used sequencers on the PC. As a program which started out on the PC running in DOS, through to the Pro Audio Deluxe versions available today, it has a huge user-base and rightly so!

This chapter mainly focuses on the flagship PRO AUDIO version of Cakewalk, however most of the topics covered can be applied to other versions in the Cakewalk range.

Again the SW1000XG is lucky in that so far as Cakewalk goes. There are various methods of controlling and supporting its features, and whilst there are limitations to how much you can do with some of them, hopefully this chapter will explain how to work around most of them and get the best out of the SW1000XG inside Cakewalk.

Using Hubis and Cakewalk to run XGEDIT in tandem

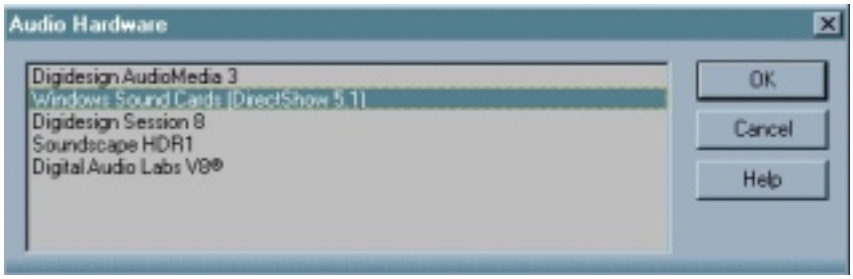
As you may have seen from the previous chapters, the use of XGEDIT and Hubis loopback is one of the preferred methods of working with applications such as Cakewalk or Cubase. With Cakewalk however, there are a few extra rules and points that one should be aware of before embarking on this way of working.

Again, as we did with Cubase VST, we need to make sure that the correct options in Cakewalk are active to allow full communication with XGEDIT and the SW1000XG.

Cakewalk prior to release version 8.03 did not have the ability to pass system exclusive data for 'real-time' monitoring. This meant that if you were using a remote application such as XGEDIT with Cakewalk, you could record your edits to the SW1000XG, but if the parameter relied on sysex data, you would not be able to hear them whilst recording. Thankfully this problem has now been fixed in versions after and including 8.03 of Cakewalk, so if you are using a version of Cakewalk prior to version 8.03 Yamaha recommend that you update it as soon as possible.

When you launch Cakewalk it will ask you to profile the SW1000XG's wave ports. This should be a trouble free experience with SW1000 Wave 1-6 all profiling quickly.

You should make sure that the SW1000XG is recognised by Cakewalk as a Direct Show (Windows soundcard). As in previous versions of Cakewalk (6.0 & 7.0), running the wave profiler without this option ticked in the Cakewalk setup menu, could result in the SW1000XG not being recognised as a full duplex device. (Capable of simultaneous record and playback – which of course it is!)

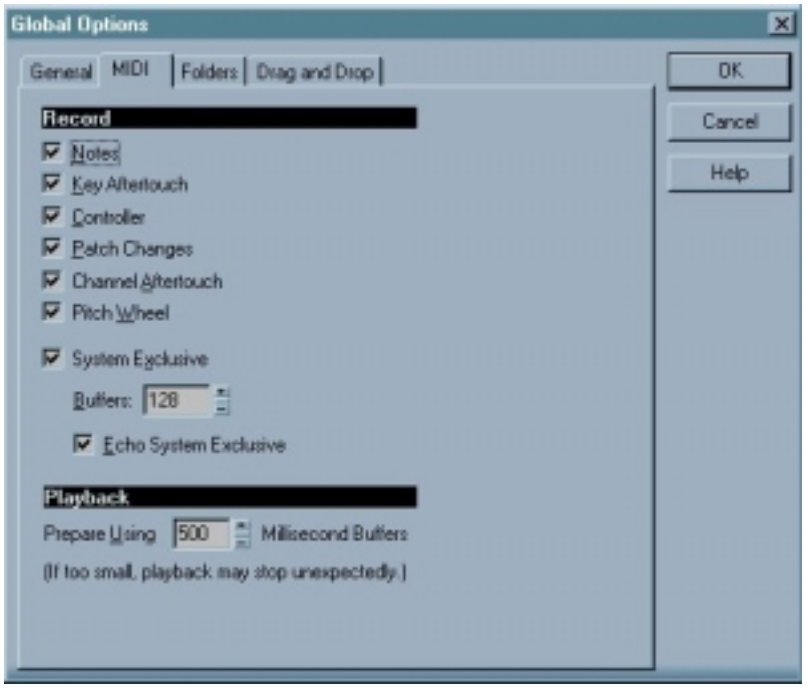


Once you have this set-up correctly, you can now go ahead and optimise the SW1000XG's audio playback for Cakewalk. This is done in the 'audio-properties' dialog box. The SW1000XG is capable, as we have discussed earlier of recording audio at 24bit resolution. This in Cakewalk is done using a mode known as **'Unpacked Audio Mode'**

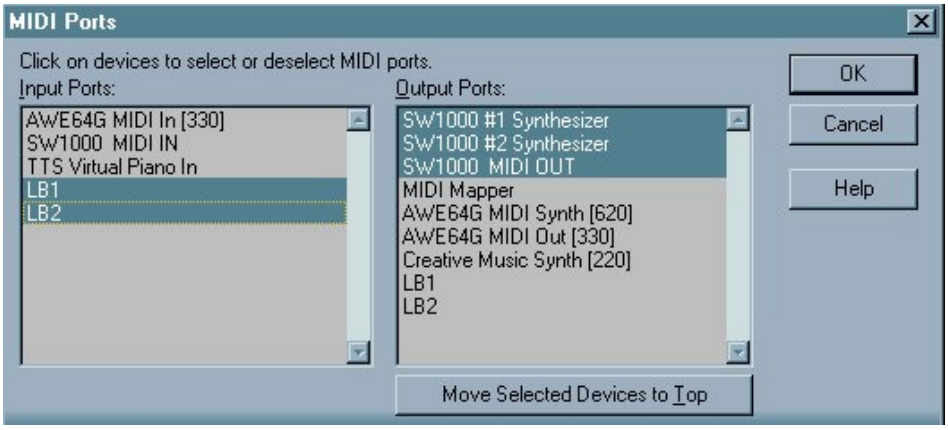
We can see from the previous diagram, that the SW1000XG is successfully wave profiled to run at 44.1k/24bit in Cakewalk. You can of course run at 16bit/44.1khz should you wish (this is a preferred option if you wish to make a final CD master of your song).

As we stated earlier, versions prior to 8.03 of Cakewalk had a small anomaly in that sysex data could not be passed through to the connected synth. If you were to run XGEdit and Hubis loopback at the same time as Cakewalk, your edits would not be heard, and consequently you may think that either your SW1000XG or XGEdit were not functioning correctly.

This anomaly was rectified by Cakewalk in version 8.03, and now is a check box, which all SW1000XG owners should tick.



The box marked 'Echo System Exclusive' is the important option here, you can also play around with the sysex buffer size, for more complex MIDI passages that use lots of sysex data. You should also make sure that Cakewalk is set to record all of the incoming data types such as Patch Changes, and controller data. It should be noted though that playing around with the buffer sizes can cause Cakewalk (as of time of writing) to hang, so be careful. If you do manage to crash Cakewalk by playing with the buffer size, the file ttseq.ini in the Cakewalk folder can be opened, and edited using a text editor to reset the values back. You can also of course, just re-install Cakewalk.

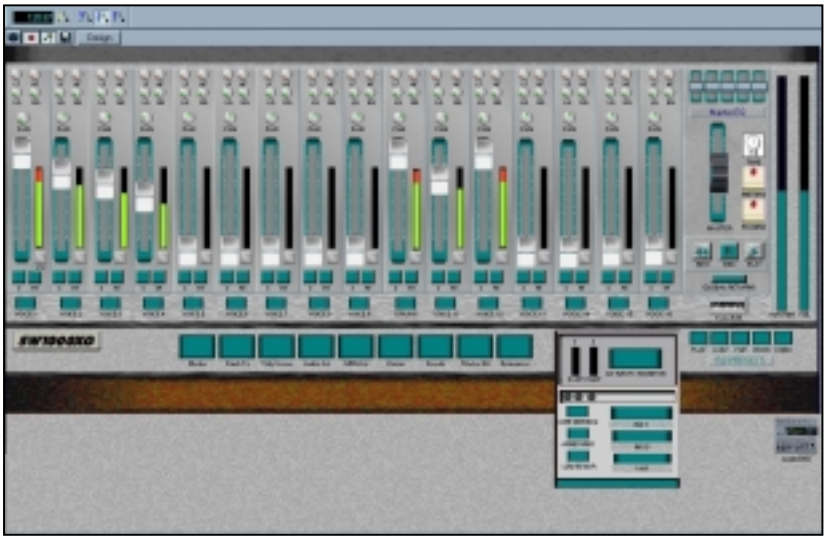


If you plan to use XGEdit with Cakewalk to control the synth and audio parts, then make sure again that you have Hubis loopback installed, and make sure that it is selected as options for MIDI in. You can also either have SW1000XG MIDI in active in Cakewalk or in XGEDIT (but not in both due to multiclient port access restrictions).

Again the common rules apply with regards to XGEDIT/Hubis loopback and your software. Make sure that you are not creating an infinite loop with Hubis, and make sure the output of Hubis is piped into the input of your software (in this case Cakewalk).

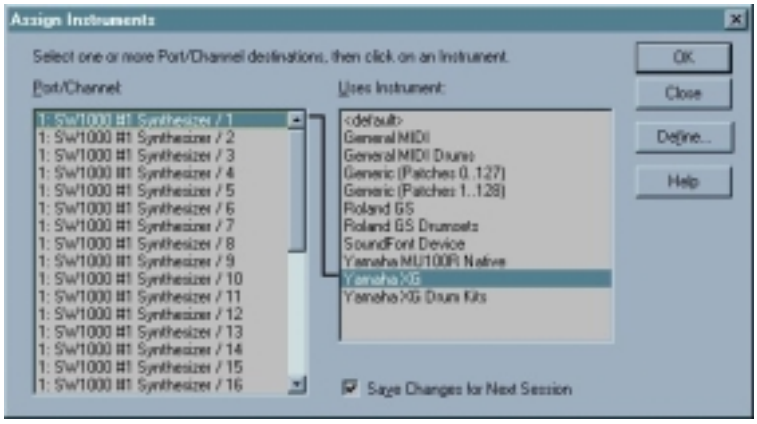
Cakewalk also offers an option known as ‘StudioWare’ for controlling MIDI devices. These panels (several of which are supplied with the SW1000XG) allow a great deal of control over the soundcard. Caution should be taken in the use of StudioWare, as the amount of sysex data and the order in which the data is sent out can sometimes lead to the MIDI file you are working on, not playing back correctly. This is due to StudioWare sending out, for example snapshot data, and placing it all on the same MIDI-tick (MIDI event time location). This can for obvious reasons lead to the data with a large StudioWare panel being sent in both the wrong order, and also ‘lumped together’. If you remember from our sysex section at the beginning of the guide, we stated that sysex for XG is fussy about data ordering. With Cakewalk StudioWare the data ordering is purely down to how the panel is laid out, and will normally all be bulked out onto 1 MIDI tick location. This is not ideal, and in many cases will just cause your file to playback incorrectly, so be cautious.

However, they do provide a unique way of the end user being able to make up their own editors, and add graphics to them for visual effect



To install a StudioWare panel you should refer to your Cakewalk user manual. Yamaha provide a range of panels for free download on the Xgfactory website. Cakewalk 8.03 and the Yamaha SW1000XG driver CD-ROM both contain the support panels for SW1000XG.

Cakewalk also supports XG by the use of instrument definition files. These are patch and bank select ‘text’ files that anyone can make up with ease. These, when installed into your Cakewalk folder can make the process of selecting an SW1000XG voice or patch within a Cakewalk track much easier. When the instrument definition file is imported (again refer to your Cakewalk manual), all of the SW1000XG (and many other) devices sounds can be seen by name, and calling them up is a simple mouse click operation.



Yamaha provide a set of instrument definition files for the SW1000XG on the xgfactory.com website, these are free to download. Once installed you will be able to select any SW1000XG sound by name within Cakewalk. Caution must be taken however due to the way in which Cakewalk treats program change messages, this is covered in the next paragraph in more detail.

Cakewalk anomalies

Cakewalk has a unique way of handling system exclusive data. It takes the sysex bytes out of the MIDI file, and places them in its own Cakewalk SYX viewer. It then adds a META21 (MIDI Meta event 21) to the event list at the location where the sysex event occurred. This in turn calls the appropriate place handle where the sysex data is stored in the SYX viewer window. For small amounts of sysex this is fine, however as we have now seen, the SW1000XG (along with many other devices from a wide range of manufacturers) can use a lot of sysex data for control of parameters. If a MIDI file that you load into Cakewalk does contain a large amount of sysex, Cakewalk will sometimes try to place all of the data together in one great big sysex bank for the SYX viewer. This is a feature of Cakewalk that may cause problems with your XG MIDI files.
This anomaly can be problematic for anyone using sysex, in so much that sysex cannot be handled in this way, as sysex should be separated by at least 1 MIDI tick between each sysex string, and normally should go out in a specific order. A classic example of this is the basic rules of XG.

For an XG device to be correctly initialised one should first send a sysex message for GM reset, this allows non-XG devices to at least have a rough go at playing back the MIDI file if no XG device is present. This in turn should be followed by a 200ms gap to allow the GM reset to work, and then an XG reset sysex string, followed by a 50ms gap (The gaps give the system time to perform the resets), before sending any further sysex or controller data out. This information is covered in great depth in our XG specification sheet, which is available from your Yamaha subsidiary or from our Yamaha websites.

Cakewalk also handles program changes in this 'block together' way, taking the standard Bank select MSB message, followed by the bank select LSB message, and program change, and converting them all into a single Cakewalk patch change message. This is fine whilst working just inside Cakewalk, but as soon as you go to play your MIDI file in another application, the program change message can be split back to it's former state in an incorrect order. This also happens in Cakewalk with NRPN and RPN messages, where the data in concatenated together to form a single event message.

Yamaha therefore recommend caution when playing or arranging complex MIDI files in Cakewalk which use lots of sysex data. This is especially true if you make your MIDI file set-up bar in XGEDIT, and import it into Cakewalk. This we must stress is not a limitation of XG or of XGEdit, but of the way Cakewalk (as of time of writing) handles these data types. If you are purely constructing your MIDI file in Cakewalk itself, and saving as a Cakewalk bundle or work file, then these problems should not manifest themselves. However as many people use XGEdit with Cakewalk, or construct MIDI files in other applications, or aim to have them played in other applications, Yamaha feel that these important points should be noted.

Cakewalk in version 9.0 introduced a new technology known as AudioX. The AudioX system basically defines the control system framework for a soundcard or audio device within the driver code for the card itself. It contains many parameters which make developing control surfaces for API based cards (such as the Yamaha DS2416, which does not use MIDI for control, but low level API commands) easier. Its relevance to the SW1000XG however is minimal, as the SW1000XG offers a far more broad-based method of support. This is by just using simple MIDI data for control, which will work in every software application that supports MIDI.

The advantage of the SW1000XG method is that a mix made with the SW1000XG is written as standard MIDI events to the event list, and consequently can be exported for use in other applications, whereas a mix made with low level API calls or special event types cannot.

As of going to press, Cakewalk 9.0 began to address many of the anomalies covered in this chapter. Please contact your local Cakewalk supplier for more info on this exciting new upgrade.

To summarise and make a few important points.

The SW1000XG is a little too complex to be supported effectively by Cakewalk StudioWare. Whilst small panels can offer some control over the main synth parameters, trying to control many of the sysex based parameters can lead to complications due to limitations in StudioWare with snapshots, and large amounts of sysex being sent out.

Cakewalk prior to version 8.03 would actively filter sysex thru, so please update to at least this version. This was due to an anomaly with the Windows API. Cakewalk added the sysex thru feature to 8.03 when this anomaly was resolved.

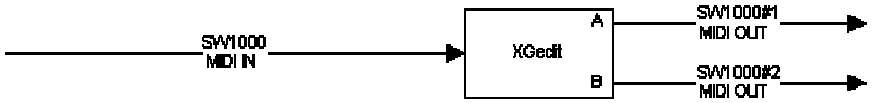
If you have a set-up bar created in XGEdit, be careful when loading it into Cakewalk, as it will sometimes 'block' the data together to form a huge sysex bank which will result in the data ordering being incorrect. Also take some caution with the option to reset controllers on stop in Cakewalk as this can affect playback of drum parts.

If you install more than 2 Hubi pipes (LB1 & LB2 is normal – LB3 & LB4 is for the more complex set-ups above) be careful that you don't have an infinite loopback happening inside Cakewalk and XGEDIT. Make sure that pipes feeding one way are not looping back on themselves (the diagram below shows how they should be configured)

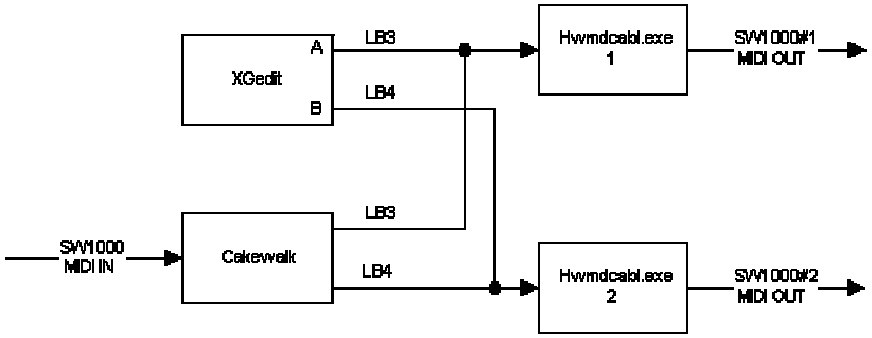
The SW1000XG will not help with you running Cakewalk effects or Active movie style effects. It will help by reducing the CPU load for mixing, and audio data processing (track playback) and using the SW1000XG on board effects instead of some of the Cakewalk ones will obviously lighten your CPU use. Cakewalk's latency in mixing audio can be greatly reduced by using an application such as XGEdit with the SW1000XG analogue mixer to control the volume levels of the SW1000XG.

The SW1000XG will work as a 24bit audio device inside Cakewalk using 'unpacked audio mode'. This is due to the mixer section of the card outputting in unpacked 32-bit mode (as does our DS2416 card). The option to use it at 24 bit is up to you, but you may find that on slower machines the 16-bit option is preferred.

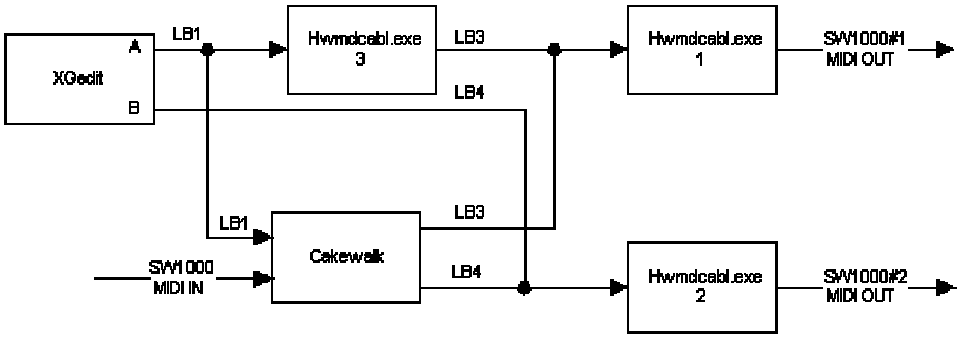
STAND ALONE



DUAL MODE



DUAL MODE WITH RECORD



Here we can see the Hubi piping configuration for Cakewalk. This method is used to circumnavigate around Cakewalk, which prior to version 8.03 did not thru sysex data. In versions after V8.03 you can either use this method or the method shown diagrammatically in the Cubase chapter.

Chapter 8

Getting it all to work in …any Windows audio or MIDI application

Now that we have covered some of the major Windows applications (from our user surveys almost 95% of all SW1000XG users will be using one of the applications we have covered in the previous chapters) it is time for a change of scene. We shall move on to some of the other software products available, and cover some general points with regards to the use of the SW1000XG.

There are 2 golden rules that you should stick to before you start to work.

1: Read the user manual in full for the software you intend to use, often many of your technical questions can be answered just by doing this
2: Make sure your computer isn't reporting any problems with any software or hardware you have installed and also that your machine is above the minimum requirements of the software (some software companies tend to understate the amount of CPU needed, as it enables them to sell more software!)

If your computer is happy, and you are happy with your software, then it's time to proceed and give your software a well-needed rest from all that CPU intensive activity.

Windows software for music production tends to fall into one of 4 categories, these are.

1: Audio Multitrack software. This is software that basically mimics the functions of a multitrack digital tape machine. The number of tracks available for playback varies from application to application, but can range from 8 up to hundreds. Remember though that your hard drive and other aspects of your computer speed will limit the number of tracks you can playback. Software that falls into this category includes Sonic Foundry Acid & Vegas Pro, Syntrillium Cool Edit Pro, The Saw range from IQS, Samplitude from SEKD and Macromedia's Deck on the Macintosh. These applications have little or no MIDI capabilities save perhaps sync to external hardware. They almost all now support multiple soundcards or cards such as the SW1000XG, which appear as multiple wave devices.

2: Audio sequencing software. This is software, which covers both MIDI and audio multitrack recording. In this category you have applications like Cubase VST, Logic Audio, XGWorks, Cakewalk Pro Audio, Evolution Pro Audio, Musicator Pro Audio, Digital Performer and a host of others. We have covered some of these in previous chapters, and will touch on a few guidelines in this chapter for the others.

3: Stereo audio editing software. This is similar to multitrack audio software, but only handles stereo audio files. This type of software is usually used in mastering facilities, postproduction houses, or for AV work. Applications that fall into this category include SoundForge by Sonic Foundry, WaveLab from Steinberg, Cool Edit from Syntrillium, Bias Peak, Sound Designer and the standard Windows audio recorder.

4: Software synthesisers and audio manipulation software. A growing industry, software in this category includes applications such as Rebirth from Propellerheads, Vaz, Unity, Metasynth and many others (growing every day). These applications either generate new synthesiser types by using CPU cycles to mimic hardware synths, or manipulate audio to create strange new effects or samples to be loaded into sampling keyboards or rackmount units at a later date.

This chapter will cover the basics of running all of them with your SW1000XG.

As in previous chapters, XGEDIT once again rears its head as the essential tool of choice, but unlike in other chapters in many cases here we will not always need to use Hubis loopback.

Audio only applications as we discussed tend not to have much in the way of MIDI facilities save perhaps basic sync to MIDI Time Code (MTC). So for example if you were to run Cool Edit Pro (or indeed any of the multi-channel audio applications that have multiple soundcard support) you could safely configure XGEDIT as follows

MIDI IN – SW1000 MIDI IN
MIDI OUT 1 – SW1000#1 Synthesizer
MIDI OUT 2 – SW1000#2 Synthesizer

As we are only dealing with audio, you would immediately open the SW1000XG analogue mixer window, and perhaps even minimise the main synth editor window for the time being (although to set up you effects and master EQ you would need it open). Now you would run up your multitrack audio application (in this case we will use Cool Edit Pro) and set up the audio outputs as follows.

Wave Device

SW1000#1 Wave OUT – Audio 1
SW1000#2 Wave OUT – Audio 2
SW1000#3 Wave OUT – Audio 3
SW1000#4 Wave OUT – Audio 4
SW1000#5 Wave OUT – Audio 5
SW1000#6 Wave OUT – Audio 6

This would set up your MME wave ports for multi-channel support. Then when you record your tracks and go to playback, you should find that instead of having to use the CPU intensive mixer of your multitrack application, you can actually use the mixer in XGEDIT to control volume levels. This also applies to panning and effects sends, much in the same way as we have discussed in the previous chapters.

Once you are happy with your mix and effects settings, you can then use the **SW1000#2** Wave record option (loopback) to make a stereo mix of the tracks, either to free up your effects for more tracks, or to make a final mix for pressing to CD.

With stereo wave editing software such as WaveLab or SoundForge, the problem of adding permanent effects is more unique. Whilst you have the ability to use any of the wave ports for playback, and can also use the 2 options for recording (with or without effects being added to hard disk), it is impossible to add effects at a later date and then print them to the wave file. As you only have the ability to playback or record to a single stereo file, and not really at the same time. (This is the nature of the way that stereo wave editing software works!).

You could however if you have access to one, create your final stereo master with the SW1000XG effects, and then digitally stream it to a DAT or minidisc style of recorder. This is not ideal, as it defeats one of the SW1000XG's strongest capabilities, that being its ability to create a stereo master internally using the loopback option.

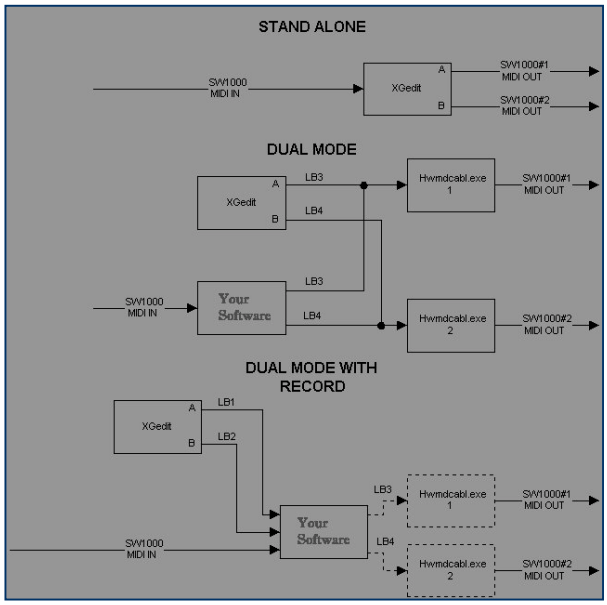
Now may be a good time to run up XGWorks? In XGWorks you could import your wave file created in your stereo editor, add the effects, loopback re-record it to a new wave file, and then paste that back into your stereo editor of choice.

The same problem manifests itself when using software synths, although you could always assign the playback from the software synth to for example **SW1000#1 wave out**. Then set your stereo audio recorder or multitrack audio recorder to record from the **SW1000#2** wave record buss (loopback). Then set your stereo editing software to playback on **SW1000#2** wave playback. This would make it possible to capture the audio from the software synth into your audio editor, and then play it back from there without having to re assign audio ports.

This way you could easily add effects to any software synth without having to use any additional CPU power (You could always get into the PLG concept which wont use any CPU power at all, and can give you a whole new synth for less than many software synths cost). This is covered in more detail in the next chapter.

For Audio & MIDI sequencers that we have not yet covered, the rules that apply to VST are a good place to start, but just in case you have skipped the VST chapter I shall re-summarise.

You can run an application such as XGEDIT at the same time as your sequencer, but first you need to make sure that your sequencer will record and does not filter MIDI system exclusive data. Then you need to have Hubis installed (see chapter 3), and the LB pipes from Hubis correctly talking to the MIDI in settings within your sequencer. You then need to make sure that XGEDIT is set up to have 'NONE' as the MIDI in setting, and LB1 & LB2 as the MIDI out settings. If your sequencer has a MIDI activity LED to show incoming data, move any slider in XGEDIT whilst your sequencer is on screen at the same time. If the activity light shines, then you have communication. You should also take a look at the Hubi routing diagram shown below for a few alternative options for connecting XGEdit and your software. Note these options only really apply to Audio & MIDI sequencer software that has no problem recording sysex data.



You can of course with audio only applications substitute XGWorks for XGEdit should you so wish, and control the levels from the XGWorks editor screens. This can lead to problems though running 2 applications that are trying to grab the SW1000XG wave ports at the same time, and also can be a bit messy on screen. XGEdit is small compact, uses little in the way of system resources. It can also float its various windows 'on-top' of any application for seamless mixing in your software of choice.

Whilst this chapter and most of the guide may seem like a shameless plug for XGEdit, we can but stress just how essential (as you may be seeing) this application is to anyone who is using the SW1000XG (unless working totally within XGWorks)

Other applications which support XG.
There are a host of other editors and sequencer programs available that support the XG spec and in particular the SW1000XG. Full details of some of them can be found on our xgfactory.com website.

Sound layering
As promised earlier, we said we would discuss the possibility of sound layering with the SW1000XG, and now seems as good a place as any, to cover this. The Yamaha range of tone modules such as the MU50/100/90/128 and 80 all feature a mode known as 'Performance' mode. This mode allows up to 4 discreet sounds to be layered on top of each other to form a more rich and complex sound. The problem with the MU modules is that in this mode, you cannot get at the other 12 MIDI parts offered by XG (or more in the case of the MU100/80/128 and 90).

The SW1000XG doesn't feature Performance mode as such, but with clever use of XGEdit you can have a work around solution. XGEdit allows you to set up multiple voice parts. Next to where you select your voice in XGEdit you will also see a window for the MIDI channel assigned to that voice. To create a layered sound, it is a simple matter of setting up your sounds on different parts, and then setting them all to the same MIDI channel. If you wish to save this, check in XGEdit's top left-hand corner you will see a tab marked sysex, make sure this is clicked (not the compact option). Thus you can save your layered voice and load/play it in any application you wish. The bonus over Performance mode is that you can layer up to 16 sounds at the same time (huge patches reminiscent of the good old days of synthesis!), or use a 4 way layer at the same time as all of your other midi parts should you so wish.

Chapter 9

All about PLG

What is PLG?

As we discussed at the very start of this guide, the SW1000XG is a truly remarkable card in that not only is it very powerful as a stand-alone product, but it is also very expandable. The 2 interface connectors located along the top of the card for connection to the PLG series of daughterboards and the DS2416 audio card make it practically future proof. In this chapter we shall discuss the PLG cards, and why they are so important to the SW1000XG.

PLG unlike other expansion systems available for synth modules made by other manufacturers doesn't just add some new samples to the original sound set (although as we shall see it can). It adds a whole lot more. In fact several of the currently available PLG cards for the SW1000XG add completely new synthesis and effects processing engines to the original SW1000XG, without, we hasten to add, taking anything away from the original card.

Yamaha had a massive amount of success in the early 90's with the DB50XG daughterboard. This was a card that gave XG synth capabilities, to any card that had a standard 26-pin Wave Blaster style of connector. As there were no drivers to configure or setup (it was literally plug and play!) it found a home in many studios, both amateur and professional. The huge increase in the overall quality of sound compared to other soundcards is why many people today have latched on to XG, and one of the reasons why the SW1000XG with its huge increase in features over the DB50XG is so successful.

The PLG interface connector was a new concept in daughterboard connectivity. Not only did it replace the standard analogue audio outputs of the Wave Blaster connector with professional digital interfacing, it also allowed extra real time effects processing to be added to the host device by virtue of an insert style send and return path.

It also meant that entirely new synths such as Physical modeling, FM and Analogue modeling could be added thus increasing the life of the host device by many years, and at an incredibly low cost.

If you think that to buy a whole new synth which provides full SVA physical modeling, on top of the SW1000XG engine, uses no CPU power, and sounds incredible would have cost only a few years ago somewhere in the region of $8000 US dollars, is now available in a PLG card at under $200, it makes you realise just how powerful and important PLG is to the future of Yamaha's soundcards.

So in the rest of this chapter, we shall cover some of the major points and features of the current crop of PLG cards, and give a brief history lesson to people who may not be aware of the hugely successful products that their engines were taken from.

PLG100-DX – The return of the DX7

Roll the clock back to the early part of the 80's. Those heady days of bad haircuts and synth-pop saw an explosion in the use of synthesisers (mainly analogue at the time) for music. The keyboards were big, heavy, unreliable and expensive (as anyone who owned one would testify). Then in 1983 Yamaha came onto the scene with what is still the most successful keyboard of all time, the DX7.

This synth re-defined all pop music for the next 5 years. Anyone who was anyone had to have one. The DX7 was seen on pop music shows being used by every band, it really was the 'must have' keyboard. At the Live Aid concert in 1985 almost every group had a DX7 on stage which was testament to it's unique sound. The sound of the DX7 unlike all of the subtractive analogue synths that were around at the time, relied on 'real world' physics. It basically involved the mixing and adding of sine waves, which could feedback on each other, along with a few other digital tricks to create sounds the likes of which had not been heard before. This technique developed by a Stanford University genius by the name of John Chowning in the 1960's had been under development by Yamaha for several years. It was only with the ground breaking price and reliability of the DX7 that it really reached its full potential.

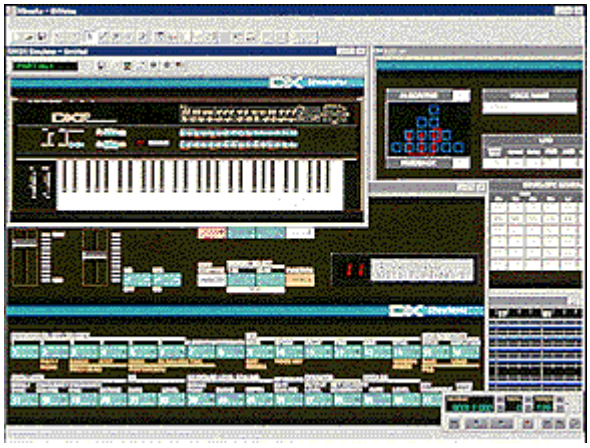
It was a new concept, and quite difficult to program, but for those who did, one that was very rewarding

FM as the system was known eventually made its way onto millions of soundcards, and here lies the first problem!

Most FM based soundcards sound terrible. The tinny pathetic little noises of your OPL chipset based FM style sound card with its 2 operator (or if you are lucky 4) sounds, really were not what pro synth users had been used to with the DX7. 6 operators were the DX7's staple sound creation tools, and that was what made FM great... the control and flexibility of the sound. The fact that over 160,000 people bought DX7 keyboards including some of the biggest names in music history, meant that this baby had something special

So Yamaha decided with the PLG100-DX to recreate this sound, and recreate it exactly.

Six operators of pure power, and without all the bugs and the noisy outputs of the 1983 original, when strapped onto the side of the SW1000XG. And the bonus here is that the PLG100-DX (along with all of the Yamaha PLG cards) can pass all of its audio via the ultra clean digital out of the SW1000XG card. It can also use the effects processing of the SW1000XG to add even more depth to the sound. You can also using software such as XGWorks or XGEdit mix and match and even layer XG sounds and FM sounds together to create the sonic possibilities offered by Yamaha's other great flagship synth, the SY99. The SY99 was acclaimed because you had the ability to add AWM voices to DX voices and use the 2 at the same time. This once more is possible with the SW1000XG/PLG100-DX combination.



There are many books written on the subject of FM synthesis available, this is not a daughterboard for the faint of heart, although the editor software for XGWorks does make life a lot easier than it was for the original DX7 pioneers with its quick editor. For people who want to relive the 80's in full, we also provide an authentic 100% copy of the original DX7 front panel with the DX Simulator, sure to send shivers up the spine of anyone who ever used one. Now how is that for retro? The PLG100-DX is also supported (for voice selection) by XGEdit, though for full editing control, you will need to run the editor inside XGWorks, or a third party DX7 editor that supports voice bulk dump mode.

PLG100-VH – The Harmoniser card

Creating accurate vocal harmonies can be difficult unless you are in a choir or barbershop quartet! The PLG100-VH is designed to create just such a range of effects which when added to the SW1000XG gives it yet another effects processing buss.

An intelligent vocal harmoniser effect using the ultra powerful DSP3 chip (as used by Yamaha's state of the art 02R digital mixing console amongst others), takes the sound of your voice (via a microphone connected to A/D Inputs of SW1000XG), and generates multi-part vocal harmonies.

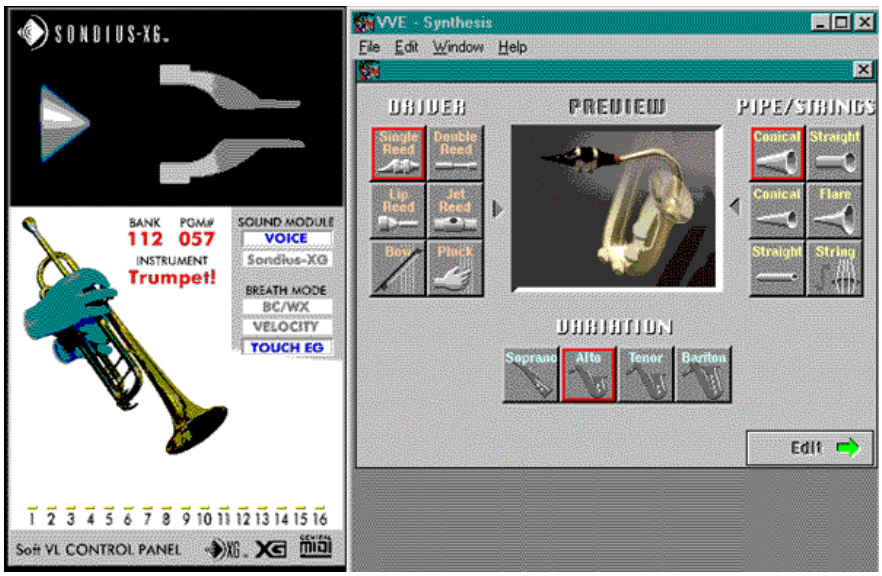
You can even change the harmony interval with the chords you play or by incoming note data from a sequencer, which in essence gives you accurate pitch tracking to your MIDI file.

It boasts 4 types of harmony effects: Vocoder Harmony, Chordal Harmony, Detune Harmony, and Chromatic Harmony. This card is supported in full by both XGEdit and also by software Plug-in modules for our XGWorks MIDI/audio sequencer to control the parameters for each type of harmony effect. With an interface (in appearance) just the same as the XG Editor of XGWorks, you can control parameters such as gender type of input voice, texture of the harmonised sound, vibrato effect and volume balance.

Of the range of PLG cards available, the concept behind this is easiest to understand. It takes a sound, and creates a harmony part for it. Great for simulating artists like The Everly Brothers (?), or for creating some really mad effects and thickening up synth parts.

PLG100-VL – The Virtual Acoustic card

Trying to simulate the sound of an orchestral wind instrument with any sample playback device is difficult. Anyone who has wrestled for hours on end trying to create an accurate flute or clarinet with a synth will tell you this. In the early part of the 1990's Yamaha again broke totally new ground with the introduction of the Worlds first physical modeling synth, the VL1. This very expensive keyboard based instrument didn't rely on sample playback like so many keyboards at the time, but again like the DX series, on some highly complex mathematics. The principle of VL comes from the fact that pipe-based instruments like flutes, sax and clarinet can be 'described' by a series of mathematical equations. These equations, unlike samples, which can be just static snapshots of an instrument at a given pitch and time, can react and move in the same way that a real instrument does. For instance, if you 'over-blow' a sax you can get strange harmonic effects, almost like a 'squealing' noise. With VL technology this is also possible to simulate using real time changes in the model used. At the time of its launch, the VL was a highly sought after instrument, the only problem with it was the cost, which ran into several thousand dollars. This was due to the enormous R&D behind it, and the cost of what at that time were very high speed and expensive DSP processors. The technology eventually though (as they all do) trickled down to more affordable versions until at last the PLG100-VL became a reality.



The PLG100-VL offers full hardware physical modeling so again your CPU power is intact. It uses a single oscillator modeling system which was first seen on our VL70m module using our VLR Algorithm Synthesis Technology to simulate the complex vibrations, resonances, reflections and other acoustic phenomena that occur in a real wind or string instruments.

But it is not just for acoustic sounds.

It also gives you the ability via software editing to design 'hybrid' sounds such as powerful new analogue style instruments that do not exist in reality. In other words... **YOU GET TO BUILD YOUR OWN SYNTH!**
To get at the cards power, Yamaha provide a free VL Visual Editor package for Windows and Macintosh, and which also exists as a software Plug-in module for Yamaha's XGWorks MIDI/audio sequencer. This allows you to control the huge potential of the VL sound. The Synthesis screen displays available driver and pipe/strings selections. After selecting the driver and pipe/string, the screen returns a number of selectable variations. Then proceed to the Edit screen, where a number of parameters can be controlled with intuitive faders. Macintosh users are also able to download from our website, any one of Yamaha's extensive range of editors. These include our expert editor or the unique Analogue editor. These were originally designed to support the VL70m module, but work just as well with the PLG100-VL.

Again much has been written about VL and the Internet is full of newsgroups and websites dedicated to this type of instrument technology, so if you want to know more, just get yourself online.

PLG150-AN – The Analogue modeling card

Whilst the PLG100-VL is great at simulating acoustic instruments and mono synth sounds, creating the big and warm sounds of classic analogue keyboards is a little bit out of its spectrum of capabilities.

Yamaha's fourth PLG card release came in the form of the PLG150-AN. This daughterboard takes the principles behind our AN1x synth, and adds a few extra tricks, which make it, sound very close to a famous analogue wooden keyboard by Sequential Circuits.

It is a 5 note polyphonic 2 oscillator synth, with 2 lfo's and a variable noise generator. It features oscillator models to simulate Pulse Wave, Sawtooth wave, Square wave, Triangle wave and an all new 'Multisaw' waveform that adds a whole new richness to the sound. The sound, and look Yamaha have created with this are very similar to traditional analogue synths, the bonus here again being that this board won't break down on tour. Won't (unless you program it to!) go out of tune (but you can make it using a feature known as FREE EG), and doesn't cost the Earth. This guide is too small to cover the entire feature set of the PLG150-AN, but needless to say, much more info can be found on our xgfactory.com website or by contacting your local Yamaha dealer.

Other PLG cards in the range!

Just briefly time to mention the new PLG150-PF, which is a 16meg Piano board, with hundreds of new piano and keyboard samples, and the PLG150-XG, which is an 8Meg XG expansion card (primarily designed for our non-XG compatible new range of synths such as the CS6X and S80). Full info on all of our current and future PLG cards can be found at www.xgfactory.com.

Now that you have read all the info on what the cards can do, let's clarify a few points and dispel a few myths regarding PLG

1: PLG cards cannot be edited from the Macintosh?

Not true. They all can be fully edited by any MIDI program that can communicate via sysex. For our PLG100-VL card Yamaha provide a free downloadable range of editors for expert, basic and analogue style editing on the Mac. Yamaha also have plans to support via full editing software all of the other PLG cards. Again the website is a good place to start

2: PLG cards are difficult to fit?

Not at all, the instructions in the SW1000XG user manual cover this topic, and they are simple plug in and go cards. Make sure you turn your PC power off before installing a card, and try not to get the cable that connects the PLG boards tangled.

3: The SW1000XG cannot work with the PLG150 series cards?

Again not true. Some of the early SW1000XG cards will need to be updated with a new heat sink on the regulator for the PLG socket, but Yamaha will perform this free of charge when you buy your PLG150 card, and return it when you fill in the 'upgrade' form enclosed in the box. Call it a kind of 12-month service check-up that we do for free. This upgrade is only required by users of the SW1000XG purchased prior to August of 1999. Please check with your Yamaha dealer if you need to ascertain if your card needs the upgrade. If your SW1000XG has the letter P printed on the backplate, it will not require the update.

4: How can I sync the PLG150-AN on board Arpeggiator to my sequencer?

With the PLG150-AN editor for XGWorks you will see an option to call up and edit the Arpeggiator/sequencer that lives on the card. To make sure it syncs with the XGWorks main timing engine, just got to system setup in XGWorks, and make sure that ***real-time messages*** *are not ticked as being filtered in the MIDI out filter option. Then set the Arpeggiator/Seq. tempo to MIDI in the PLG150-AN editor screen. The sysex, which corresponds to this setting, can be shown by linking XGWorks up to MIDI-OX using the methods we have described in previous chapters should you wish to mimic the capabilities of XGWorks in another application.*

Chapter 10

Audio overview of the SW1000XG

A lot of confusion over the audio capabilities of the SW1000XG exists, this section of the guide will hopefully clarify what is, and what is not possible with the cards DSP processors.

The audio features of the SW1000XG were, and still are a complete breakthrough for computer based soundcards at this price point. Never before had the ability to add up to 6 real-time, non CPU using effects at 24bit resolution from a massive palette of over 170 different types been possible, and especially without having to pay any extra for them!

For those of you who have not read this entire guide so far I will begin by summarising the way in which the audio works on the SW1000XG.

The SW1000XG has 3 physical RCA style audio output connections. 2 of them (marked L OUT and R OUT in red and white) are for analogue audio output, which means that you can connect the sockets to your hi-fi, mixer or amplifier. It is important to note that they are not pre-amplified outputs so you can't just plug in a pair of headphones, or a cheap pair of non-powered computer speakers. It is also worth reminding you that the better the quality of your monitoring system, the better the SW1000XG will sound. These 2 connectors carry all information being played by the card, be it MIDI or audio out via an 18bit DAC converter located on the card itself.

The third connector marked in black is the SPDIF (Sony/Phillips Digital Interface) digital output connector. This is a stereo digital output, which again carries the information out of the SW1000XG, but this time with in an even cleaner digital form. This connector is for linking up to digital mixers such as the Yamaha 01V, DAT machines, Mini Disc recorders, Audio CDR units and anything else that can accept a digital input in this coaxial form. It outputs data at 44.1khz.

The output from the 3 connectors is the same, so if you are playing audio & MIDI from your analogue port, you can also be monitoring or recording the data from the digital output at the same time.

Some people may see the lack of individual outputs to be a limitation, but as we shall see later in this section, nothing could be further from the truth.

The Analogue input on the back of the SW1000XG feeds directly to a 20bit Burr Brown Analogue to Digital converter. This is then passed to our mixing and effects processing chips, which run at a minimum of 24bit resolution before being outputted from the digital mixer processor at either 32bit or 16bit resolution. Currently very little software supports 32bit recording, so many of them record the audio to wave files at 24bit (truncating 8 bits of data), although this may change in future.

Recording audio to the SW1000XG can be as simple as just plugging in a microphone or guitar to the input jack (which is stereo) and hitting the record button in your audio software. There are however a few points worth noting before you set off.

The first is that the SW1000XG analogue input has no facility for input gain control (although control is possible, as we shall see using SW1000#2 wave record). You have 2 options for input gain, one is MIC level (pre amplified – this is ideal for dynamic microphones, and guitars plugged straight into the back of the card) and the other is Line level (used for amplified signals such as the output from a mixing desk or guitar cab).

To maintain full compatibility with the XG spec, Yamaha have set the default input gain to MIC level, which is fine for people who just have a MIC or guitar they wish to plug in, but not ideal for people wishing to record from a mixing

desk. To get around this, Yamaha provided a free software tool for Windows users that will, if placed in the Start Items folder of a PC, switch the default level back to LINE on start-up. This tool is free to download from our Xgfactory website. Another way to get around the line level setting is to create a MIDI file in XGWorks that resets the card to line level using the XGEditor for both AD1 & AD2 (left and right audio input channels), and then running this MIDI file before you begin any work. The problem here lies with the fact that most MIDI files designed for XG begin with a **RESET XG** command, so caution must be maintained when recording audio from a mixer with MIDI in an XG file otherwise you could end up damaging something!

For people who do not have the line tool, or who use a Macintosh, the sysex string to set the AD Parts to line level is quite a simple one. If you remember to include it after every XG RESET command in your sequencer event list, you won't go far wrong.

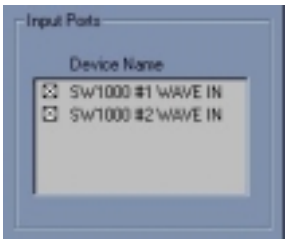
It is as follows:

F0 43 10 4C 10 00 00 01 F7 – For AD1

F0 43 10 4C 10 01 00 01 F7 – For AD2

Insert these 2 lines into your sequencer event list with a suitable gap between them, and all should be well.

The SW1000XG has 2 methods of recording audio. When you open up your music software of choice, you will see that although it has only 1 physical connector socket on the back, it actually has 2 record options. These are



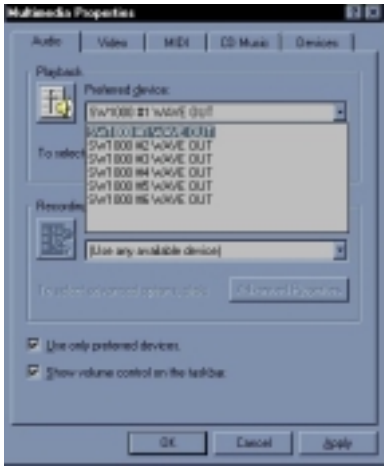
So we have SW1000#1 wave in and SW1000#2 wave in, what is the difference?

As we know the SW1000XG has a wealth of effects processing on board, these effects can be applied to the analogue inputs in real-time allowing you to hear the effects as you record your audio. With SW1000#1 wave in, you can monitor the effects whilst you are recording your audio, but the signal that is eventually recorded to your hard drive as a wave file (or AIF/SD2 on the Mac) will be dry. Why would you want this? Well as any studio engineer will tell you, committing your effects at the pre mix stage can be a bad idea. It is always better to be able to experiment with the effects during mixdown, as this gives you more flexibility with your final sound. It also means that you can chop and change effects at will without ever having to worry that the original audio track is being effected. Once you have set your playback channels for your audio in your sequencer, you can use applications such as XGEdit to add effects like Reverb, Chorus, and the other few hundred SW1000XG onboard effects at will, and all of this will never affect the amount of CPU power your computer uses. Try doing that with Active Movie or VST effects!

We stated earlier that the SW1000XG in reality only has 4 physical outputs, 2 analogue and 1 stereo digital which all carry the same data. This would be limiting if it were not for the fact that as far as Windows or Macintosh audio software is concerned, the SW1000XG actually has a total of 6 discreet stereo outputs. Thus giving a total of 12 output channels, through which, as many audio tracks as your heart desires can be played. How does this work?

The SW1000XG driver cleverly tricks your Windows software into thinking that it is in fact 6 discreet (but locked perfectly in sync) audio cards. This is by virtue of the 'multiple wave driver model' implemented on the card. Once the driver for SW1000XG is correctly installed, your PC will show up a total of 6 audio devices in your Windows Multimedia control panel, and hence also in any Windows Audio software.

This is shown below.



Now the advantage of this is that for volume control and effects control you can individually add effects or volume/pan changes to any one of 12 discreet playback 'busses' as we shall term them using software like XGEdit or the Mac XGEditor or even XGWorks. If we now go and look at the XGEdit SW1000XG audio mixer window we can see 12 discreet channels which map as follows

SW1000#1 WAVE OUT – CHANNELS 1&2
SW1000#2 WAVE OUT – CHANNELS 3&4
SW1000#3 WAVE OUT – CHANNELS 5&6
SW1000#4 WAVE OUT – CHANNELS 7&8
SW1000#5 WAVE OUT – CHANNELS 9&10
SW1000#6 WAVE OUT – CHANNELS 11&12

So, with your audio software or sequencer of choice active, (presuming that it supports multiple soundcards or multiple wave outs, which most do these days) you can run an application such as XGEdit along side it, and using (or not depending on the software) Hubis loopback should have full control of the audio level and effects for all of your SW1000XG. This as we have discussed earlier, is faster, uses no CPU power, and means that in most sequencers you can automate everything.

But what if I want to record with effects?

Well you can but you have to be careful!

SW1000#2 Wave Record does give the option of recording whilst monitoring with the effects you have chosen. For stereo wave programs such as SoundForge by Sonic Foundry or WaveLab by Steinberg, this is a good option for recording. This is due to the fact that you can also use the XGEdit analogue mixer to control the input level (this is because SW1000#2 is actually a post mixer tap off point as we shall now see). This is achieved using the AD part input control, which will adjust the input level to the card if using SW1000 #2 wave record.

But!

As the SW1000#2 Wave record option is also the famed 'loopback' record option (the neat thing we talked about much earlier in this guide that enables you to record all of your mix down to a stereo wave file via an internal loopback path). Everything else that is being played by the SW1000XG at that time will also be recorded.

Hence it's great for recording just stereo audio files with effects (for example you could spruce up a live recording with some reverb). It is not so great when you are in a multitrack audio application (unless you use it to create your final stereo mix, which is what it is really useful for).

So if you have recorded a dry track whilst monitoring the effects and wish to commit the effects permanently to a track this is how you do it.

Solo the audio track that you wish to add the effects to. Call up XGEdit's analogue mixer, and depending on which wave port you have your audio coming out of, set up the volume, panning and effects levels that you wish to use on that track. Set a new audio track in your multitrack application that you wish to record the effected track to (give it a name like 'Track with effects'). Select **SW1000#2** wave in as your record input option for the new track. Arm the track ready to record, and making sure just the track with effects is going to play, hit the record button. However long the original track was, will be the time it takes for the new track to be created with the effects on.(It works like a digital bounce-down)

Make sure when you go to play back you new track that the old one without effects is muted, and also make sure that the effects settings you have just applied are no longer still active in the XGEditor mixer window. As you will (if you are playing the audio track out of the same wave port) just end up adding the effects again to the track being played back, which will sound very odd.

Make sure also that you correctly set up the panning for the playback track with your new effects added, so that any stereo effects such as delay LCR sound right. Also try to make sure your volume levels are up to maximum, as the loopback record option can attenuate the gain of the original track (this is to compensate for EQ and effects processing which can add up to 6dB of gain) by as much as 6dB.

How do I add effects to an audio track then?

From what you have learned so far, you can see that inside XGWorks or XGEdit's analogue mixer you have effects send dials for the Chorus, Reverb and Variation effects busses. These allow you to easily apply effects to either pre recorded audio tracks on playback or to the analogue inputs themselves for effects monitoring or recording live. If you are adding a variation effect the only golden rule is **PUT THE VARIATION CONNECTION TO SYS MODE** which can be done easily in XGEDIT or XGWorks. For insertion effects, XGEdit is easier in that the small led indicators at the top marked I1, I2 and P (P only works if you have an effects based PLG board such as the PLG100-VH installed) can easily just be clicked to add an insert effect to any audio part. They light up green when applied.

This is covered in more detail in the XGEdit help file that accompanies XGEdit.

What about EQ on audio parts?

Unlike our DS2416 sister card (covered in more detail in the next chapter) the SW1000XG doesn't have dedicated EQ for each audio part. The Multi band parametric EQ master will affect audio and MIDI (as this is the final stage before the audio actually goes out), but the 2 band EQ which can be applied to MIDI parts cannot be applied to audio parts. So how do we add EQ to individual audio sections? Simple, we use the **Insert** effects and **Variation** effects buss with programs like '3 band parametric eq'. You will notice from the list of effects available in the SW1000XG manual that you have options for 3-band fully parametric eq and 2 band eq. Using the methods we have just discussed for adding effects to audio parts, you can easily apply all 3 effects busses that may act as eq (VAR, INS1, INS2) to audio parts. You may then loopback re-record them so that the eq is committed to a part. Don't erase the pre-eq audio track, just mute it, as you may wish to change the eq settings when you go to final mix. As you will see in the next chapter, the eq is one of the DS2416 cards strongest points, although as you will also see, it is more limited in overall effects bussing, and has no MIDI or synth section. This is why the 2-card combination is such a strong one.

So in summary

SW1000#1 Wave record allows you to monitor effects but records dry to your hard drive
SW1000#2 Wave record will record with any effects you have set up on audio parts, and also is the loopback record buss so you can add effects at a later date to audio tracks
The SW1000XG has 6 stereo outputs (virtual) that can play back as many hard disk tracks in your audio sequencer as your hard drive and PC will allow. It is not limited to only 12-track playback.
The SW1000XG audio playback mixer can be hardware controlled from any MIDI controller device
All SW1000XG audio mixing, panning and effects functions can be controlled via MIDI sysex excepting input gain level, which is non-controllable unless using SW1000#2 wave record.

Common pitfalls

Due to the lack of MME input gain, many people find that the Windows mixer input control is greyed out, and thus think that they cannot control the level of signal getting into the SW1000XG. This as we have shown is not always the case although Yamaha do recommend an external mixer for controlling the level going into the SW1000XG. The other common mistake that people make is that when they go to playback their 'loopback' audio track, it sounds muffled, this is almost always down to incorrect panning settings in the wave output port being used. Run up XGEdit and set the pan position to full left and right, and make sure the volume level is set to maximum for the wave port you intend to use. You should also check that you are not adding effects to the already processed track again (unless you intend to), and that your master 5 band parametric eq settings are not processing the sound again. The standard Windows MME driver is just one way of controlling the SW1000XG audio in Windows, another is ASIO. We shall discuss the differences with ASIO drivers in the ASIO and Macintosh sections of this guide.

Chapter 11

The DS2416 linkup

The SW1000XG is also known as the Audio & MIDI Factory card, which forms part of Yamaha's DSP Factory solution. Well what is DSP Factory?

DSP factory is Yamaha's total solution for mixing and producing audio, and at its heart is the DS2416 card. This is a dedicated DSP based mixing console on a PCI card that is functionally every bit as good as our flagship top of the range digital mixing consoles such as the 02R and 03D.

A brief overview of the DS2416 card.

The DS2416 is a PCI card with five DSP chips on-board. It provides recording of up to 8 tracks simultaneously and playback of 16 individual wave streams simultaneously, in addition to mixing quality equal to the Yamaha 02R digital mixer, and effects processing comparable to the Yamaha ProR3 and REV500.

Like the SW1000XG the DS2416 provides professional quality digital mixing and effects processing without relying on the computer's CPU. This ensures guaranteed processing power regardless of other tasks the CPU may be performing. Mixing and effects parameters can be adjusted in real-time, as opposed to the sluggish performance common in CPU-based mixers. And by significantly reducing the load on the computers CPU, much more accurate record and playback timing can be achieved.

So what are the differences?

Well if we look at the DS2416 as a professional digital mixing desk on a card, and the SW1000XG as a synth, expandable plug in system host, mixer, effects processor and MIDI interface all in one it pretty well sums up the 2 cards differences.

Whilst the DS2416 has 5 DSP processors dedicated to mixing, effects processing (2 effects busses), dynamics processing (compressors, expanders, duckers on every channel), equalisation (104 bands of eq are permanently accessible as 4 band parametric eq on every audio part), and routing. The DSP processors on the SW1000XG as we have seen are dedicated to the effects processing (6 busses), mixing, synth engine, routing, and master EQ.

If you plan to work totally with audio, then the concept of the DS2416 may be more appealing to you, as the option of owning what is, a multi thousand dollar Yamaha digital mixer on a card for a relatively low cost is exciting.

So why do the 2 cards exist?

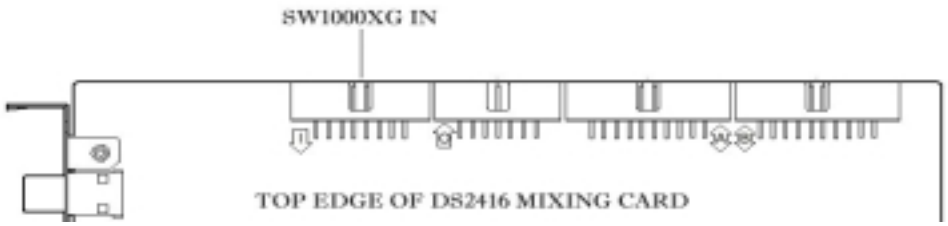
Well, as we have said, the DS2416 is designed purely for mixing audio, whilst the SW1000XG is a professional synth and mixer and effects unit all in one. The SW1000XG doesn't have all of the mixing capabilities of the DS2416 (eq as we mentioned in the previous chapter is not available on every audio part at the same time), but has a powerful synth engine on board.

This also applies to dynamics processors. The DS2416 has 26 of these, which are always available and can be applied to any audio track at will. It does however only have 2 effects busses as opposed to the 6 of the SW1000XG, and don't forget that the DS2416 has no MIDI functionality at all, and no synthesiser or expansion for PLG cards.

The beauty of the Yamaha ''Factory" concept is that the 2 cards talk to each other and really are designed to work alongside each other seamlessly in any computer environment, the question is 'How do I make this happen?" This chapter aims to show you!

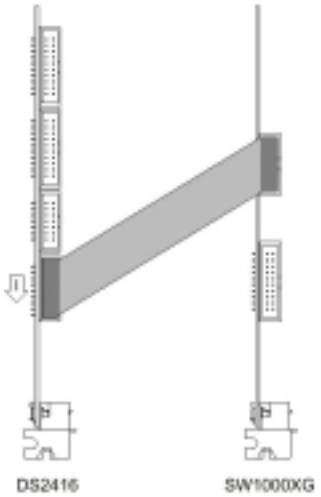
As we covered in our opening chapters, the SW1000XG has 2 connectors along its top edge. The PLG connector we have covered in detail, now it is the turn of the CN102 connector, which is the larger black connector on the top edge. What does this do.

The SW1000XG comes supplied with a short ribbon cable that has a black moulded lump in the middle of it. This is a ferrite core, designed to stop the incredibly noisy computer environment from affecting or disrupting signals flowing between the 2 cards. Along the top edge of the DS2416, you will also find a set of similar connectors, one of which is designed to be attached to the cable that comes with your SW1000XG. The correct connector is shown in the diagram below



The other connectors on the top edge of the DS2416 are covered in detail in the DS2416 user manual. For the purposes of this guide, we shall not go into too much detail but briefly mention that they are designed for the optional AX44 and AX16AT units designed for the DS2416, and also for linking up 2 DS2416 cards together in tandem.

So when we open up our computer to fit the DS2416 card along side the SW1000XG it is important that you connect the 2 cards together in the manner shown below, to allow them to communicate, and perform their magic together.



When you have done this, it is then time to visit our website again!

The DS2416 and SW1000XG are clever in that they use a common driver model. For Windows users Yamaha have posted 3 versions of the common driver files which are designed for the various configurations that you, the user may have. These are

1: A driver set for people who just use the SW1000XG
2: A driver set for people who just use the DS2416
3: A driver set for people who use the 2 cards cascaded

The latest versions of all of these can be found on our Pro Audio web site, and Xgfactory web site (drivers downloads sections), or if you do not have net access can be obtained by calling your local Yamaha dealer, and asking for them.

For Macintosh users, there are again 3 options that cover the same configuration variations with ASIO.

The reason for the 3 versions is that the driver code optimisation priority for each version (even though they look very similar with similar named files) will differ based upon the configuration you own. With one driver optimised around the DS2416, one around just the SW, and one designed for both cards at once. So once you have updated your driver to work with your new 2-card setup, it is time to see what you can do, and how to get the 2 working together.

Yamaha's decision to not include any software support other than a basic MIXTEST application with the DS2416 card was one that initially caused many people confusion. How did one get at all of the available power on the card?

Yamaha had come to an agreement with several third party software companies including Steinberg, Emagic, Cakewalk, Cmexx and Musicator that they would supply the software support for DS2416 based around the software development kit that Yamaha provided. Whilst graphically the software support looked different from application to application, fundamentally they all did the same kind of thing. We shall focus on 1 application in this chapter, that being Steinberg Cubase VST24. This is solely due to the software being a clear example of how to use the linkup between the 2 cards. The methodology and terms used however can be applied to any of the applications that support the DS2416.

The internal connector, which we shall refer to as SI (Serial Interconnect) between the 2 cards is capable of carrying up to 8 discreet digital channels or either MIDI or audio to 8 discreet mixer channels of the DS2416 card. The DS2416 card has the ability to bring in audio from many sources, such as the AX44 expansion bay or its own digital inputs or analogue inputs, however, one of its cleverest functions is the SI option.

The SI connector can also carry wordclock information between the 2 cards to maintain synchronisation. It would now be a good point to discuss what wordclock is, and why it is essential.

Unlike analogue audio equipment, digital audio equipment must be synchronised when digital audio is transferred from one device to another, otherwise, the digital audio might not be read correctly and audible noise, glitches, or clicking may occur.

Synchronisation is achieved using what's called a *wordclo*ck, which is a clock signal for synchronising all the digital audio words in an audio system. Note that wordclocks are not the same as SMPTE or MIDI time code, which are used to synchronise audio recorders, MIDI sequencers, and so on. Wordclock synchronisation refers to the synchronisation of the digital audio processing circuits inside each digital audio device.

In a typical digital audio system, one device acts as the wordclock master and the other devices act as wordclock slaves, synchronising to the wordclock master. If the DS2416 is the only digital audio device in your system, no special wordclock settings are required, as the DS2416 synchronises to its own internal wordclock. The SW1000XG card not having a digital input port will always act as a wordclock master running from its internal clock source.

If you add the SW1000XG to the DS2416, the DS2416 will have several options as to where its wordclock information is coming from. Our interest lies in the SI option, for as we said, the SI connector can also carry wordclock info.

Wordclocks run at the same frequency as the sampling rate. The SW1000XG generates its own wordclock at 44.1 kHz (the industry-standard sampling rate for music CDs). As we have seen the DS2416 can be used as a wordclock slave synchronised to an external wordclock of the SW1000XG (or indeed to other devices such as DAT recorders) between 30.08 kHz and 50.88 kHz (32 kHz –6%, 48 kHz +6%).

Converting the sampling rate of digital audio is a complicated process, so it's best to use the 44.1 kHz sampling rate, especially if your work is destined for CD distribution.

Before commencing with a recording session, make sure that all wordclock slaves are synchronised to the master. Some devices have front panel indicators to show when they are wordclock synchronised and this is the case with the software support for the DS2416/SW1000XG linkup.

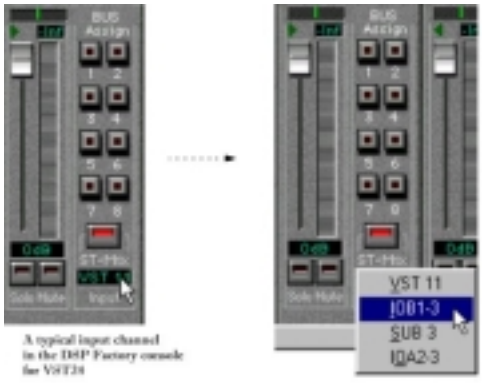
Once connected together, the SW1000XG will be passing its wordclock information to the DS2416 at 44.1 kHz. For the actual audio to be passed over however to the SUB input channels of the DS2416, you need to make sure that the DS2416 is actually listening.

If, as we discussed, we take Cubase VST as our example, when you have the DS2416 correctly installed in VST24 (any version after version 3.6) you will see an additional option menu in the VST audio section labelled DSP Factory.

Opening this will present you with several new options, one, which is labelled **OUTPUT PATCHBAY**. It is here you will see the options for wordclock selection for the DS2416. Now if you have correctly connected the 2 cards together using the supplied link cable, you will be able to select **EXT SI** as your option. If the led for this stays lit when you select it, you have successfully got the SW1000XG and the DS2416 talking to each other, and the DS2416 is now reliant on the master clock from the SW1000XG. If the LED doesn't light up, then you may need to open up your computer and check the connection cable, make sure it is securely slotted in.

Now you return to the DSP Factory menu in VST and open up the INPUT CONSOLE window. This window allows you to configure the DS2416 mixers input sources. Channels 9-16 and 17-24 are your 8 options for sub inputs 1-8 which correspond to the 8 discreet channels we mentioned earlier that may be passed between the 2 cards. As a point of note, as many tracks as your hard disk is capable of can actually be passed between the 2 cards, just across 8 discreet channels.

In the VST DSP Factory Input console window then, you will be presented with the options as shown in the following diagram



A typical input channel in the DSP Factory console for VST24

You can see that for channel 11 represented in the diagram we can select **VST11** (A Cubase playback track), 2 sets of IO options (for the AX44 or AX16AT that may be connected) or **SUB 3**. SUB 3 is **SUB** input channel 3 coming from the SW1000XG. As you have a total of 8 discreet channels known as SUB channels, it would help to see how they map with respect to the VST mixer for DS2416.

Input
SUB1 – VST Channel 9 or 17
SUB2 – VST Channel 10 or 18
SUB3 – VST Channel 11 or 19
SUB4 – VST Channel 12 or 20
SUB5 – VST Channel 13 or 21
SUB6 – VST Channel 14 or 22
SUB7 – VST Channel 15 or 23
SUB8 – VST Channel 16 or 24

If you have this VST input mixer console configuration saved, and then play a MIDI file or audio track for the SW1000XG inside Cubase, immediately you will see channels 9&10 in the DSP Factory Input console show activity. This is because the main stereo outs on the SW1000XG are already configured to play over **SUB 1&2** of the SI connector. You will also have the audio coming out of the SW1000XG analogue and digital connections so if you decide that you just wish to use the audio outs of the DS2416, now may be a good time to mute the channels from the main SW1000XG outs on your mixing desk. This is to avoid phasing between the SW outputs and the passed signal from the DS2416 outputs.

So all MIDI & audio playback from your SW1000XG is now being passed to a single stereo pair of SUB inputs on the DS2416. You can also have all of the playback channels and other audio devices connected to your DS2416 running at the same time, which is why this set-up is so very cool. Without any loss of quality, you can connect the 2 cards up, and use some of the excellent mixing facilities of the DS2416 to alter your audio or MIDI from the SW1000XG. At present though you will only see 2 channels, how do you get access to the other 6?

If you have set-up the VST mixer correctly as per the table above, you will have channels 9-16 or 17-24 assigned to SUB 1-8. Now it is time once again to delve into our setup for XGEDIT and SW1000XG inside VST.

You will recall from the chapter on VST with the SW1000XG that XGEDIT is a superb way to control the audio mixing features of the SW1000XG when used with Hubis loopback. One of the features of XGEDIT that we have not yet discussed is the individual output selection option.

If you open up XGEDIT and look at the bottom left hand corner you will see a dialog box labelled OPUT (Output). This for each of the synth channels determines which of the outputs is used on the SW1000XG. By default it is set to S for Stereo which refers to the main outputs of the card, and also the SUB1&2 outputs to the DS2416.

So you can set any of the synth parts (or in drum mode any individual drum instrument) to any one of the 8 sub channels of the DS2416. To perform this task, just highlight the OPUT window in XGEDIT and use your +/- keys of your computer keypad to jump through the various options. These are covered in detail in the XGEDIT help file/user manual.

XGEDIT allows you to select all 8 of the SUB channels as follows

XGEDIT OUTPUT WINDOW DISPLAY	**SUB CHANNEL**
S	**SUB 1&2**
INDIV 1&2	**SUB 3&4**
INDIV 3&4	**SUB 5&6**
INDIV 5&6	**SUB 7&8**
INDIV 1	**SUB 1**
INDIV 2	**SUB 2**
INDIV 3	**SUB 3**
INDIV 4	**SUB 4 etc**

Remember that panning inside XGEDIT and also panning in the DSP Factory Input console window will be important to the stereo placement and volume level of your individual outputs. Now that you have the basics, it may be a good time to experiment with your software of choice. Many of the applications that support the DS2416 come with comprehensive user manuals that cover this function. So remember to read them thoroughly.

For the audio side of the SW1000XG to be passed over to individual outputs on the SI connector you need to open up the XGEDIT analogue mixer for SW1000XG.

In the audio mixer for the SW1000XG in XGEDIT you will find the individual output option labelled OP. This enables you to take any audio track being played back under VST (or whatever application you are running) by the SW1000XG, and pass it over to any of the 8 discreet sub input channels of the DS2416. Why would you want to do this?

As we have discussed previously, the DS2416 has a more comprehensive eq section for each audio channel, and also has a different set of effect processors to those on the SW1000XG via 2 effect busses. You may wish therefore, to treat your audio track with different effects, or apply some dynamics processing to it, whilst not using the effects of your SW1000XG.

There are other options for setting up the audio linkup inside software such as VST and Emagic Logic. These come in the form of the mixer maps, and environment pages we have talked about in the VST and Logic chapters. Yamaha encourage the use of these maps, but you may find that using XGEDIT makes it easier, as with a registered copy of XGEDIT you can save your mix set-ups, for both audio and MIDI, which can then be pasted as MIDI files into your sequencer of choice very easily.

So in summary, here is a quick guide to setting up inter-connect and individual output channels when linking the SW1000XG to the DS2416.

1: Make sure you are using the correct drivers for the 2-card system, available from our website
2: Make sure you have the SI linkup cable connected firmly linking the 2 cards together
3: Make sure that your DS2416 software application of choice supports the option to select the SW1000XG as a wordclock master source, if it does not, you need to ask your software supplier why not?
4: Once you are in your software of choice, make sure that SI is selected as the wordclock master. If it is not selected then you will not be able to hear the SW1000XG through the DS2416
5: For individual output selection of audio and MIDI parts to pass from the SW1000XG to the DS2416 you have 2 options

Option A: The easy way

Follow the instructions earlier in this chapter for using XGEDIT to select the individual outputs (VST and Logic users can also use the mixer maps/environment pages to perform this task)

Option B: The very hard way (no kidding!)

The hard way to route audio or MIDI to individual outputs, and mix is to manually type it all in as system exclusive data into the event list of your sequencer. This option is for desperate people only, but should you wish to torture yourself in this way, here goes!

(Remember what we said about sysex in the opening chapters!)

Sysex = F0, 43, 10, 4C, 0A, nn, 10, xx, F7 ------ Hexadecimal indication

(nn = Part #/xx = Output #)

Enter Part # for "nn" (e.g. Enter 00 for MIDIPart#1 and 10 for MIDIPart#17.)

Enter the destination BUS IN for "xx".
Stereo Out = 00 (Sub1+2)

Indiv1+2 = 08 (Sub3+4)
Indiv3+4 = 09 (Sub5+6)
Indiv5+6 = 0A (Sub7+8)
Indiv1 = 28 (Sub3)
Indiv2 = 29 (Sub4)
Indiv3 = 2A (Sub5)
Indiv4 = 2B (Sub6)
Indiv5 = 2C (Sub7)
Indiv6 = 2D (Sub8)

Doesn't look to bad, you may think. But that is just the sysex for the output assignments for normal MIDI parts, imagine trying to do that for an entire drum kit with for example 40 instruments.

Also you then have to enter the sysex for the panning, volume, effects send levels, controllers for MIDI volumes.

Trust us. You should either use XGEDIT, or use the mixer maps for VST, Logic environment pages, it will save you weeks of typing work.

For people still not deterred, the full list of sysex for every part, and the parameters mentioned above can be found in the SW1000XG user manual, happy typing!

Common Pitfalls

Read the user manual for your DS2416 support software to make sure that it offers the option to set the SI input as wordclock master, for if it doesn't you won't be able to hear the SW1000XG via the interconnect cable. Make sure also that the cable is connected firmly between then 2 cards.

If you can grasp the concept of what is possible with the 2 cards, it really begins to hit home just what an incredibly powerful system you have, with all that effects processing and MIDI power coming out of a perfectly synced 2-card solution.

However, there are some points you need to be aware of.

The first is that your SW1000XG must be updated with the latest revision of its FLASHROM firmware, which as of writing is version 1.04. Without this, if you apply an insertion type effect to any audio or MIDI part, which is configured to an individual output, then you will not hear anything, the part will be muted. This is fixed in our firmware updater, which is available to download for both PC and Mac from the xgfactory website.

Individual outputs, being pre effects send will not carry buss send effect information to the DS2416. You can use the effects on the SUB1&2 parts (stereo out) and insert effects (being inserts) which will carry over to the DS2416. Chorus, reverb and variation buss effects will not however be carried.

You can however use the effects of the DS2416 to add effect to the individual audio or MIDI parts from the SW1000XG. Please refer to your DS2416 supporting software manual for details.

Wordclock when the 2 cards are linked is set to come from the SW1000XG (should you wish to hear it). If you want to set the wordclock back to DS2416 or any other source you will lose sound from the SW. To get around this, a good way to work would be to record your audio and MIDI parts as audio tracks using the individual inputs from the SI connect. And then just working with the DS2416 whilst you record from your alternate clock source. Or you could monitor from the physical outputs of the SW1000XG and DS2416 separately whilst recording from your alternate clock source to the DS2416.

We do recommend that you get familiar with the DS2416 or SW1000XG first before trying the linkup, and once you have a set-up with which you are entirely happy, save it in your sequencer or audio application. And register XGEDIT, which will allow you to save mixer snapshots and set-ups for the linkup also. Yamaha using this method can have the 2 cards talking together in under a minute every time.

Chapter 12
Living in the new age: ASIO & NT.

Yamaha's SW1000XG and other 'Factory' style products form part of an ongoing project family at Yamaha. With software moving forward into new areas at such a fast pace, it is only correct that we should cover some of our latest and future developments.

ASIO – Audio Streaming Input Output

1997 saw the introduction of a new type of Audio driver for both Windows and Macintosh computers, from Steinberg. This new driver model type known as ASIO has grown widely in acceptance throughout the music industry, during 1999 being updated to ASIO 2.0, which increased its functionality yet again. Here is a brief overview of the ASIO system.

In the late 90's Steinberg felt that the current Sound Manager driver model for Macintosh, and the Windows MME system had reached their limits. They felt that what was missing on the personal computer platform was a relatively simple way of accessing multiple audio inputs and outputs. They believed that today's operating system's audio support was designed for stereo input and stereo output only, and offered no real provision to extend this without creating major problems, i.e. synchronization issues between the different input and output channels.

With the Steinberg Audio Stream I/O (ASIO) Steinberg wanted to help hardware manufactorers create hardware and driver software which fitted best into the music production world and meet the expectations of the customer (Both musician and audio engineer).

The Audio Stream I/O system addressed areas relating to efficient audio prcoessing, high data throughput, synchronization, low latency and extensibility on the audio hardware side. The interface was not bound to any fixed number of input and output channels. It put no limitation on the sample rate (32 kHz to 96 kHz or higher), sample format (16, 24, 32 bit or 32/64 bit floating point formats), and it took advantage of todays computer architectures for high data throughput (PCI, Firewire and Mlan).

ASIO also supported sophisticated hardware solutions for additional audio processing (such as the DS2416). But remained simple in comparison to other approaches.

Yamaha started work on the ASIO driver model for both PC and Macintosh not long after the MME driver for Windows was completed. The problem with the existing MME driver within the Cubase environment was primarily one of latency. If you decided to use the VST mixer (rather than the XGEDIT one which as we discussed moves audio playback levels etc. in realtime with zero latency), you would find that the level response itself appeared to be sluggish in comparison to the movements of the sliders. This is because the time for the card to respond using the mme subsystem drivers could be as much as 557ms.

With ASIO you are effectively talking at a lower level to the hardware using features of the hardware itself to reduce latency times. With the Yamaha ASIO driver you could also support the SW1000XG in its full 32bit mode, rather than the 16-bit mode supported by some Windows applications. Yamaha provided 2 drivers for ASIO support, one at 16 bit and one for 32bit mode (VST currently records audio data at 24bit resolution). These drivers reduced the latency of the DS2416 and SW1000XG cards, by approximately a factor of 5, lowering them from 557ms to 106ms.

The Yamaha ASIO driver was also unique in the fact that it was the first driver in the world to support 2 independent pieces of hardware (being the DS2416 and SW1000XG) at the same time, using just the 1 common driver model. This meant that for users of the 2 card system via linkup, they could access all of the wave ports, and functionality of both cards at the same time. This is true of both the Macintosh and Windows versions of Yamaha's ASIO driver.

To install the Yamaha ASIO drivers you must first make sure you have the latest version of Yamaha's MME drivers for Windows (Mac users just install the ASIO driver). These are always available from our Xgfactory website. The installation is very simple being just a simple setup.exe routine once the MME drivers have been updated. Once

installed, you can run your ASIO compatible application (Cubase VST we will use here) and see the new options available to you in the audio setup panel. It is important to note that you must have the latest version of the MME drivers to support the ASIO system.

The SW1000XG drivers appear in the ASIO control panel of your software with different names. Instead of being SW1000 #1 wave etc, they now appear as PCI 1&2,3&4 etc. If you have a DS2416 and SW1000XG installed, make sure you have the correct ASIO driver for the combined setup installed (available from our Pro Audio website). In this instance the playback drivers will appear as

DSPCI 1-16, and SW PCI 1-12

The SW1000XG audio record options will appear as

Analogue 1&2 (SW1000 #1 Wave record)

Loopback (SW1000 #2 Wave record)

Basically, if you have an application that supports ASIO, then using the Yamaha ASIO drivers for SW1000XG is a good idea. It is also recommended that you stick to using ASIO for the session you are in, as dropping back and forward between ASIO and MME drivers inside software such as Cubase can lead to well documented problems with any ASIO device.

Windows NT4/Windows 2000

Microsoft's NT operating system is a whole new ball game when it comes to performance. It supports multi-processor computing, which can (if the application supports it) greatly increase the amount of CPU power available. It also works in a different way to Windows 95, in that it contains no 16-bit code, and when applications crash, only the application crashes not the entire operating system (most of the time!). It is used by industry professionals and major corporations for their office, banking and networking solutions, and until recently was almost totally ignored by the music industry, so why use it?

In recent years a growing number of software companies have begun to see the benefits of NT. It being a more stable environment for applications, being more crash proof and offering as we said, potentially huge power increases.

Whilst this was ok for purely audio based applications, such as Cool Edit Pro and WaveLab, applications that worked on both MIDI and audio had to overcome a new set of problems.

The problem with many software applications is that they relied on many of the 16-bit core code routines present in Windows 95 to actually run. For a variety of reasons, a Windows 95 application in general must use some 16-bit code to work with Windows 95's low-level MIDI and timer services. Otherwise, timing would be extremely poor and unreliable. With the arrival of Windows 2000 (previously known as NT5), and the increased popularity of NT4.0, application providers started to make more of their software NT compatible.

So, as any serious programmers will be aware, many parts of Windows 95/98 remain as 16-bit code. This includes the multimedia subsystem and drivers for MIDI and audio devices. (Contrary to popular myth, there is no such thing as a "32-bit MIDI driver for Windows 95". MIDI drivers can be updated to support Windows 95 Plug and Play and the Device Manager tree, but the core MIDI driver code remains 16 bit.)

So software vendors had to re-write their core code to accommodate for this, and find new ways of getting stable and accurate timing under Windows NT.

Yamaha's stance on NT

For NT4.0 Yamaha have released during August 99 full support for the SW1000XG in the form of a combined MME audio and MIDI driver. This driver is available on the Xgfactory website and also from your Yamaha dealer. Installing this is not dissimilar to installation of a driver under Windows 95, but you should be aware that Windows NT4 does not support the Microsoft plug and play standards, so it is wise to check your IRQ resources in NT before installing the SW1000XG.

To install the SW1000XG under NT4, the following procedure should be adhered to.

Displaying the file (just in case you can't see it!)
1. Select the Windows [View] menu, then [Folder Options].
   The Option window opens.
2. Select the [View tab].
3. Check the [View all files] checkbox.
4. Press the [OK] button and close the Option window.

II) Driver installation
1. Select [Start] menu, [Settings], then [Control Panel].
2. Open [Multimedia] in the Control Panel.

3. Select the [Devices] tab.
4. Select the [Audio Devices] and click the [Add...] button.
5. Select [Unlisted or Updated Driver] and click the [OK] button.
6. Insert the [YAMAHA SW1000XG Driver Disk for Windows NT] disk into the
A drive, and enter "A:\" in the drive field, and click the [OK] button (if you have the files copies to your hard drive, just browse to the correct location)

7. Select [YAMAHA DS2416, SW1000 Driver] and click the [OK] button.
8. Restart the computer.

Now the driver has been installed.

Note: Yamaha recommend that you are running at least service pack 4 of Windows NT4.0 prior to installation.

THE BSOD (Blue Screen of Death)

Before adding any new drivers or devices to NT, users should be fully aware and familiar of the implications of the BSOD. This is an NT start-up screen that nobody ever wants to see. A full memory dump and instructions to use crash recovery mode to re-instate your Windows NT system. Yamaha presume everyone running NT, will be aware of the recovery methods which are covered in the NT users manual. As we have said, the Yamaha SW1000XG driver has been tested under NT up to and including (as of time of writing) service pack 5. Please make sure you have a free IRQ to allocate the SW1000XG to, and are running support software that is specifically written for NT such as Logic Audio 4 & higher, Cakewalk Pro Audio 8 and higher, or Steinberg Nuendo. Yamaha will not offer technical support for the NT driver with applications that are not specifically designed to run under NT

Applications support under NT4.0

As of time of writing of this guide, Yamaha‘s own XGWorks application does not support NT, so Yamaha recommend XGEDIT95 which runs flawlessly under NT, alongside one of the growing number of NT compatible applications, such as Cakewalk Pro Audio, Logic Audio 4.0 (and higher), Cool Edit Pro etc. It is wise to keep checking with your Yamaha dealer or the Yamaha websites for latest information relating to NT4.0 support. Remember also that Hubis loopback driver as of time of writing does not support NT, so please download MIDI-YOKE (discussed earlier in this guide) if you wish to run XGEDIT and another application at the same time under NT.

Installation of MIDI-yoke under NT is covered in the MIDI-yoke read-me file that accompanies the software. MIDI Yoke will be essential for use with the SW1000XG under NT, to allow applications such as XGEdit to communicate with your NT application.

Whilst NT can offer a great many benefits in terms of stability and multi processing, at the time of writing many applications packages and software that you may use every day, will not work under NT. You will need to weigh up the possible advantages and disadvantages yourself before deciding to go down the NT path.

Yamaha‘s future commitment to driver development on the SW1000XG.

As of time of writing, Yamaha is committed to an ongoing development of drivers for new technologies. With the introduction of the new Cakewalk AudioX standard, Yamaha‘s DS2416 card will be the first card in the world to utilise this exciting new technology, which embeds the control needed for a card such as the DS2416 inside the driver. Yamaha will continue to monitor all other new audio standards as and when they appear.

The latest info as always will be on our xgfactory.com website.

Chapter 13

Installing in the Macintosh, and using the bundled Yamaha XGEditor.

The SW1000XG had enjoyed huge success on the PC platform, but it was always Yamaha's intention to release Macintosh drivers and support software for the card. This finally came to light in mid 1999 with our first ASIO & OMS compatible driver release coupled with our XGEditor software for Macintosh.

Before reading this chapter, please make sure you have read all of the chapters, which cover the specifications, and details of the SW1000XG. It will not harm also to check out some of the PC specific chapters (especially if you use Cubase or Logic on your Mac) as some of the points covered in these sections are just as relevant to the Mac as they are to the PC.

For most Macintosh users, who are used to soundcards that only did hard disk recording, the SW1000XG was a revelation. Never before had a card offered synthesis, hard-disk recording, effects processing and digital mixing all in one. However due to the fact that this had never been done before, certain initial 'teething' problems arose. Hopefully this chapter will aim to cover the setup and configuration of the SW1000XG on the Macintosh platform, and also bring to light a few problems associated with the Macintosh, especially some of the early incarnations of the new B&W G3 models.

Installation of the SW1000XG with the Apple Macintosh.

Compared to the installation of SW1000XG on the PC, (which is an easy install) this is a breeze. First and foremost you should make sure that your Macintosh is running OS 8.1 at least. At the time of writing Apple had just released system 8.6, which offered even greater stability (and was a requirement for the B&W machines). You should also try and make sure that your machine has a decent amount of RAM (For applications like Cubase VST or Logic Audio on the Macintosh, Yamaha recommend at least 128megs…with RAM so cheap, you owe it to yourself!).

Now Macintosh users who may have read the PC related chapters would no doubt be rubbing their hands together will glee at the thought of not having to mess about with those awful IRQ things. But would not be overly happy when then open up their new blue and white pride, to discover that they only have a couple of PCI slots left.

A lot of Macintosh machines of the B&W variety only come with 1 or perhaps 2 free PCI slots. This is due to the SCSI interface, beloved by all music makers not being present as standard on new Macs (damn!). Also you will usually find that a slot has a rather big video card manufactured by ATI living in it (again something all Macs previously had embedded on their main-boards). So there are potentially 2 PCI your slots gone before you even begin. If you then want to plug in a DS2416 as well, you may find that if you ever need another free slot, you could be stumped. The USB interface is too slow for the kind of complex operations and multi-channel audio the SW1000XG is capable of, so bear this in mind when choosing your cards. At least with the SW1000XG you have pretty much everything on 1 card in the first place.

So you open up your computer, and put the SW1000XG in a free PCI slot, what next?

Well, now its time to restart you machine, and install the software & drivers which are available from the CD-ROM (SW1000XG's shipped after May 1999) or from our Xgfactory website (always a good place to start to get the latest versions).

To install the drivers, you must first have OMS installed. OMS (Opcode Music System) is a set of extensions and programs that help to bridge the gap between MIDI software and hardware on the Mac. It is pretty much now accepted as a universal standard for Macintosh MIDI applications. It handles patch management, all information relating to your setup/MIDI studio, and handles your MIDI timing. If you don't have the latest version of OMS, then a quick visit to the Opcode website at www.opcode.com will get you going. OMS is free to download, and as we have said, essential to the SW1000XG.

Opcode also provide a very comprehensive guidebook in PDF format to OMS, which is also free from their website.

This chapter will not cover all of the subtleties of OMS, as the Opcode guidebook goes into great detail on certain options and set-up configurations, which would be beyond the scope of this guide. Needless to say that if you are not familiar with OMS, now is the time to go and get that OMS guidebook.

Once OMS is installed, you can proceed with running the SW1000XG installer.

On your CD-ROM (or downloaded driver set) you will find an SW1000 Installer folder, within this you should find the Install SWDriver icon. Double click "Install SWDriver" icon and your Mac will begin to install the following files in the locations as listed.

System Folder: Extensions: SWXGDriver
System Folder: OMS Folder: SW1000XG OMS Driver

When the installation is complete, an SW1000XG folder is created. In this you will find

SW1000XG folder: License (E)
SW1000XG folder: into ASIO Drivers: ASIO SW1000XG (32), ASIO SW1000XG (16)

The 2 ASIO options refer to the 16-bit ASIO driver, and the 32-bit ASIO driver. If your ASIO software supports recording at 24bit mode (such as Cubase VST) then you can use the 32-bit ASIO driver model for SW1000XG to support full 24bit-resolution recording. If you are running applications that do not support this mode, or are using a slower Macintosh computer then we recommend the 16-bit driver.

A full text log for the installation is recorded into the "Installer Log File"

ASIO for Macintosh and the SW1000XG.

Macintosh users for many years have been used to the simplicity that is 'Sound Manager' Sound manager is (as of time of writing) a stereo audio file support system for embedded audio chipsets on the Mac, and some soundcards. With the SW1000XG being a multi-channel audio device with 12 independent wave stream capabilities, Yamaha chose to write an ASIO only driver implementation for the audio of both the SW1000XG and the DS2416. ASIO (Audio Streaming Input Output) as we have seen in other parts of this guide, is a powerful system developed by Steinberg for synchronising and playing multiple audio streams for both Mac and PC platforms. Many applications now on the PC are supporting ASIO and a growing number do so on the Mac, the most famous being Cubase VST. To enable audio wave-file playback via the SW1000XG on your Macintosh you will need to have an ASIO compatible application installed. Please check that your software of choice does support ASIO, as if it doesn't your SW1000XG will be confined to use as a MIDI only device, which will be a great waste of its immense power.

So if you have an ASIO compatible application running on your Mac, then you can complete the installation process, which is simply

Drag the ASIO SW1000XG (32) and ASIO SW1000XG (16) files from the "into ASIO Drivers" created by the Yamaha installer to the ASIO Drivers folder of your ASIO-compatible audio software.

Restart your Macintosh (if you haven't already done so!)

OMS setup for SW1000XG

The SW1000XG also comes with a comprehensive editor package for the Mac platform, known as the **Yamaha XGEditor for Mac**. It takes some of the visual editing approach found in the PC version of XGWorks, and turns it into a stand alone application for the Mac which combines an editor function with a basic MIDI file player function. The XGEditor is fully compatible with OMS (now you see why it is so important) and thus can be run at the same time as your sequencer for full access control of the SW1000XG's audio and MIDI functions (much as XGEdit on the PC works). But before running the editor you must let OMS know all about the SW1000XG. Yamaha again provide a simple solution to this. Once you have installed the XGEditor software (either from CD or from downloading it from the website) you will find a file inside the editor folder called 'SW1000XG Setup' (with an OMS icon), Double click on this and OMS will start. You should then see a window not dissimilar to the one shown below

It is advised that you have your keyboard connected to the SW1000XG's external MIDI port, if you use the OMS search function to detect the card, otherwise the search function may not find or correctly configure the SW's external MIDI port.

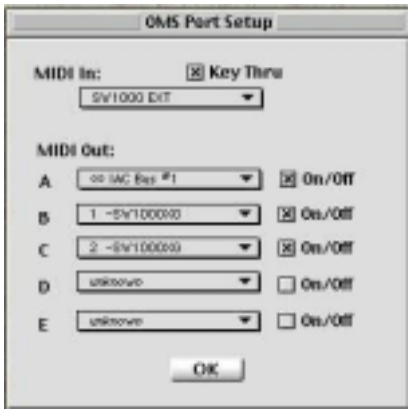
Once you are happy that the SW1000XG is being correctly identified by OMS, you should save it as your current studio setup using the 'Save and make current' option in OMS.

Now it is time to run the Yamaha XGEditor for Mac.

It is at this point, you will find out whether or not your SW1000XG is working, and being recognised by the PCI slot in your Mac. If it isn't then the XGEditor software will not run. It will say that the SW1000XG is not installed or detected, and close down. If this happens then we recommend that you move the SW1000XG to another free PCI slot, and try running the editor again (turn off your Mac first!).

Once the editor is up and running and you can see its main window, it is then time to configure the editor to correctly talk to the SW's MIDI ports.

Choose the OMS port setup from the 'MIDI' menu of the editor, and you will be presented with a dialog box roughly the same as the one shown below

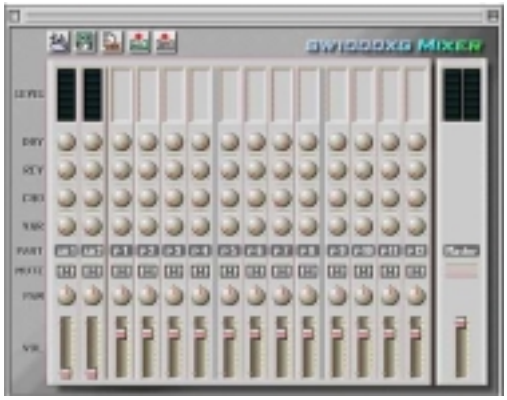


Now the first thing you may ask yourself is 'Why are there 5 MIDI out ports, when the SW1000XG has 3?" This is due to the editor originally being written for generic XG devices such as the MU10/MU90 and the 5 port MU128 (hence it supports up to 5 ports). Logically you should assign MIDI In to **SW-EXT** (and click on key thru so you can hear your SW1000XG whilst playing your MIDI keyboard). MIDI out A, should be set to ' **1- SW1000XG** ' and the check box set to the ON position, likewise for MIDI out B ' **2 – SW1000XG** ' MIDI ports B, C and D are in fact used for monitoring MIDI output only, and do not send XG Parameters. Port E can be used for connection to your sequence software if you wish to record parameters directly into it (as most people will).

There are effectively 2 ways of working with the Macintosh editor package. The first is to circumnavigate around your application software whilst it is in loop mode, monitoring your edits, but not actually recording them. You would then, when happy with the sound, save the editor setup file as a type 0 SMF (Standard MIDI file) which you would then import into your application package such as Cubase as a set-up bar. The other way is to connect the editor directly to the sequencer of choice. This is achieved via what is known as the IAC (Inter Application Communication) buss in OMS.

The IAC is not dissimilar in function to the way Hubis works on the PC. You effectively install a new driver (which will be done via the 'custom install' option in OMS) which configures 4 busses known as IAC 1,2,3 and 4. These can be renamed to suit your needs.

With IAC configured you could pipe the output directly from the Yamaha XGEditor into your software, thus allowing you to record edits of sliders (for example from the SW1000XG analogue mixer), etc whilst your track is playing.



Advantages of using the XGEditor.

As with the PC editing software, the main advantages of using the XGEditor package on the Mac are that it enables you to edit and get around every single parameter that the SW1000XG supports. It allows you to save snapshots and quick edits in its own parameter file format or as a standard MIDI file, which can be used to form the setup bar of a sequence you may be working on in another application. The flexibility of its routing allows you (with OMS) to configure it in a multitude of ways to either edit directly to your sequencer or to audition around your sequencer whilst still hearing your edits. The XGEditor for Mac comes with a comprehensive user guide and addendum section for the SW1000XG so we shall not cover it in too much depth during this chapter; needless to say, it will prove to be an invaluable tool when learning to use the SW1000XG.

However there are some disadvantages

Yamaha's current version (as of time of writing) of the editor software does not support any of the Yamaha PLG cards available. Yamaha have provided editing software for some of them (PLG100-VL for example is supported fully by our range of VL70m editors), but running more than 2 applications (XGEditor and for example Cubase) at the same time is messy and can lead to problems. It is hoped that in the near future, Yamaha will include much greater support for the PLG cards on the Mac platform. The editors that support the range of PLG cards from Yamaha for Mac can all be found on the yamaha.co.uk website.

OMS patch listings

Recently, Yamaha have uploaded a full OMS patch list for the SW1000XG courtesy of an SW1000XG user. This is free to download from our xgfactory.com website. The OMS patch list enables OMS compatible applications to select the sounds of the SW1000XG by name. Full documentation relating to how this works is available in the OMS user manual (PDF file that accompanies the download of OMS)

Other editing options?

Sadly Gary Gregsons' XGEDIT for Macintosh as of time of writing does not yet support the SW1000XG's feature set. It does support voices up to an including the MU80, and hence can be used as a basic XGEditor for the SW.

Yamaha are currently working on a range of new and exciting editing possibilities with some of the major sequencer companies, which we hope will make editing in future even better.

Emagic SoundDiver

Emagic software, whilst being primarily known for their excellent Logic Audio platform on both PC and Macintosh, also make a generic editor package known as SoundDiver. This software offers comprehensive support for XG, and as of writing, also offers full support for the SW1000XG. Further details on SoundDiver are available from the Emagic website at www.emagic.de . It is also featured in our next chapter.

Flash updating

As with the PC platform, it is also possible to update the firmware on your SW1000XG using the Macintosh. Yamaha have provided a free utility for doing this on the xgfactory.com website. The update enables early users of the SW1000XG to modify their firmware allowing INSERT 1&2 effect busses to be passed over to the DS2416 via the interconnection cable. It also cures a few other minor bugs with the MIDI interfacing on the SW1000XG. The flash update software is a simple point and click affair, which reports the status of the firmware on your SW1000XG on launch. It then just runs, and if needed, will update your SW1000XG firmware.

Summary and things to look out for

The new Blue and White Macintosh computers don't have SCSI or Video embedded on the motherboard as the older Macintosh range of computers used to have. This needs to be remembered when considering your audio setup, as you may in future wish to produce CD's with an external CDR or CDRW unit over SCSI, and you could run out of slots very quickly.

The PCI slots on some older B&W G3 machines have been known to be problematic in some cases. You should always refer to the Apple.com website for the latest news. As of time of writing Apple had posted 4 updates to the main-board firmware for the B&W G3, (which on the new B&W Macintosh machines can be updated). Your Apple system profiler will tell you what revision you are running.

Make sure you have sufficient 'actual' RAM in your Macintosh to perform the task in hand. Applications such as RAM doublers and speed doublers tend not to work well with audio software.

Your audio application software needs to support ASIO for the SW1000XG to work. For a full list of ASIO supporting software please visit the Steinberg website.

Also you need to be running OMS to allow the SW1000XG to function as a MIDI device. The MOTU FreeMIDI system is not supported by the SW1000XG natively, however MOTU do provide an OMS to FreeMIDI patch. Yamaha cannot guarantee 100% that this will work. When configuring OMS for the first time with your SW1000XG, please make sure you have an external device connected to the MIDI ports of the SW, to allow correct detection of their status. As of writing the latest version of MOTU Performer supports OMS fully. So if you have Performer by MOTU, please upgrade to the latest version.

As on the Windows platform, ASIO drivers for the SW1000XG come in all shapes and sizes. As we have already seen the standard SW1000XG stand-alone ASIO driver supports both 16 and 32-bit modes. The other ASIO drivers that support the SW1000XG for audio on the Macintosh combine support for the Yamaha DS2416 card. This provides a seamlessly integrated 2 card audio system. Be sure that you have downloaded or installed the correct driver for your card combination. The ASIO driver supporting both cards at the same time is available from Yamaha's Pro Audio website. Again 32-bit and 16-bit modes of operation are supported, although caution should be maintained with some Macintosh ASIO compatible applications. If you are in any doubt as to whether your software will support the 2-card combination, please refer to the owner's manual of your software, or contact your software vendor by email/phone.

It is possible to run the SW1000XG alongside other Macintosh based audio cards. This means that you can use the SW1000XG as your synth/MIDI interface and digital mixer/effects processor, whilst using the other card, which may have more sophisticated I/O options for just that – Input and Output!

Of course, it is possible to use other methods to control the SW1000XG on your Macintosh, and the next chapter will take us through just some of them.

Chapter 14

Applications support…On the Macintosh.

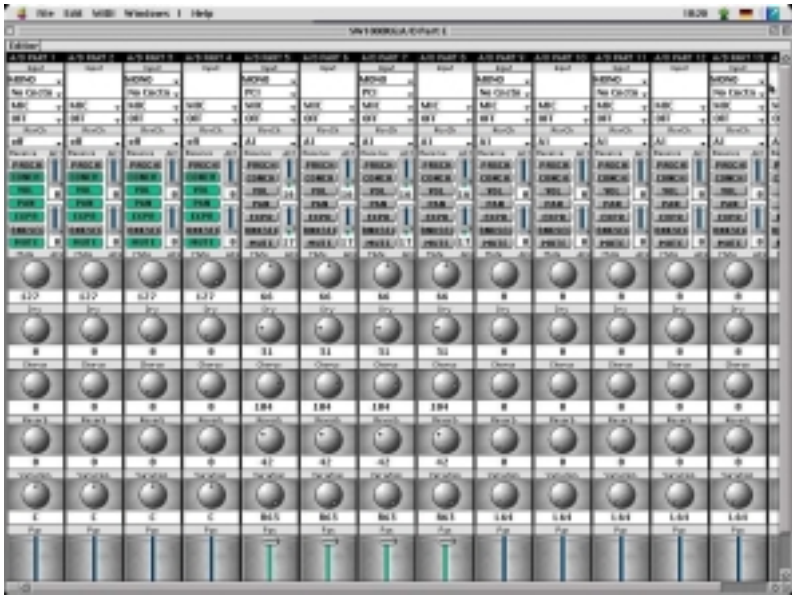
Most of the chapters for the SW1000XG on the PC covering software such as Cubase and Logic along with the previous chapter outlining the functions of Yamaha's own XGEditor for Macintosh will have given you a flavour of what is possible with the card. This chapter will cover some of the more specific support offered by the Macintosh platform, again focusing on software from Emagic and Steinberg.

Emagic SoundDiver for SW1000XG on the Macintosh.

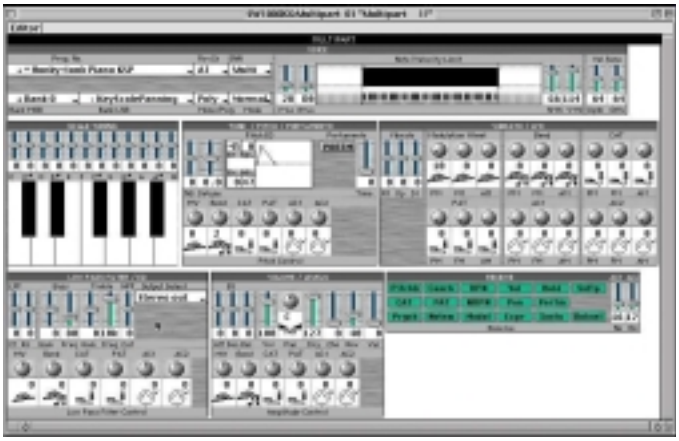
SoundDiver is a generic editor librarian package for both Windows and Macintosh that has supported XG almost since day one. Specific support for the SW1000XG though has just been finalised as of time of writing, and truly deserves a mention in this guide.

What SoundDiver allows is user definable editing systems that can be configured to run in a multitude of ways and with a growing number of devices from all manufacturers. The integration of SoundDiver with Emagic Logic version 4 is now fully implemented via the **Autolink** system. Autolink allows edits, parameters and voice selection made in SoundDiver to be easily transferred over into your Logic song and then saved, embedding the parameter data into the event list of Logic itself.

From the SW1000XG perspective, this means that full support of all of the synthesis parameters and audio mixing can be done from SoundDiver whilst Logic is running, and then placed within the event list of Logic as standard MIDI events (remember all of the functions of SW can be controlled using MIDI!)



What we can see in the above diagram is the SoundDiver audio mixer page for Macintosh. You will notice the effects processors, output assignments and input selects are all present. SoundDiver also offers full control over the synth engine of the SW1000XG, with a highly intuitive GUI (Graphical User Interface) shown in the next diagram.



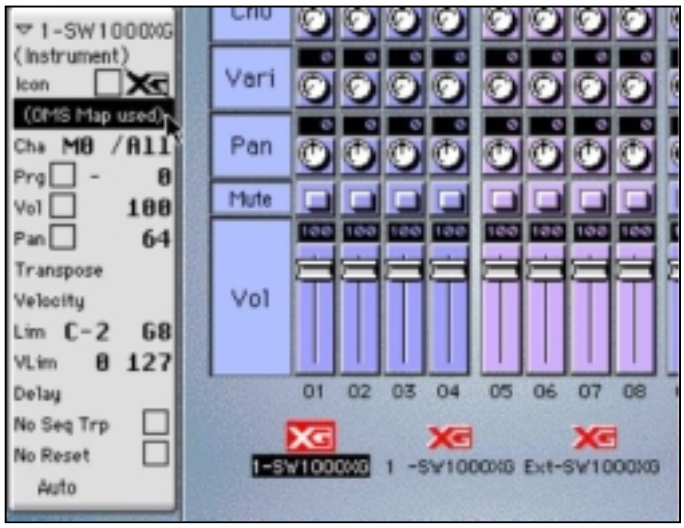
SoundDiver also supports OMS so routing the editing from it into other software such as Cakewalk Metro, Deck or MIDIGraphy (all sequencers and audio applications that support the Mac platform) is possible. It is only with Logic however (as of time of writing) that the benefits of the Autolink system shine through. You should consult your Logic and Sound Diver manuals for information on the Autolink system and how it is implemented.

Logic Environment pages for Macintosh

Xgfactory.com offers these free of charge. They basically mimic some of the capabilities offered by SoundDiver in that audio and synth parameters can be edited within the Logic song, simply by importing an environment layer for the parameters you wish to access. These are also provided on the SW1000XG CD-ROM with a comprehensive set-up guidebook in PDF format (Adobe Acrobat Reader).

The advantage with them is twofold. First they are free, and secondly they write directly to the event list in Logic, so you do not have to configure anything other than Logic itself and the port that each object in the environment is communicating with (usually using the OMS map)

Whilst environment pages do not offer some of the graphic subtleties of the Sound Diver implementation, they can provide an alternative way of working with the SW1000XG for Logic users on the Macintosh.



VST 4.1 for Macintosh

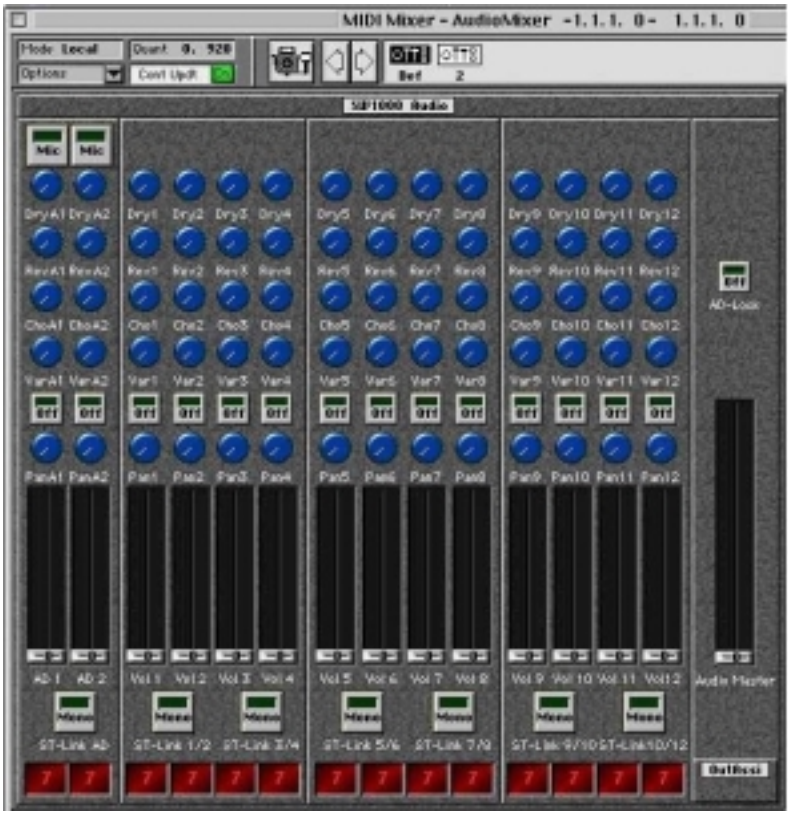
Steinberg's VST 4.1 series as of time of writing offered a few features that are not available to Windows users, most notably the MIDI-Track mixer option.

This option is a sort of 'souped up' mixer-map implementation, with user definable (via a text based editing system at present) set of sliders and knobs that can be configured to send out any MIDI sysex, controller or NRPN/RPN data to the device listed on each loaded MIDI channel. This again allows channel by channel editing of a good few SW1000XG synth parameters, and also control over the audio mixer from a more pleasing GUI than that offered by mixer maps.

Yamaha provide a free set of track mixer profiles with the SW1000XG CD-ROM and also on our xgfactory.com website. To install them, just copy the contents into your VST track mixer folder, and restart VST. You should now be able to select a new set of SW1000XG specific objects within the track mixer. Remember that for audio control, you need to assign an additional (at least) 12 MIDI tracks, and name then SW1000 AUDIO part 1-12, with a track mixer applied to each of them.

We can see in the following diagram how the VST track mixer when correctly configured should look when controlling the audio parts. You can see AD outputs and inputs, along with effect sends and the ability to read-write to and from the event list in VST.

The final option we will mention in this chapter is VST mixer maps. These like their PC counterparts are free of charge from the xgfactory.com website and also on the SW1000XG CD-ROM (from August 1999). They offer a huge amount of control over all aspects of the SW1000XG, and can be easily loaded into any Cubase arrangement. Just set up a new track as a mix track, and click on the load mixermaps option. You should ideally copy the Yamaha SW1000XG mixermaps into your VST folder, and load the appropriate one for the types of editing you wish to undertake.



Notes and common questions

Whilst all of the above solutions support the SW1000XG, it should be noted that in all bar the Sound Diver case, the ordering in the event list of XG Data cannot be guaranteed with snapshots. As many of the above systems (mixermaps and environment pages) send out snapshots of entire maps as a sysex dump onto 1 MIDI event tick, which as we have seen in previous chapters is not good. Versions of Cubase prior to V4.0 did not have the track mixer option, so please update your copy of VST if required, to support this. Logic similarly prior to V4 for PC and Mac had not implemented full support for Autolink with Sound Diver (many bugs have now been fixed in the latest build). You should contact Steinberg for information regarding scripting for the 'MIDI Track Mixer' in VST, and Emagic for adapting the SoundDiver support. For all of the above Yamaha recommend that you get as much RAM in your computer as possible, as anyone who uses Logic or Cubase on the Mac for heavy audio and MIDI editing in a professional environment will confirm. Whilst other applications do support XG to a limited degree on the Mac, Yamaha feel that the ones covered in this section offer the greatest level of support for our SW1000XG.

Chapter 15

Hardware control options (Control Freak and the Phatboy)

Fact: NO-ONE LIKES TO MIX WITH A MOUSE!

It's a simple fact of life that mixing audio or MIDI tracks with a mouse can be a drag (no pun intended). Having to move multiple faders one at a time with an imprecise pointing device can be a really slow process. People for many years have wanted the kind of hands-on control offered in 'The Good Old Days' with analogue synthesisers and big mixing desks. Luckily with the SW1000XG being fully controllable over MIDI, almost any MIDI controller unit can become a very comprehensive mixing or editing device. Yamaha have chosen to focus on 2 such devices in this section, both of which are made in the UK but are available all over the World.

The Keyfax Phatboy

This small knobbed wonder came onto the scene in 1998 to massive critical acclaim. The beauty of it lies in its simplicity of design. You have a fixed set of knobs controlling a fixed set of parameters via NRPN and controller messages. The SW1000XG responds to these, and hey presto you have an editable synth with knobs on. Used with applications like XGEdit, you can re-map the controllers coming in to XGEdit to be assigned to various other parameters such as audio volume levels. As the Phatboy supports 3 modes of operation, you could re-map dozens of controllers in your software to react and change all sorts of XG parameters.

The Kenton Control Freak.

The control Freak is a marvellous device in that it takes the concept of the Phatboy to another level again. In the case of the Kenton Control Freak you can program every single button or fader on the front panel of the unit to perform almost any MIDI task you wish. Each slider or button can be assigned to perform program changes, controller message sends, and also system exclusive data changes. It has a great 'learn mode' which when hooked up to XGEDIT via the MIDI out of the SW1000XG, enables anyone to build their own editing parameters and then use the Control Freak to edit the SW1000XG. It is almost like having XGEdit in hardware. Yamaha have provided a set of preset profiles for the SW1000XG which Kenton have kindly now built into the factory ROM.

It really does act and feel like a proper hardware mixer, and this author uses one all the time. The profiles for it include Audio Mixing, synth editing, effect selection/send levels plus many more besides.

The SW1000XG then as you can see is a powerful professional tool, when placed in the right hands. Many MIDI controller devices exist from companies such as JL Cooper and Peavey Electronics. So if you are lucky enough to own a MIDI controller unit, start using it with the SW1000XG. It really is an eye opening experience.

So how do you set up the SW1000Xg with the Control Freak for example?

The simplest way is to think of the Control Freak or Phatboy as a hardware version of XGEDIT. If you connect it to the MIDI in of your SW1000XG then whatever sequencer you have running will respond to the sysex or controller data coming out of the MIDI port on the hardware controller. Thus, so long as you are not filtering the data out, will automate the parameters inside your application software. For audio control, remember to have a MIDI channel highlighted, (as you will recall from earlier chapters, some sequencers when you have an audio part highlighted will ignore incoming MIDI data) and make sure that the track in your software application is talking to the correct port on the SW1000XG. If you are running a purely audio based application such as Cool Edit Pro, Saw, Sound Forge or similar then you will need to have an application such as MIDI-OX running at the same time. This should be configured with the following settings (note these settings only apply to applications that only work with audio)

MIDI OX – MIDI IN – SW1000XG MIDI IN
MIDI OX MIDI out 1 – SW1000 #1 Synthesiser

This will ensure that the hardware controller unit is communicating with the audio only application. (Just make sure MIDI-OX or whatever you use is not filtering sysex!)

Here is a quick guide to setting up the Control Freak in full with Cubase. The methods employed should work with any of the major sequencer applications software covered in this guide.

1: Connect your Kenton Control Freak to the MIDI in on your SW1000XG, or the MIDI in on any soundcard interface attached to your PC, and make a note of which interface it is attached to.

2: Run up VST, set up your ASIO multimedia driver to wave profile the SW1000XG on all ports, and perform any sync tests. Make sure you have the number of tracks set to a sensible level (minimum should be 12 to take full advantage of the SW1000 wave ports). This only applies if you are not using the Yamaha ASIO driver.

3: Go to your master mixer, make sure that all of the SW1000XG output wave ports are active (green light on each).

4. With the Control Freak switched on, make sure that you can see the MIDI in LED flashing in Cubase when you move a slider or press a button on the control freak itself. Try to be on one of the SW1000XG control pages (Control Freak preset) whilst doing this.

5: Go to your monitor mixer, and set your 12 (or more tracks) to Master, Buss 1, 2, 3, 4, 5, and 6 respectively (tracks 1&2 to master, 3&4 to buss 1, 5&6 to buss 2 etc). This will assign your VST channels in the arrange page to the master outs (which you have previously made active). Make sure that you pan the monitor mixer tracks hard left and right so that they pass over to the SW1000XG's individual audio channels (1-12) on the Control Freak SW1000XG audio control preset

6: Now make sure that you are not filtering sysex (MIDI options, filter) in VST (This is critical). Then set up a control channel in VST's arrange page (call it SW1000 control) and set its MIDI port out to SW1000#1 synth, and MIDI channel to all (any channel will do!). Make sure in preferences (file/prefs menu) in VST, that you have audio & MIDI to play in background set to on. Open up a multi-channel audio demo or song that uses all 12 channels set your active track in Cubase to the SW1000XG control track, and then call up the preset profiles for SW1000XG audio control on the Control Freak. You will now be able to control all of your audio levels, pans, effects sends etc from the Control Freak and record the changes in VST, as sysex or controller data, on your control track (much like a mixer map track).

7: For MIDI control of the synth parts, the same rules kind of apply although you should limit the Cubase track to single MIDI channel when playing with MIDI edits, rather than use ‘set channel to all’. Also be careful when sending out snapshots from the Control Freak, as sometimes Cubase and any other sequencer can upset the data ordering in the event list if you have quantisation on a high value.

8: Remember that you don’t have to be in record mode inside VST to hear the Control Freak changes taking place, which makes it and ideal way to set up mixes and then snapshot them when you are happy!

Yamaha’s own digital mixing consoles such as the 01V also offer limited support via the remote mode. In this mode you can assign a small number of sliders to transmit user defined midi messages.

And there you have it, for a fraction of the cost of a digital mixer with multiple effects, you have exactly that, a hardware controlled digital mixer with multiple effects, and a synth, and hard disk recorder, and 48 channel MIDI interface all in one.

Chapter 16

Common Question, Answers and troubleshooting

Yamaha have a massive (almost 500 question and growing) FAQ which may be found on our xgfactory.com website. If you need to consult this, please feel free to either download it (PDF file) or browse through it. In this section, we have summarised some of the more common questions we get on the SW1000XG. Some of the topics have been covered already in this guide.

Questions:

I am getting timing problems via the MIDI in on the SW1000XG. What is causing this, and can it be cured?

The MIDI in timing problem can be related to the revision of driver you are using, and also to overall CPU load on the system. Please make sure that you are using the very latest driver from www.xgfactory.com, and also make sure that the application software you are using is not exceeding the maximum CPU load of your system. Filtering out active sense information from your keyboard (should it be sending it) can also help with both timing and MIDI note hanging.

How do I record the output of the audio & MIDI parts back to a stereo wave file internally?

Using the SW1000XG #2 Wave input. When this input is selected in your recording application, all audio and MIDI data is automatically re-recorded via the internal interconnect buss of the SW1000XG. Make sure that your have the audio playback panning for the wave out port you wish to hear the re-recorded track set correctly to full left and right, otherwise your recording can sound muffled. Also make sure that you are not reapplying any effects to your playback track. This is easily set up and configured using XGEdit/XGEditor for Mac.

How do I run the outputs from the SW1000XG into my DS2416 card?

Two ways to set this up. The easy way is to make sure that the SW1000XG and the DS2416 are connected internally via the cable supplied, then run XGEdit and your application (i.e. Cubase) using Hubis loopback multiclient MIDI driver. When you have got XGEdit talking to your application, it is a simple matter of setting the output port in XGEdit for audio or MIDI parts to the corresponding input channel on the DS2416. Please make sure that in your application that the SW1000XG is the acting master clock for the entire system, and also that the mixer channels for the DS2416 are set to sub inputs 1-8 to allow audio & MIDI from the SW1000XG to be carried over.

The harder way to set this up is as follows...

Connect the output of the SW1000XG and the input (SI/SUB IN) of the DS2416 using a cascade cable. The pins on the I/O connectors are arranged so that you can't get the correction wrong.

Set the DS2416's [Word Clock Source] to SUB IN. You should set this parameter within the supported application. Otherwise, select "SUB" in the DIO page of Patch.exe (an application that is provided with the DS2416). Be sure to perform this step correctly, since the SW1000XG cannot be a "Word Clock Slave."

Use the input source selection parameters for CH 9/16 and 17/24 to select SUB IN. If you select SUB IN 1/2 for CH9/10 or CH17/18, SW1000XG's ST audio will be passed over to the DS mixer channel. This can be set within the supported application. (Otherwise, select SUB in the Master & In Patch page of Patch.exe.) *You cannot select SUB IN using the input source selection for CH1-8. This is down to a limitation of the specifications of the DS2416. Set the routing of the data for each part of the SW1000XG that is to be sent over to the DS2416's SUB IN.

This method uses sysex

Sysex = F0, 43, 10, 4C, 0A, nn, 10, xx, F7

Hexadecimal indication (nn = Part #/ xx = Output #)
- Enter Part # for "nn" (e.g. Enter 00 for MIDI-Part 1, and 10 for MIDI-Part#17.)
- Enter the destination BUS IN for "xx".

- Stereo Out = 00 (Sub1+2)
- Indiv1+2 = 08 (Sub3+4)
- Indiv3+4 = 09 (Sub5+6)
- Indiv5+6 = 0A (Sub7+8)
- Indiv1 = 28 (Sub3)
- Indiv2 = 29 (Sub4)
- Indiv3 = 2A (Sub5)
- Indiv4 = 2B (Sub6)
- Indiv5 = 2C (Sub7)

- Indiv6 = 2D (Sub8)

*You can assign multiple Parts to the same Indivi OUT simultaneously.
*The SendRev, and Chorus/Variation effects will be ignored for individual parts. Refer to Document/Data_E.pdf/Page#79 on the CD-ROM included in the SW1000XG package for more information.

Drum Part and Audio Part can be sent over to SUB IN also. Refer to Document/Data_E.pdf/Page#79 on the CD-ROM included in the SW1000XG package for more information.

In other words, use XGEdit!

I get a blue screen of death on the PC when I try to install my SW1000XG, what is causing this?

This was a symptom of early drivers where IRQ steering in some systems could cause this problem. Please get the latest driver from www.xgfactory.com, and you should find that this problem should no longer occur.

In XGWorks when I edit a sound or select a sound, it doesn't save with my MIDI file, why?

In the XGEditor screen you need to *INSERT XG EVENT* into the event list, this will insert the XG sysex data and bank select/program changes that you need. Please refer to your XGWorks manual for more information on this.

I cannot seem to control input gain using the MME mixer in Windows?

The mme input gain function is not implemented on the SW1000XG current driver. Use an external mixer to control gain or SW1000#2 wave record with XGEdit/XGEditor for Mac.

The SW1000XG defaults to Mic input on start-up rather than line level, how do I switch it to line level easily?

To do this using XGEdit, just open up the analogue mixer panel, and highlight the AD part channel you wish to switch to line, and using your +/- keys on the numeric keypad, switch to the setting you require. Registered users of XGEdit can then save this as a default template that can be launched on start-up using media player to just play the MIDI file. XGWorks users can also use the mixer/XGEditor inside XGWorks to set line level as default, and then save this information out as a MIDI file or XWS file to play when they start-up their machine. You can also use the free (Windows only) line level setup utility from the Xgfactory website should it not be on your SW1000XG CD-ROM. For the Macintosh, please use the XGEditor mixer panel to control this.

Credits

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Links

www.yamaha.co.uk – Most of the drivers and editing software featured in this guide can be found here
www.yamaha.co.uk/shop – And you can buy XG MIDI files, XGWorks and XGEdit here.
www.xgfactory.com- The official site for the SW1000XG,a wealth of info, free software and the FAQ
www.yamaha-xg.com – The Yamaha Corporation of Japan XG home page
www.steinberg.net – The home of Cubase & WaveLab
www.yme.co.uk/yme – Gary Gregsons home page (Author of XGEdit)
www.cakewalk.com – The home of Cakewalk Music Software
www.emagic.de – The home of Emagic Logic Audio & SoundDiver
www.kenton.co.uk – The home of the Control Freak
www.keyfax.com – The home of the Phatboy

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