

basic

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MUSIC HANDBOOK

Macworld is the UK's most popular magazine for the Macintosh. Each issue includes news, reviews, lab tests, 'how to' features, expert advice and a buyer's guide, plus a cover-mounted CD-ROM that includes full-version software, top demos and trial versions, games, shareware, fonts, icons and much more. You can subscribe to *Macworld* magazine by calling +44 (0)1858 438 867 or by visiting www.macworld.co.uk

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MACWORLD
MUSIC HANDBOOK

MICHAEL PROCHAK

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introduction

'In dreams begins responsibility.'

– William Butler Yeats

There are few tools or inventions that can claim to have seriously transformed a whole culture. The Macintosh, however, did, and as the first true realisation of McLuhan's vision of the computer as a medium, its very *raison d'être* had to be to do nothing less than to change the thinking of an entire civilisation. What's significant about the Macintosh is that it broke down that modal barrier between words and pictures, sound and motion, and enabled a whole community of people to expand their artistic and creative abilities.

The original Macintosh had its own distinctive character and slightly anarchic demeanour that was a direct result of human effort and the creativity of the artists, musicians and techies who created it. Apart from being dynamic and a true example of brilliant innovation, most of the original Macintosh development team actually had a life outside of the arid world of computers. Andy Hertzfeld, for example,

could talk for hours on James Joyce, literature in general and rock music, to complement a degree in maths and physics. Joanna Hoffman originally specialised in an obscure corner of Persian archaeology before she changed careers after the Iranian Revolution closed off all relevant digs. The frighteningly talented Alan Kay was a child protégé, distinguished musician and all-round Renaissance man before becoming a virtuoso computer programmer. And Jef Raskin, with degrees in computer science and philosophy, was also a painter with work in the Museum of Modern Art, a musician, and former conductor of the San Francisco Chamber Opera Company. The list goes on...

So, with that sort of pedigree it's not surprising that the Macintosh has long been the choice of professional musicians due to the close integration of hardware and software for the recording, manipulation and playback of digital audio. As a musician, I've always appreciated the Mac – it was born to rock, with high-quality integrated sound from day one and it's always had the best music-production applications, such as Cubase VST. What's more, it's still the easiest platform for handling sound, integrating with live instruments and even burning your own CDs. For example, the latest version of Roxio's Toast is a joy to use, and it even

enables old freaks like me to copy and remaster my ancient vinyl or dub four-track tape masters directly to CD effortlessly. Better still, if you've got one of the new-generation Macs, you can burn CDs and DVDs directly from the Desktop without programs like Toast. So, for creative musicians and producers everywhere, the tools are there and the magic is just beginning.

Although Steinberg's Cubase started life on the Atari ST, it's naturally at home on the Mac in this ever-evolving digital world. Cubase VST version 5 has provided Mac users with a powerful and accessible integrated music software environment where, within nothing less than a 'virtual studio', you can record, edit and process MIDI and audio in a creative and affordable manner. And Cubase SX, the revolutionary version for Mac OS X will probably make a lot of Mac users give serious thought to investing in a full system upgrade. Furthermore, Apple's adoption of USB and its own FireWire technology means that Mac users can instantly connect digitisers, MIDI devices and DAT storage drives to capture high-quality, 44.1kHz audio tracks at lightning speeds.

To paraphrase Douglas Adams' definition of the universe, as a program, Cubase is big – mind-bogglingly big – and it's got more power and

functionality than most of us know what to do with. Likewise, the whole craft of recording, mixing and production is equally big and even more impossible to examine in real detail in one single book. That's why this book focuses on the creative process and is aimed primarily at musicians and Mac users interested in creating and recording their own music. It is not an unabridged compendium documenting in mind-numbing detail all of the features and functions of this wonderful creative tool. Instead, it sets out to try to think like a musician rather than an engineer, techie or a producer, and provides enough practical detail and tips to enable you to start recording and mixing your music as quickly as possible. This book is designed to introduce musicians to the skills and techniques required to use the essential elements of Cubase VST, whether they've read the manual or not. It's also designed specifically for Mac users who traditionally hate manuals and prefer a more 'heuristic' approach. The idea is to familiarise musicians and Mac users with the essence of Cubase on the Mac so that you're free to create the music you hear in your head, but until now have been unable to realise in a recorded form.

With the availability of easy-to-use music production software such as Cubase VST 5 and, particularly, the launch of Cubase SX for Mac OS X, the Macintosh is

once again changing the way music is made. What used to be done by a team of people in an expensive editing studio can now be done at home by one person. All it takes is the right equipment and a bit of knowledge about the basics of digital recording and MIDI. When making music on the Mac, you can use two different processes for creating sound: audio and MIDI. The ideal production scenario integrates both capabilities in one powerful package such as Cubase VST or Cubase SX.

To feed audio into your Macintosh, you need to convert acoustic sound into a digital format that your computer can read. This process, known as digitising, is done using an analogue-to-digital converter. Most Macintosh computers have a built-in stereo analogue-to-digital converter, allowing you to plug a microphone directly into your Macintosh and record. Unlike audio, which needs to be digitised, MIDI instruments, such as keyboards and MIDI guitars, generate digital data. To feed MIDI data into your Macintosh, you plug your MIDI instrument into one of several available MIDI interfaces and plug the interface directly into your computer. With the addition of music production software, your Mac becomes a fully functional digital-audio workstation. Audio editing is performed in the same way as you manipulate text in

a word-processing program. While composing music, you can cut, paste, delete and insert whatever you need to create your song. All the fine-tuning and editing of MIDI data takes place in software such as Cubase VST, otherwise known as a sequencer. From here you can correct rhythm errors, print sheet music, or change instrumentation (from flute to oboe, for instance) even after you've recorded your song.

Once you've created your music, there are a number of ways to share it. With MIDI, you can save your song as a Standard MIDI File (SMF) that other MIDI musicians can play back using their own MIDI system. With audio, you can burn your own CDs. Alternatively you can convert your files to a format such as MP3, which enables you to send your music as an e-mail attachment or even stream it from your Web site using Apple's QuickTime.

Because this is a Mac book, I am assuming that readers will already be familiar with the general conventions of the Mac as well as the Mac OS. I've deliberately not gone into a lot of technical detail about add-on audio cards or other peripherals since these will vary considerably depending on your own personal studio set-up. However, when it comes to add-ons and MIDI devices, I cannot recommend reading the manuals and

documentation strongly enough. Yes, it is boring. But, in these instances, it's the best bet for getting everything working together in a reasonably harmonious fashion.

Ultimately, the magic that is music always depends on that indefinable 'something' that turns a riff, break or chord sequence into something transcendental. A good Mac running Cubase VST can cater for nearly all of your creative recording needs, but it won't write your songs for you and it doesn't come with creativity and talent plug-ins. As clever and as powerful as a Mac/Cubase digital studio may be, try to remember that, generally, musical perfection does not exist. Even if it did, a MIDI sequencer, however powerful and accessible, is not what you should use to search for it.

As we shall see, some level of technical involvement is inevitable, and even though it offends your Mac sensibilities you will need to at least browse the manual and other documentation. But the real secret for musicians and Mac users alike is to simply know the limits of the software and to be properly equipped before taking the musical plunge. Luckily, with Steinberg's Cubase, you can always choose how deeply you wish to go. The user interface and level of

functionality can be adapted to each individual's needs. But it's you, the musician, who needs to know how to enhance that power and add the essential element of magic. Feel free to dream...

Michael Prochak
Summer 2002

why professionals prefer the Mac

'In terms of multitracking actual audio, I've only ever used Macs. I had more problems just trying to use a PC.'

– Guy Fixsen, Music Producer

It has to be said that I find myself more and more in agreement with a philosophical tenet of one of my favourite – and sadly departed – rock stars, Frank Zappa, who suggested that people will agree with you only if they already agree with you. That is, you don't really change people's minds.

One of the things a lot of people already agree on – and probably don't need their minds changing on – is the simple fact that the Macintosh is a superb platform for music. Unlike PCs, the audio capabilities of which have always relied on plug-in cards, every Mac motherboard has always had audio built in as standard. And of all the machines out there, none is better than the current crop of Mac G4s, which is why over 90 per cent of recording studios and a growing number of

serious home studios favour them to PCs. Okay, digital sound has come a long way since the early analogue synthesisers of the late 1960s and today, most desktop PCs are capable of reproducing CD-quality sound or working in conjunction with a burgeoning range of digital audio and sampling technology which includes digital hard-disk recorders, digital sampling instruments, digital sample players/synthesisers and audio device controllers. That is, of course, if you can manage to get your assorted sound cards and various other add-on gizmos to work properly in the wacky and wonderful world of Wintel.

Apart from some of the early Mac PowerBooks, all Macs have 16-bit, stereo audio in and out as part of the standard hardware configuration. You won't get that on a PC unless it's got an extra sound card or some other audio interface. This means that although media hype has conditioned most people into believing that PCs are generally cheaper than Macs, by the time you buy all the extras you need to bring them up to the Mac standard you're probably not really saving all that much. As it happens, a complete midrange G4 system with monitor, fat hard drive and ample memory will cost under £2,000 (\$3,000) and will provide anything from 16 to 24 audio tracks – or more if you get a really fat hard drive. Twenty years ago, you'd have paid more

than that for an eight-track tape recorder. This same Mac system enables you to run a number of virtual samplers with your audio software and loads samples just as quickly as you can change synth patches on dedicated samplers. As an added bonus, the Macintosh also adds on-screen graphical editing and provides mix automation for MIDI tracks, all audio tracks and even virtual instruments.

So, whether Uncle Bill likes it or not, when it comes to music, the Mac is still easier to set up and use than any Windows PC and, contrary to public ignorance, it really isn't that expensive. Think about it: if you're a musician who's simply interested in creating music and getting it recorded, the last thing you want to be doing is struggling with the arcane evils of a PC. If you want to run games, surf the Net and run spreadsheets in the discomfort of your home for cut-rate prices then go ahead, buy a PC. But if you're a serious musician or producer and you want to make real music don't even think about it. Today's Macs, including the latest flat-screen iMacs, are still the easiest computers to use and have more punch for music and digital audio than ever before. Sequencers and plug-ins are expanding to exploit all this power to the full, and if you're using a G4 – or whatever comes next – audio latency is less of a problem and matching suitable audio cards is far less

hassle. If you don't want to be desk-bound, the latest crop of PowerBooks and iBooks are more than capable of providing excellent mobile studio facilities for bands on the run.

Nowadays, even old standards like MIDI are facing competition from new technologies such as Firewire, an interface standard developed by Apple offering better bandwidth and accessibility for digitally transferring music and sound. So, despite Apple's usual lack of panache in promoting itself as *the* ultimate creative solution for music and audio, the Macintosh is still the favoured computer within the music industry for all aspects of digital audio production. Major studios like Abbey Road have installed PowerMac systems and a plethora of composers, musicians and producers – both signed and unsigned – now work exclusively on Macs.

Steinberg recently upgraded its flagship sequencer, Cubase VST/32 5.0 for Mac, and is also launching Cubase SX, an OS X-only version for the new-generation Mac OS. Both of these sequencers, like this book, are aimed at the creative musician who wants to write and/or record original songs and arrangements. However, despite all the new features, version 5.0 does lean slightly more heavily in the direction of the more

technically minded producer/engineer. As a matter of fact, some of the new features and interface 'improvements' may actually irritate the creative musician who is more at home with version 4.1. But don't worry, you'll get used to them. Previews of SX, however, suggest that the interface may be easier to get to grips with.

Cubase VST 5

Although version 5 was a real step up for PC users, many of the 'new' features were already available in version 4.1 for the Mac. The most striking difference you'll notice when you upgrade to version 5 on the Mac is the overall look of the program. The Arrange window has been transformed in terms of its colour scheme, and the virtual Mixers and Effects have been redesigned. Effects such as reverb have been greatly improved and the default plug-in interfaces have been modified so you can see every parameter at once. For example, in the EQ window you can draw EQ curves with the mouse. Unfortunately, you still have only a one-step Undo function. However, the latest version of Cubase VST pushes the boundaries even further and now all Cubase versions support 16- and 24-bit recording modes. An all-new equalisation algorithm brings unprecedented performance and musicality to

the on-board equalisers and a new set of plug-ins provides an uncluttered professional aspect to the plug-ins that you need everyday. All the Cubase 5.0 plug-ins are written by Spectral Design's DSP professionals, including the CubaseVerb, which sets new standards for on-board effects quality. In addition to all that, Steinberg has added high-quality dithering options to all Cubase versions to optimise the reduction of the number of bits to the CD's 16. This means that apart from being the perfect digital recording studio, Cubase VST is now a perfect mastering tool as well. The new version also includes the Apogee UV-22 dithering algorithm, widely seen as the best-sounding dithering in the industry.

With Cubase VST 5.0's InWire you can sign-up for free Internet studio access and take part in real-time sessions with Cubase VST 5.0 users around the world. Your changes are streamed to the other users each time you 'actualise' the project you have open, just as their changes are delivered and integrated seamlessly into your version. Additionally, the Universal Sound Module, a special VST instrument included with Cubase VST 5.0, means that even while on the move you have access to a common sound palette shared by all other studio members. While you are working, you can use the built-in Internet chat services, or even an

Internet audio and video stream to interact with the other studio musicians. Cubase's InWire is supported by the Rocket Network, and offers enhanced support including all VST parameters and dynamic mix and effects automation data.

With the arrival of the new multi-processor Macintoshes, such as the G4 MP series and dual-1GHz models, not only have multi-processors arrived on standard machines, but the latest OS versions support it in new and more comprehensive ways. Steinberg took advantage of this new functionality to greatly increase the amount of power available to the VST audio engine. With the previous multi-processor scheme, the maximum processing power available to the audio engine was one CPU, as the complete audio process could exist only on one or the other processor. Now the audio-processing load can be split much more evenly between the two processors. One processor is still doing the MIDI, file handling and user interface tasks, but its remaining processor bandwidth can be used to support audio tasks. Techie geeks estimate that this new multi-processor model brings about a 50 to 60 per cent increase in processing power over a standard single-processor machine, and an increase of around 20 to 30 per cent over previous multi-processor performance. The improved timing of Cubase VST 5.0

Mac offers a MIDI timing that is mainly limited by the CPU and its OS. Interference and delays are minimised by a new technique that allows a better internal connection between MIDI and the audio engine.

All Cubase VST 5.0 versions now support 16- and 24-bit recording. Cubase VST/24 is replaced by Cubase VST/32 and supports recording, mix-down and export of 32-bit floating-point files. Cubase VST 5.0 also imports MP3 files and converts them to WAV files directly on import. With the optional MP3 encoder component, Cubase VST can also export directly to MP3. The Auto Crossfade feature ensures smooth audio playback. This function can be activated independently for each audio channel and automatically crossfades between consecutive audio segments for smooth, click-free transitions. With the new 'generic' Remote Control device you can set up any MIDI-control device to manage the VST Mixers, the MIDI Track Mixer or the Transport controls. Yamaha DSP Factory support is also now available in all three Cubase VST versions.

The new version of Cubase continues its support for the G4 chip's AltiVec engine and multi-processing, as well as adding a new option for 'extended' multi-processing. When using a dual-processor machine with

this option turned on, Cubase assigns all odd-numbered Events (Tracks, Effects and so on) to the first processor, and even-numbered events to the second processor. It's been estimated that this will enhance performance by at least 50 per cent. Additional features for Cubase include 'TrueTape' emulation, which lets you overdrive audio while recording without introducing digital break-up artifacts – thus allowing a much stronger signal – and a software version of Apogee's UV22 for 'dithering' Tracks down to 16-bit, 44.1kHz for CD mastering. The release also includes the 24-bit LM-9 drum machine. For around £70 (\$100), you can also get the LM-4 – described as the LM-9's 'big brother', – with 400Mb of sound that is 'sample accurate, and clocks itself from the audio engine'. Great stuff if you're a bit of a sad techie, but if you're a musician first and an engineer second, all that big science can start to get a bit tedious.

Incidentally, PC users had to wait for nearly two years to get most of the improvements that version 4 already had on the Mac. With the Wintel version of Cubase 5.0, PC users are still playing catch-up, although they now have features such as a dedicated MIDI Track Mixer, a new Controller Editor, enhanced Toolbox, user-definable Toolbar and key commands, improved drag-and-drop, Transport Bar display options and so on.

For me, the greatest advantage of the whole so-called digital revolution is that anyone can have a go. Like multimedia, digital recording can be as complicated or as simple as you want to make it. And, again like multimedia, you don't always have to have the most expensive top-of-the-range kit and accessories to produce interesting and original music. You just have to be interesting, original and creative.

Cubase SX

Steinberg describes this new version as 'so revolutionary there's no point in going back'. SX runs only on OS X and has been completely revamped, boasting a new audio engine derived from Steinberg's Nuendo. New features include graphical automation of all parameters, real-time MIDI processing, a complete set of virtual instruments and 5:1 surround mixing. This version will support 16 VST Effects simultaneously, including Waldorf synthesiser technology, SPL De-Esser, a collection of Virtual Effects processors, edit history and 32-bit/96kHz sampling. With the power of OS X, Cubase offers unlimited Undo/Redo functionality for the first time. Other improvements include a project overview panel, saveable screen-sets, user-definable keyboard shortcuts and simultaneous playback of up to 200 audio tracks. Integrated audio processes include Acoustic

Stamp, Crossfade, Envelope, Fade-Ins and Outs, Gain Change, Normalise, Phase Reverse, Pitch Shift and Timestretch, MPEX algorithm, DC Offset removal, and Stereo Flip. And if you don't want to wade through all those features, Steinberg is also releasing a basic version called SL, which is about £200 (\$300) cheaper.

system requirements

The nice thing about Cubase is that you don't have to have a particularly flash system to get up and running. Once you've got the hang of how things work, you can either continue to build your system up from scratch, or you might want to opt for one of the many bundled offers found in adverts in magazines. But if you can't afford the latest and greatest Mac don't be afraid to shop around for second-hand kit. Older PowerMacs can be found for reasonable prices and you'll find that most of them are perfectly functional and generally upgradeable. And don't forget: you can use Cubase with iMacs and PowerBooks as well.

budget systems

The great thing about using Cubase on the Mac is that even with a bog-standard budget system you can still produce great-sounding music. I know of several

musicians who produced their own compositions with a demo version of Cubase and, although they couldn't save their files, still managed to burn mixed-down tracks onto CD – don't tell Steinberg! The minimum system requirements for running Cubase 5.0 are:

- Processor: PowerMac-based 604e
- Processor speed: 200mHz
- RAM (Cache): 64Mb
- Operating system: Mac OS 8.5 or later
- Drives: CD-ROM drive
- Other components: 256K Level 2 cache, MIDI box

You can actually produce excellent results with this sort of set-up, but you will have to have rather more patience. Everyone in this industry suffers from 'processor envy' and we all drool over the newest and fastest machines. But if you're on a budget, keep in mind that a few years ago people were producing magazines on MacPluses, and I still know of a couple of studios running all their sound gear with the aid of a Classic. So, if money is tight, you can still afford to put together a reasonably effective digital recording studio without spending thousands of pounds. However, if you can spend a bit more, the minimum recommended system for running Cubase 5.0 in a much more effortless manner would be something like:

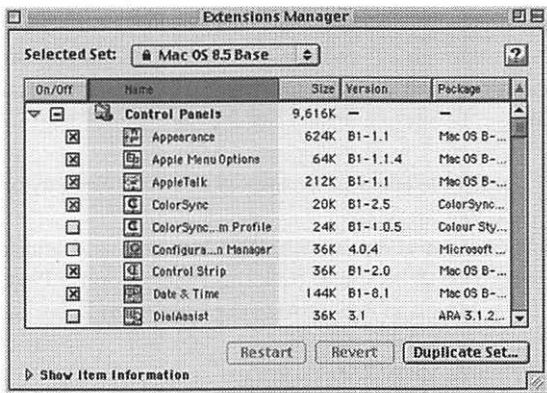
- Processor: PowerMac G3
- Processor speed: 266mHz
- RAM (Cache): 128Mb
- Operating system: Mac OS 8.5 or later
- Sound card: approved MME- or ASIO-compliant sound card
- Drives: CD-ROM drive (external floppy for VST plug-ins)
- Other components: Also for PowerMac G4 and iMac

Obviously, you want to get the fastest system with as much memory and with the best audio card that you can possibly afford. You should also go for the largest and fastest hard drive you can afford, preferably one of the newer AV models. For best results, you should always defragment and optimise your hard disk before recording, and particularly before you actually install Cubase. Before you install Cubase you should also:

- Deactivate File Sharing and switch Virtual Memory off
- Disable AppleTalk
- Select an audio input in the Monitors and Sound (pre OS 9) or Sound (OS 9 and later) Control Panel if you plan to make use of the built-in audio inputs and outputs
- Disable all anti-virus software
- Install the MIDI interface and its drivers

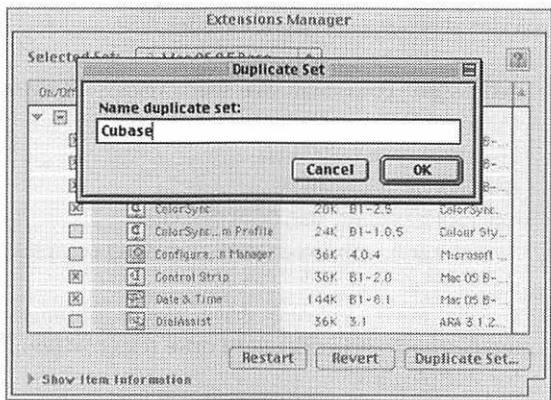
Another important thing to do is to minimise your Extension set. Digital recording can throw up some weird conflicts with other applications and their Extensions, and often the cause won't be all that easy to track down. So, to avoid some of these hair-tearing annoyances before they start:

- 1 Choose Apple Menu → Control Panels and select Extension Manager
- 2 Choose Mac OS [system version] Base
- 3 Choose Duplicate Set. Rename the set 'Cubase' and then switch off any other extraneous Extensions that may cause conflicts



The Extensions Manager Control Panel

- Restart your machine. Use this Extension set whenever you're using Cubase or any other digital audio applications



Create a duplicate Extension set and name it 'Cubase'

pro systems

If you've got the budget, the sky's the limit for a truly professional Mac-based digital studio and a number of specialist dealers will configure custom-built digital systems to suit your particular needs. For example, for just under £15,000 (\$22,000) you can have a G4 Mac, a 24-channel mixing desk and all the add-ons you need to set up a complete digital studio that would rival

many existing commercial studios. Or, if that's a bit too ambitious for your wallet and bank manager's ulcer, you could still get a very competent high-end system for between £2,000 (\$3,000) and £3,000 (\$4,500). A typical mid-pro system might include:

- Processor: PowerMac G4 with Velocity Engine (AltiVec), 1Mb Level2 Cache
- Processor speed: 800mHz
- RAM (Cache): 256Mb
- Operating system: Mac OS 8.5 or later
- Sound card: approved MME- or ASIO-compliant sound card
- Drives: 30Gb internal drive, 15Gb optimised internal audio drive, CD-ROM drive (external floppy for VST plug-ins)
- Other components: MIDI box, SCSI card, 17-inch monitor or larger

If you can afford cutting-edge technology, Apple has launched the most powerful and expandable G4 Macs ever, including easy-to-use tools for creating movies, music CDs and even DVD videos. Features include:

- Fastest-ever PowerPC G4 with Velocity Engine, up to 1gHz dual-processor
- Optional dual 533mHz PowerPC G4 processors

why professionals prefer the Mac

- New on-chip Level 2 cache and backside Level 3 cache
- High-performance graphics cards and AGP 4x slot, 133mHz system bus and PC133 SDRAM up to 1.5Gb
- PCI throughput up to 215Mbps
- Personalised music libraries and custom CDs
- 10x CD-RW/DVD-R drive for creating music CDs, DVDs and archiving data files
- iTunes software included for managing digital audio collections and creating music CDs
- Movies and DVDs from start to finish
- FireWire for connecting DV camcorders and digital audio peripherals

The Macs are also more expandable than ever:

- Four high-performance PCI slots (64 bit, 33mHz)
- Easy access to built-in expansion bays and slots
- Two 400Mbps FireWire ports for connecting up to 63 devices
- Two Universal Serial Bus (USB) ports for connecting up to 127 peripherals
- Optional AirPort wireless networking

Models include 800mHz and 933mHz single-processor configurations and the dual-processor 1GHz Power Mac G4. The PowerMac G4 is a phenomenally powerful

computer and this is especially evident when it performs processor-intensive tasks in creative and scientific applications. In fact, at speeds of 5.5 gigaflops, the older 733MHz PowerPC G4 processor with Velocity Engine was already up to 57 per cent faster than a 1.5GHz Pentium 4 when performing certain tasks.

As the ideal 'studio in a box', the new PowerMac G4 has an improved system architecture featuring a new 133MHz system bus, which can move data at speeds of over one gigabyte per second. And with five slots – one AGP 4x graphics and four high-performance PCI slots – plus an AirPort Card slot, FireWire ports and USB ports, the massively expandable PowerMac G4 lets you pursue your musically evolutionary ideas on an even grander scale. The AGP 4x graphics slot, incidentally, comes loaded with a graphics accelerator. Most models feature the state-of-the-art NVIDIA GeForce2 MX accelerator with 32Mb of SDRAM for blazing-fast 3D performance, but you can choose the ATI RADEON card instead if you prefer.

band on the run

Out on the road, G3 and G4 PowerBooks and iBooks already offer a viable alternative to desk-bound digital studios. What's more, the latest G4 PowerBook is just

too sexy for words. At only 1-inch thick and weighing a mere 2.4kg, the PowerBook G4 is the world's first notebook computer made of 99.5 per cent pure-grade CPI – or 'commercially pure' titanium.

At the core of this new mobile system is the PowerPC G4 processor with Velocity Engine. With speeds of up to 800mHz, the PowerBook G4 packs a tremendous punch, crunching through digital, audio and video, and rendering huge audio files faster than ever before. And the 133mHz system bus – the pipeline between memory and processor – plus the 1Mb of backside Level 3 cache with speeds of up to 250mHz make significant performance-enhancing contributions as well. The result? The PowerBook G4 outguns all Wintel Pentium III-based notebooks by over 30 per cent. And with industry-leading battery life of up to five hours between charges, you can keep outshooting your PC counterparts long after their batteries give up the ghost.

But, unlike PC notebooks that either shed features or compromise performance (or both) to achieve modest weight reductions, the PowerBook G4 is a robust, full-featured system with everything you need to do creative work on the move: up to 40 gigabytes of hard-disk space, room for up to one gigabyte of RAM, plus a slot-loading DVD/CD-RW combo drive. Add to that the

ATI Mobility Radeon 7500 video chip with 32Mb of video RAM, FireWire, USB, PC card slot, VGA output and S-Video output, DVI-I output for hooking up an external flat-panel display, a built-in microphone and stereo sound output and you know the PowerBook has everything you need. With its 15.2-inch megawidescreen format and 1152x768-pixel resolution, this display is perfect for laying out your audio, video or graphics projects, tools and palettes simultaneously, or for keeping multiple applications open while you work.

Another great choice for music on the move is the all-white iBook, which now comes in four delicious flavours. You can get a 600mHz or a 700mHz model with a 12.1-inch screen and all the trimmings, or you can get two varieties of the 700mHz model with the slightly bigger 14.1-inch screen. Both sets can be packaged with an extensive range of sound cards and various music add-ons, offering a powerful-yet-portable digital studio configuration.

peripherals and add-ons

How you actually configure your Cubase system and determining which peripherals and add-ons you might need will vary enormously from user to user. There's a huge range of samplers, microphones, keyboards,

monitors, effects and so on that can be used in conjunction with your Cubase digital studio and, frankly, it would be impossible in a book like this to cover even a fraction of them in any detail. However, there are some items – such as microphones – which are an essential part of any digital studio and which do need some further comment. Also, unless you're happy listening to playback through headphones, you will want some sort of monitoring system, including an amplifier and speakers. For MIDI-based recordings you'll also need some sort of input device such as a MIDI keyboard/synth. We'll look at those issues as we get further into the recording process, and the Working Practices section in Chapter 4 will provide you with a detailed notion of what, apart from a Mac and Cubase, you'll need to complete your set-up.

missing the bus

One thing you will notice when you start using the newer Macs for music is the fact that a number of busses and interfaces that have been standard on every Mac since its inception are now missing. These include the designated modem and printer serial ports where you used to be able to attach your MIDI interfaces, the ADB (Apple Desktop Bus) where you used to connect those software-protection dongles, and the SCSI ports

for connecting high-speed hard drives and facilitating SCSI transfers to sample-editing packages. Apple has done away with these ostensibly to drive the development of new interface standards and to force third-party developers to create devices for new interfaces such as USB (Universal Serial Bus), which replaces both serial ports and the ADB port. The upside of this is that Macs can now utilise peripherals developed for the entire computer industry. However, for musicians, it also means that there is nowhere to plug in traditional MIDI interfaces or dongles. However, a range of cards and adaptors is available to deal with these issues and there are plenty of good solutions that don't cost a fortune. The other thing that's missing from the new Macs is the traditional floppy drive. Generally, this isn't too much of a problem but if you want to use the range of VST plug-ins that Steinberg provides on floppy disk then it's worth investing in an external USB floppy drive.

the OMS dilemma

A primary consideration when using Cubase for the first time is whether or not to use OMS (Open Music System). Steinberg's manual comes down firmly on the fence, leaving the choice to the user, but if you are using a Mac equipped with USB rather than serial ports and

don't wish to spend money on a PCI card offering serial ports, you have only one choice: OMS is obligatory.

OMS is the creation of Opcode Systems and was designed to break the '16-channel barrier' that normally constrains MIDI operation. It also enables you to use 'Librarian' software that stores every patch (voice) within an OMS-compliant sound module inside a database that can be accessed from Cubase, making the selection of patches a simple matter. Put simply, whereas normal MIDI operation constrains you to a maximum of 16 MIDI channels, OMS allows up to 16 channels per 'Out' port on your (OMS-compliant) MIDI interface. So if you have an interface with four 'outs' and a 16-channel multi-timbral sound module connected to each of these, under OMS you can have 64 MIDI channels at once.

The ongoing problem with OMS is that two years ago its creator company, Opcode, was purchased by Gibson, the guitar company. Since then, it has more or less gone to sleep – that is, it now lags badly behind in terms of development and is still being written in so-called 68K (pre-PowerMac) code, which makes it slightly uneven in performance on PowerMacs. Worse still, since the advent of the blue-and-white G3 series – on which the old serial ports were finally dumped –

OMS has become more important than ever before, since the USB channel will not accept anything else. And yet there are acknowledged problems with USB/OMS, which are still being investigated, problems made worse when the USB channel is asked to carry audio signals as well. However, it is perfectly possible that you will never encounter any problems, especially if you route your audio in/out via a sound card.

Put in a nutshell, you should use OMS if:

- You are running a USB-equipped Mac
- You are running a serial-equipped Mac but want more than 16 MIDI channels at once

Consider doing without OMS if:

- You have a serial-equipped Mac but a low (16 channels or fewer) MIDI requirement
- You have a serial-equipped Mac but plan to major on audio recording (with fewer than 16 MIDI channels)

a way through

Even if you own a USB Mac, you can still regain the choice (of using OMS or not) by purchasing a serial-port PCI card. These typically cost less than £100

(\$150), but you must also make sure that your MIDI interface is of the serial (not USB) type.

setting up OMS

The first time you boot Cubase 5.0, you will be asked if you wish to use OMS or not. If at a later time you decide you want to use OMS after all (or not), go to the main menu and select Options → MIDI Setup → System. Choose In & Out or NO OMS from the OMS Compatibility pop-up and reboot.

Now, from the same main menu, choose Options → MIDI Setup → OMS → OMS Studio Setup and use the resulting Opcode software to create a 'master map' of your MIDI set-up. Once you have done this, all of your modules will be embedded in Cubase and can be selected from the Output column in the Track window.

extra hardware

Cubase is a very powerful program, but, like many other powerful programs, its use can be made much more enjoyable by investing in some extra hardware. Consider purchasing either the largest monitor you can afford – the larger the better – or, if you can afford it, a second display. When operating Cubase at 'full

tilt' you will find yourself with a large number of palettes or windows, such as the Track Mixer and Channel Mixers, which can hide vital parts of the Arrange window while they are visible. By dragging these onto a second display you can keep the Arrange window clear at all times and still have immediate access to them.

If you are doing lots of audio work, consider investing in a sound card. Audio also requires lots of hard-disk space, too, as well as a fast hard disk. So, if the one already inside your Mac is, by today's standards, small, consider purchasing an external hard drive. This should be SCSI if possible (SCSI is faster than IDE), which means that if you have one of the newer Macs, you may also need to purchase a SCSI card.

Many of Cubase's most potent features such as the built-in Effects and VST Instruments take a great deal of processor power, so it helps to have the fastest processor possible inside your Mac. Obviously, you can do little about this once you have purchased your computer – and under no circumstances consider using a third-party accelerator card since these can prove to be incompatible with Cubase – so the only remaining option is to go gently with the built-in Effects and VST Instruments.

The Mac OS in all its incarnations includes a number of built-in technologies that make music-computing significantly easier. These powerful built-in technologies add critical support to many music applications. More importantly, they virtually eliminate the need for artists to become troubleshooters. With Apple's QuickTime, music producers also have the ability to stream digital content, delivering MIDI, MP3 or Qdesign compressed audio over the Internet. This means that millions of people who have QuickTime software are ready to receive your audio files from CDs or over the Web. Let's face it: a lot of people regret getting a PC for music, but no one ever regrets getting a Mac.

getting started

'Music is art, Muzak the science.'

– Muzak Corporation slogan

With Cubase VST and a reasonable PowerMac, musicians have access to a fully integrated 'virtual recording studio' that can be used to record, mix, edit and process MIDI and audio. Like all modern sequencers, Cubase uses a graphical interface enabling blocks of sound or MIDI information to be copied, sliced, moved around and so on. Audio and MIDI recordings are visible within the same window to make editing and tracking easier by showing you exactly where your audio sources are in relation to your MIDI data. With the addition of VST, or 'Virtual Studio Technology', Cubase and a few add-ons can easily cater for nearly all of your recording and production needs. Okay, if you're a fanatical audio-purist or a techie geek, you'll always be able to find something that's not absolutely perfect with various recordings, whether they're done on a Mac at home or in some famous commercial studio like Abbey Road – which, incidentally, also uses Macs and Cubase for a

variety of projects. But, if you know your music and know the sound you want, Cubase is more than capable of helping you achieve that special blend you're looking for. As I mentioned earlier, having the best-equipped studio with obscenely expensive microphones, desks and effects would, like winning the lottery, be a wonderful solution in an ideal world. But most musicians don't live in an ideal world – and rarely win the lottery, either. And, also in the real world, even expensive state-of-the-art studios still churn out a lot of well-produced, ear-numbing mediocrity, all of which simply proves the old computer industry acronym: GIGO (garbage in, garbage out). Don't allow yourself to be distracted by the savage rantings of self-styled asinine audiophiles or ear-wax-impaired 'kit-junkies'. Just tap your foot to the rhythms in your head and listen to what you produce. Then decide what else, if anything, you might truly need.

plug-ins

VST is now the most common native audio plug-in and was actually pioneered by Steinberg. VST plug-ins are available in both Mac and PC versions and help in handling all the usual studio-style effects such as compression, limiting, gating, reverb, echo, chorus,

flanging, and so on. Nowadays, plug-ins are also available for pitch correction, creative or gratuitous distortion, vocoding, noise clean-up, click suppression, spectral enhancement...the list goes on. As with a conventional mixer, effects such as reverb and echo can be used in an effects send-and-return loop on the virtual mixer so that a single plug-in can be applied to as many channels as needed without soaking up additional processing power. Other plug-ins, like compressors or equalisers, still have to be used on a per-channel basis and have to be patched in via virtual controls in much the same way as you would on a traditional desk.

the Cubase interface

Depending on the speed and efficiency of your particular Mac, Cubase VST can give you up to 64 audio tracks, each with four-band parametric EQ, eight real-time auxiliary effects slots, four real-time master insert effects slots and four real-time insert effects slots per channel. It's got an excellent plug-in architecture for a huge variety of third-party effects and processors, great mix-down facilities and clever time stretch and pitch shifting. You can patch to a number of external processing devices, while features such as 'groove analysis' enable you to analyse the

rhythmic structure of your audio recordings, which can then be applied to the structure and 'feel' of your MIDI parts. The cool thing about Cubase is that it incorporates the use of native audio processing, so you actually don't need any additional hardware to record and process audio. However, the more facilities you decide you need from Cubase the more processing power will be required, particularly when you start adding third-party plug-ins or if you want to use a lot of audio tracks. The nice thing about Cubase is that it keeps up with your Mac, and as you increase your processing power you actually unlock even more capacity in Cubase.

the main windows

When you get into a new car, it's always useful to sort out where the controls are for those all-important things such as the lights, heating, ignition and so on before setting out on a road-trip. The same applies to applications like Cubase: it's worth knowing where everything is and what everything does before you start trying to do any serious recording. Trying to dive in head first will lead to frustration and unnecessary delays later on. Cubase has a number of main windows that provide access to various tools and key control elements of the program.

the Transport Bar

The first window you need to be familiar with is the Transport Bar, which normally appears in the lower part of your screen below the Arrange window. This panel works pretty much like the normal controls found on any standard tape deck. You can play your recording, stop, wind forward or rewind, just as with any analogue system. However, in Cubase, the Transport Bar has additional functionality, which enables you to set the tempo for your track, time signatures and more.



The Transport Bar

At the left end of the Transport Bar is the Record Mode selector. This determines whether Cubase will add ('Overdub Mode') any existing sound when recording or over-write ('Replace Mode') what you've already recorded. The Record Mode selector affects only MIDI data and will not alter audio recordings. In Cubase, recording over an existing Audio Part won't rewrite or merge with existing audio but will, instead, create a new audio file for each new recording. This also means that only one audio recording can be heard at any one time when the audio is on the same Channel.

Immediately to the right of the Record Mode selector you'll see a panel that contains the Left and Right Locators, the Cycle button, and buttons for punching in and out of a recording as well as the Automatic Quantise button. The Left and Right Locators indicate the current positions of the Locators and define where to start and end recording or what section to cycle. If you click on one of the Locator labels (Left or Right) on the Transport Bar, your Song Position is moved to the corresponding Locator. You use the Cycle button for cycling between the Left and Right Locator positions.

Because Cubase can play back and record in a cycle – which is essentially nothing more than a loop – you can decide where the cycle starts and ends by setting the Left and Right Locators as required. When Cycle is activated, you can listen to a section of the arrangement over and over again and record more information each time. Playback with Cycle is also particularly convenient while editing or when making adjustments in the Inspector.



Transport Bar: Locators, Auto-Quantise Button, Cycle, and Punch In/Out

If you've used a portastudio, multitrack tape recorder or have done any recording in a traditional studio, you're probably familiar with a technique called Punching In. Punching or dropping in is when you start recording while your tape is rolling. This is particularly useful if you mess up a section of a lead or vocal line but the rest of the recording is fine. You simply 'drop in' a replacement section over the flawed section and either punch out or carry on until the end. Contrary to notions popularised by the Gallagher brothers and other rock 'n' roll clichés, in recording parlance, a punch out is when you stop recording without stopping the actual playback. In Cubase you can either use an automatic or a manual punch in.

With the Auto Quantise button you can choose to immediately quantise everything you record according to whatever Quantising Type you've currently chosen. As with practically everything in Cubase, quantising can be undone if the result isn't what you intended. It's worth noting, however, that automatic quantising applies only to MIDI recording, not audio.

Moving even further to the right, directly above the tape-style controls you'll find two Timing display bars. The first of these shows the current Song Position in bars, beats and ticks (fractions of a beat). The second is

essentially a time-code read-out showing the current Song Position in hours, minutes, seconds and frames. Directly below both of these displays is the Position Slider. You can drag the handle and the range of the slider will relate to the length of your Arrangement. In other words, if you drag the slider all the way to the right, the Song Position will appear at the end of the last Part. But we'll look at all that in more detail when we start laying down tracks.



Transport Bar: Beat and Time-Code Displays

At the far right of the Transport Bar you'll find controls for activating the metronome, tempo and time-signature readouts and indicators that show MIDI In (recording) and Out (playback) activity. There is also a Synch button for synchronising the sequencer to external devices. Tempo determines the actual speed of your music and the number of beats – usually quarter-notes – per minute. The time signature, such as 4/4, 3/4, determines the overall 'feel' of the beat. Cubase offers two sources for choosing tempo. If, for example, you're recording a song with a steady beat throughout, you

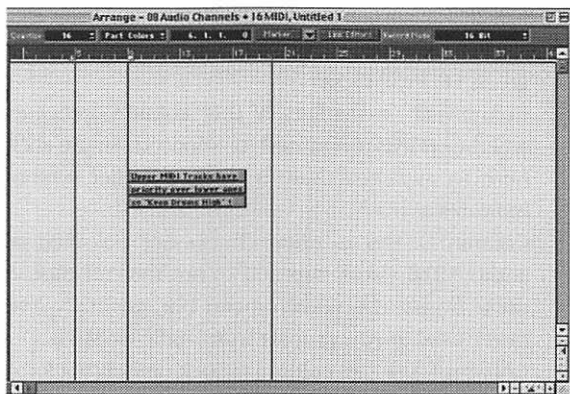
can turn the Master button off and set the desired tempo on the Transport Bar. You can still adjust the tempo at any time, even during playback. If your song has a number of tempo changes, use the Master Track. But don't worry about all that just yet – we'll go into all this stuff in more detail later. One of the easiest ways of setting the tempo is to activate playback and adjust the tempo on the Transport Bar while listening to the metronome (triggered by the Click button) that is generated on each beat. Incidentally, if you start playback with the Click button and still can't hear the metronome, you'll need to adjust the settings in the Metronome dialogue, found in the Options menu. The bar at the end enables you to resize the Transport Bar.



Transport Bar: Tempo, Time Signature, Click-Track, External Sync

the Arrange window

The heart of your digital studio is probably the Arrange Window, since this is the place where you record and assemble Songs. You'll want to be particularly familiar with this window and all of its functionality as you'll be



The Arrange window

spending most of your time here. The left side of the Arrange window is called the Track List, because it's divided into 'tracks' which you use to organise your recordings. As in a traditional multitrack studio, you might use a couple of tracks for drums, another for guitar, one for bass, several for vocals and so on, depending on the type of music you're recording and the sort of instrumentation and arrangement you're looking for. If you view this side as a sort of musical spreadsheet or Chinese menu, you've got:

- Column A: an activity column that shows whether or not anything is being played from that particular

track in real-time. If something is happening, a green LED will flicker

- **Column M:** a marker in this column indicates whether tracks are muted, or silenced. Single-click here to mute/reactivate a track. A bullet symbol indicates a mute
- **Column C:** this is where Tracks are classified as audio, MIDI, drum, mix and so on. You can choose these from a drop-down menu but, generally, I've never used anything apart from audio or MIDI
- **Column T:** use this column to lock/unlock Tracks to prevent them from further, unintended, modification
- **Column Tracks:** this is where you name your Tracks or designate instruments and so on in the mix

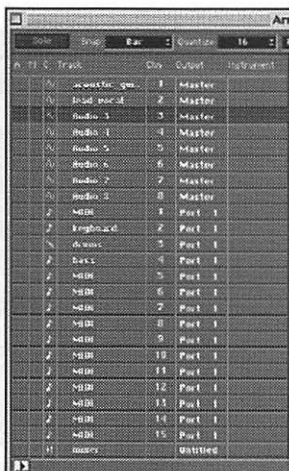
The Channel (Chn) column shows the MIDI Channel Number to which the Track has been allocated. Behind the Part Display, and usually hidden when you're actually working, you'll find additional columns for output (for choosing MIDI output), an Instrument column (where you can name any combination of MIDI Channels), and the Output column. Incidentally, remember that the Instrument column has no functionality for audio Tracks.

The button that is situated at the bottom left of the Tracks List opens a new feature in Cubase 5, which is



Drop-down menu for classifying track type

Note: with MIDI Tracks, the Output column lists the output port names of the ports or drivers you've installed with your audio card. If they're Audio Tracks, the column will contain the letters 'VST'



Main Tracks List

called the Inspector. This allows you to have easy access to more detailed settings for active Tracks in the same window.

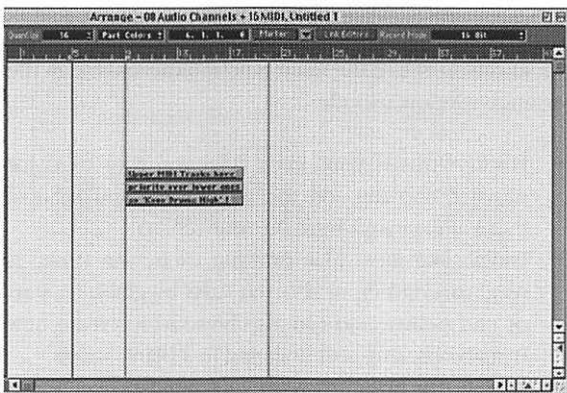
At the top of the Tracks List is a red Solo button, which you can click on to listen to a selected Track only without any of the others playing back. If all this is getting a little confusing, just remember that the Arrange window basically shows you time on a horizontal axis in bars and beats, and Tracks on the vertical axis or columns.



Expanded Track List showing Inspector controls

To the right of the Track List is the Part Display. This is where all the real music goes and it's also the place where you can edit and enhance the bits you record. Each recording you make, either audio or MIDI, appears as a bar called a Part, and the width of that bar corresponds to the duration of the recording. The vertical position of each bar corresponds to the Track

that it's on in the Tracks List, and the horizontal position shows you exactly where the Song Part starts and finishes. Along with the Solo button, at the top of the Arrange window you'll find various pop-up windows and settings for precision-editing functions such as moves and splits, and there's also a pop-up window for assigning different colours to different Parts to help differentiate between sections when you're editing.



Part Display area

In Cubase, because higher MIDI Tracks have priority over lower ones, it's recommended that when you're ordering your Tracks, you put drums and percussion towards the top of your Track List.

the Toolbox

The Toolbox in Cubase is accessible from the Tools menu and can be 'torn off' and positioned anywhere on your screen for easy access to manipulate and edit musical Parts in the Part Display area. If you're familiar with other Mac programs, you'll probably recognise some of these. In the latest version of Cubase, various tools used in various situations are gathered into Toolboxes, and most windows in Cubase VST will have their own particular Toolbox with appropriate variations. Some of the main functions accessible in the Arrange window include:

- **Pointer:** this is your main selection tool used for moving, copying and the general manipulation of musical data anywhere on your screen
- **Pencil:** like most Mac drawing tools, the Pencil is used to lengthen or shorten Parts by grabbing start or end points, and can also be used to create new Parts by clicking and dragging in a blank space
- **Eraser:** this does just what you might expect and is used for deleting Parts by clicking on one or dragging over several
- **Scissors:** used for splitting Parts and splicing Parts into smaller segments
- **Speaker:** used, as you'd imagine, to monitor contents of an Audio Part

- **Glue:** the digital equivalent of sticky-backed plastic for joining two or more Parts together to make one long Part. A lot neater than the old method of cutting and splicing audio tape
- **Match Q:** Match Quantise is used to put timing characteristics of one musical Part on another by dragging from a source to a target
- **Mute:** another way of muting or silencing a particular Part
- **Magnifying Glass:** useful for closely monitoring contents of MIDI or Audio Parts. Click once to zoom in, drag to zoom in on a particular area
- **Selection Range:** if you don't want to select a whole Part, use this tool to make a selection independent of the Parts
- **Volume:** use this to click on a Part and adjust the volume by moving the slider that appears
- **Pan:** brings up a click-and-drag pop-up slider to change pan settings
- **Transpose:** brings up a pop-up keyboard for transposing the key of a Part
- **Logical:** opens a pop-up menu of pre-sets, which apply a Spock-like logical pre-set to a designated Part
- **Groove:** another pop-up menu of settings for applying a groove to a Part
- **Stretch:** use this in order to stretch or to shrink a Part and to scale Events accordingly. Audio Parts

are time-stretched, while the MIDI parts are moved so that the relative distance between Events is the same



You can open a Toolbox temporarily by pressing the Control key and clicking the mouse on an applicable window. You can also choose between a horizontal and vertical Toolbox by clicking on the zoom box on the window title

There are other important windows such as the VST and MIDI Mixer, Channel Settings, VST Instruments and the Audio Pool. However, we'll look at those in more detail and in context when we start working through a proper recording session.

sequencers

Back in the old days, original sequencers handled only MIDI. Audio didn't arrive on the scene until some years later when computers and hard drives got faster and

cheaper. Modern digital sequencers are generally capable of providing an impressive number of audio and MIDI Tracks depending on the processing power of your Mac, the speed of your hard disk and the interface you use to get things in and out and to connect external devices. In each of these departments, particularly when choosing a system for running Cubase, the two key things to remember are: 'speed is good' and 'size does matter'. Like everything in the digital world, music software is improved and upgraded often, and even if you buy the most powerful Mac system you can afford, you may find at some point that you'll feel under pressure to upgrade to keep up with developments that you'll either want or think you need. It's at this point that you need to take a serious look at what kind of music you're making, what you require to continue making it, and whether or not a slightly faster computer or marginally improved software application will really make a significant improvement to the way you work and the music you produce. It may be clichéd to say it, but if it ain't broke, don't fix it – unless you win the lottery. If you do, then by all means go out and blow the lot on high-end microphones, big mixing desks and loads of samplers, keyboards, instruments, drugs... And when you play live, demand a full-size Steinway grand piano on stage with you – but don't play it. Just use it to put beer cans and ash trays on.

As you've probably gathered by now, Cubase VST is a fully integrated modern software sequencer suitable for recording, editing and processing both MIDI and audio. And, as mentioned earlier, VST is the magic ingredient that turns your Mac into a virtual recording studio. Cubase on the Mac provides a very intuitive and direct interface featuring a comprehensive set of menus, keyboard short-cuts, pop-up menus, drag-and-drop editing, and a whole raft of features that will already be familiar to seasoned Mac users. But, like any powerful application, it does take some getting used to, and to actually get the sort of sound and recording quality that you require may take a bit of patience and an element of experimentation. The thing about the Mac is that it's made for experimentation, so don't be afraid to try things out. Generally, anything you do can be undone, and rarely will a healthy heuristic approach to creativity result in anything disastrous. Just as the best music often comes out of improvised jams, often the best recordings happen when you bend the rules or ignore them completely and just work on creative intuition. Getting your head around how a sequencer like Cubase works isn't really much more difficult than figuring out how to use a four- or eight-track portastudio, and you'll definitely find that you have a lot more freedom, control and functionality with a digital studio than you would with even some of the best analogue equipment.

For example, things like overall room acoustics and background noise become less of an issue when recording because, in a digital environment, you can edit and clean-up all of your input and add effects to simulate any kind of room or ambience you desire.

Cubase is one of those applications that can stretch as far as you want to stretch it. As I said in the Introduction, this book is designed for musicians and Mac users who simply want to have a go at creating music with a digital studio. Sure, hard-core tech-heads or sound engineers with loads of traditional studio experience will be able to use Cubase and explain everything you never wanted to know about decibels, waveform, impedance, Ohms, room acoustics and so on. And it's cool and extremely impressive that an application like Cubase can offer so much to so many different users. But don't be overawed by all the science and, above all, don't let it get in the way of the music. Providing that you've got a reasonably good microphone, basic MIDI kit and, perhaps, some sort of sampling capability, you can easily produce music that will sound as good, if not better, than most of the stuff currently being produced commercially. If you want to know all the science and techie bits, there are plenty of books out there to choose from. If you just want to play, compose and record interesting music, then learn how to do what you

need to do for what you want to produce, even if you don't fully comprehend all the jargon and technical explanations behind it. But science or no science, before you get down to serious recording, you do have to have some idea of how to get an audio signal into your Mac, how to record and manipulate MIDI data, and how you're going to produce it in a form that you can feed back into the real world.

what is digital audio?

Audio, or just 'sound', comes from any source that you can connect to the sound input of your Mac. With the right bits you can use a microphone, keyboard, electric guitar...essentially, anything with a plug. Raw audio input becomes digital audio when your Mac converts the signal into numbers, which Cubase captures and then stores on your hard drive. Once it's in the box, you can creatively start to manipulate and process your recordings. In Cubase, audio files are created each time you record on an Audio Track. The important thing to remember here is that audio files can be exceedingly large and they're written to your hard disk during the actual recording process. That's why hard-disk size is important when it comes to storage and also why you should always de-fragment your drive with a program such as Norton Utilities before starting to record.

How good your digital audio is depends entirely on the performance of the converters found in your Mac or audio card, sampling rate and bit resolution. When people talk about 'sampling rate', all they mean is the number of times an analogue signal is measured per second. Bit resolution – usually 8-, 16-, 20- and 24-bit – is how the accuracy of the system is measured. The higher the number of bits, the more levels of resolution are available to measure the analogue signal. So, for example, Cubase VST has a default sampling rate of 44.1kHz with 16-bit resolution. This is the same as a normal audio CD.

Cubase 5.0 now handles up to 32 bits of audio data at once – as opposed to the 24 bits of earlier versions. Considering that CDs handle only 16 bits, this may seem like overkill but, in fact, the situation is analogous to graphics scanning: images are typically scanned at very high resolutions – up to 2400 dots per square inch – even though no printing device in the world can cope with such dense grids of ink. Colour images are normally printed at a maximum of 200dpi, while greyscale ones seldom exceed 300dpi. The reason is that the graphics expert gets far better results by scanning an image at these enormously high resolutions and then, when the image is ready for printing, 'dithering' down to a grid more acceptable to

imagesetters and high-res printers. All of the data is still in the original file and can be reprocessed if necessary.

Audio is exactly the same. Although in the end all CD-based audio must be reduced to 16 bits, far greater initial accuracy can be obtained by 'scanning' (recording) at these very high resolutions and then 'mastering' at 16 bits.

However, since the Macintosh's built-in sound (microphone/headphone) ports are limited to 16 bits, using Cubase VST/32 5.0 to its full capacity requires the use of a sound card. These live in a PCI slot and typically cost between £200 (\$300) and £500 (\$700). If your planned use of Cubase involves lots of audio, and you wish to make this as professional-sounding as possible, you will need a sound card. Otherwise you will be restricted to 16 bits, which is still enough to produce excellent results, and also – importantly – creates much smaller (though still large) data files. Running at 32 bits with a card produces gigantic documents for each Audio Track, which in turn imposes burdens on your hard disk, both of size and speed of operation. Therefore, the use of a sound card also requires the largest possible hard disk with plenty of free space, and if this is of the SCSI rather than the IDE variety so much the better.

Each audio bit that you record into Cubase also includes a number of useful properties, which give you control over how you can process and use them. Cubase can play any chosen part of an audio file for any chosen length of time because it saves properties within Audio Events and Segments. For example, an Event contains a reference to a Segment, has a start point relative to the Part where it resides, and includes a Q point for quantising. Each Segment contains a reference to the actual audio file on your hard disk, start and end pointers determining which part of the file is to be played, a file name, and controllable volume and pan curves. Audio Events can be viewed and manipulated in the Audio Editor, changing only the references to it without actually changing the actual audio file on your hard disk. For example, if the start reference for an Audio Event is dragged to a new position, your original audio file on your hard disk stays the same, but the playback begins from a new position.

If you've worked with portastudios or other analogue multitrack recorders you should understand that there are some aspects of digital audio that require a different approach. In traditional studios, it's not unusual to push certain sound signals so that VU meters occasionally peak into the red. In an analogue environment, this sort of technique can add a natural

kind of warmth to the mix, and although there is mild, graduated distortion, it tends to be rounded off in the recording and is hardly ever offensive to the ear. With digital audio, however, you cannot allow levels to go into the red without getting a truly nasty distortion. This means that with Cubase, you must ensure that no clipping occurs, and you may find that you need to record at lower-than-average levels than you're used to with analogue sources.

However, as I suggested earlier, you will find that the advantages offered by digital audio generally outweigh the occasional disadvantages. Apart from the convenience of storing it on your hard disk, digital audio tends to have less background noise and hiss, provides a better dynamic range and can be copied with no loss of quality. And, with Cubase and an assortment of VST plug-ins, you can easily apply a whole range of signal-processing effects.

what is MIDI?

MIDI is another one of those annoying acronyms: it stands for Musical Instrument Digital Interface. It's essentially a form of computer code that was developed as a means by which synths and other devices can talk to and interact with one another. For any techies who

may have tuned in, MIDI is an asynchronous, serial interface, which is transmitted at the rate of 31.25 kBaud – or 31,250 bits – per second. For the rest of us, a MIDI synthesiser or similar device works a bit like a musical printer. Your Mac sends information to it specifying the notes, sound, instrument type and so on that you want to play, and it gets on with creating the actual audio. This means that you can take a recording made on say, a piano, and play it back on a guitar sound just by changing the settings on your synth.

General MIDI, or GM as it is often referred to, was an attempt to create a standard system for MIDI parameters by which songs created on one GM-compatible synth could be played back on any other GM synth and sound like the original. In other words, if the original composition specifies particular sounds to be played, then any other GM synth, when handed the GM MIDI file to play, will reproduce the correct sounds assigned by the composer. In practice, for particularly mundane applications such as playing and singing along to a sequenced backing of Wild Rover down the pub, this system works fine: Landlord buys a GM MIDI file of Wild Rover, punter loads it up in a drunken stupor and hits Play. All the sounds that should be heard will play back, and everyone will sing badly and bang the table at the appropriate time spilling beer all over the floor.

GM does have restrictions, however, one being that you are tied to a fairly standard, unadventurous palette of sounds. So, if you have created some wicked tune featuring a clever little sound that you've programmed on some non-GM device, this sound will not be recognised by GM and could come out sounding like a duck. The other restriction is controllers: since GM specifies fixed controller numbers for certain functions, basic parameters such as pan, volume, sustain pedal and so on are represented, but, unfortunately, more advanced functions such as filter resonance and cut-off are not.

GM was agreed as a standard in 1991 by the Japanese MIDI Standards Committee, (JMSC) and the American MIDI Manufacturers Association (MMA). General MIDI System Level 1 specifies 24-note poly, 16-part multi-timbral operation. All the drum sounds are defined per note number, and the 128 sound patches for the other instruments are also defined.

There are also extensions of the GM standard called GS and XG. GS is Roland's extended GM version, which adds some extras on top of the GM settings. It does this by utilising the GM Bank Select command. MIDI has a fixed range for all parameters from 0 to 127, so original GM allows only 128 sound patches all stored in one

Bank. The GM patch command allows further Banks to be accessed, each with a further 128 patches. Also added are extra Non-Registered Parameter Numbers (NRPN). This adds extra controller numbers to twiddle things like Filter control, Envelope control and extra FX parameters. In practice, GS files will play back on a GM synth, but none of the extras will be recognised, except by another GS-compatible device. As with the Roland standard, XG is Yamaha's version, also offering extra sounds and control parameters. However, these are not recognisable by GM or Roland and vice versa.

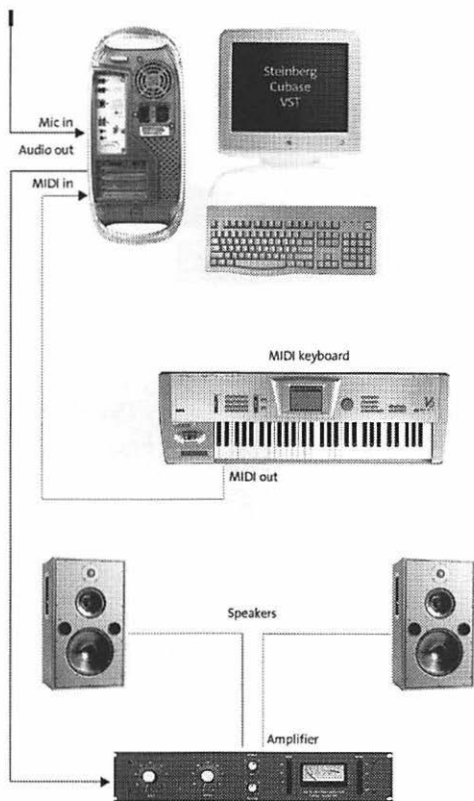
Okay, maybe that does all sound a little too much like Muzak. But while MIDI can seem a bit confusing and downright cantankerous to wire up properly, it's extremely useful in digital recording – so you'll be pleased to know that Cubase supports General Midi as well as the extensions from both Roland and Yamaha.

audio and MIDI set-up

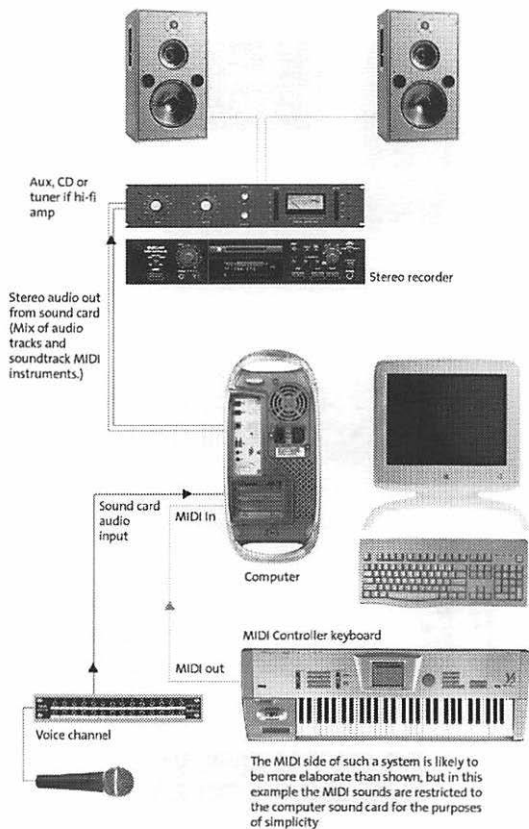
'We are robots. We have become robots through our experience of working and living. We are musical workers.'

– Florian Schneider, Kraftwerk

How you configure your system for Cubase will depend on what kind of music you make, what kind of external devices you require and how elaborate you want to make your personal recording environment. Obviously, for making even the simplest MIDI-based recordings you'll need some sort of input device such as a synth, MIDI keyboard or a sampler. For audio recordings, the minimum is probably a microphone that will plug into the audio input of your Mac or audio card or perhaps an electric guitar or bass. You may want to start with a small-scale system that provides the minimum set-up necessary to record and play MIDI and audio in Cubase and perhaps work up to a larger set-up. Or, you may want to customise your own to look like something somewhere in between the sort of digital-studio lay-outs suggested next.

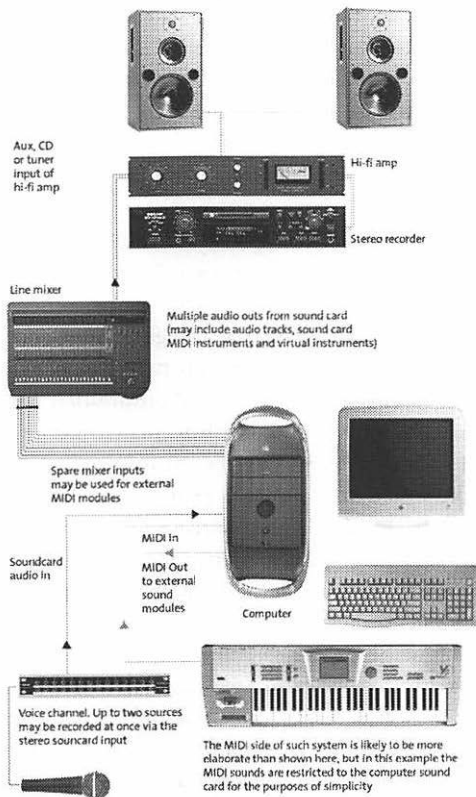


Minimum audio/MIDI studio set-up



Intermediate audio/MIDI studio set-up

audio and MIDI set-up



Advanced audio/MIDI studio set-up

setting up audio

Since this book is aimed at musicians and curious Mac users with an ear for music, I'm assuming that you could be using an audio card with analogue stereo inputs and outputs, or you might even be simply using the audio hardware built into your Mac. As it happens, the built-in audio input on most Macs accepts only line-level signals. This means that the input gain will probably not be enough for recording the output of a decent microphone, electric guitars or other low-output sources. However, you can get around this with a separate microphone pre-amp or mixer. If you do decide to use a mixer you should ensure that you use the mixer's input gain controls to match the levels of the different sources using the mixer. You'll also have to make sure that the mixer's output signal being sent to your Mac is not too loud or too weak. As mentioned in the previous chapter, digital audio is much more sensitive to distortion and noise than traditional analogue recordings. Line-level instruments connected directly to the Mac's audio input need similar monitoring. While Cubase can lend a hand by indicating input levels, remember that there are no actual input level settings within the program itself. If you are simply using the built-in audio hardware in your Mac, you'll have to adjust input levels with the audio hardware you're using or from the ASIO Control

Panel accessed via Cubase's Audio System dialogue. ASIO is yet another acronym for something called Audio Stream Input Output, a technology developed by Steinberg that acts as a connector between an audio application like Cubase and the audio hardware. This means that despite the problems described earlier, you usually have to select the proper ASIO driver to record and play back in Cubase.

To get your initial set-up out of the way, open the Audio System Setup dialogue box from the Options menu and select a device from the ASIO menu. If you're not using an audio card, choose 'Apple DAV' for a PCI Mac and choose 'Apple Sound Manager' for all non-PCI Macs. If you are using an audio card with a special ASIO driver, be sure to select this from the menu. One of the advantages of using additional audio hardware is that dedicated ASIO drivers generally give much lower latency and can provide a number of hardware-specific features.

the latency issue

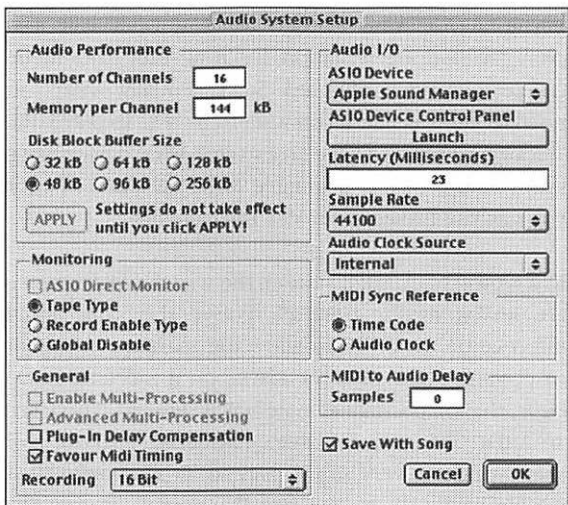
Audio cards supplied with ASIO multimedia drivers tend to suffer from significant latency when monitoring via Cubase. Latency is essentially the amount of time it takes for an audio signal to pass through the entire

audio system. This includes entering via inputs, passing through the card into your Mac, and finally making its way to the outputs. Latency can also cause similar delays between fader/control movements in the Master window, Channel Mixer window and so on. Specific ASIO drivers that come with quite a few audio cards can reduce the latency to more acceptable levels, so always choose a card supplied with its own dedicated ASIO driver. Usually, audio playback and recording timing won't be affected by latency because VST takes latency into account and adjusts timing accordingly. That's also why if you playback MIDI parts routed to VST instruments, playback will be 'sample-accurate' regardless of latency.

You might also want to adjust the Number of Channels value in the Audio Performance section while you're in Audio System Setup. This determines how many audio recordings you can play back at the same time. Remember: stereo recordings use two audio channels.

You can disable audio input and output in situations where say, you wanted to record and play back MIDI only and don't want to waste power on the audio engine. Again, in the Options menu, choose Audio Setup and then Disable Audio. You can use this option as well if you're running an older or minimal-spec Mac

that may not be powerful enough to run Cubase with the VST engine enabled. You can disable audio on start-up by holding down Shift when you launch Cubase.



Audio System Setup dialogue box

setting up MIDI

While there are certain recommended conventions to follow, the precise way you'll need to set up your Mac and Cubase for MIDI recording and playback will

depend on what sort of MIDI devices you have and how you want them to operate. The manual that comes with Cubase describes four possible ways to configure a MIDI system based on some typical permutations. Your chosen MIDI devices will also come with documentation for how they should be connected and configured. So, essentially, what you need to know is that if you want to be able to play MIDI Tracks, you need to have an external MIDI device like a synth connected to a suitable MIDI interface box, or you can use the range of VST Instruments.

In a typical basic MIDI system, the way the instruments are linked means they all receive the same MIDI information. In order to allow the master instrument to communicate with the slaves on a more selective basis, the MIDI Channel system was devised. There are 16 MIDI Channels available, numbered 1 to 16, and they work in a very similar way to TV channels. Most people in the UK receive five TV channels (forget Sky just for now), yet all five channels arrive at the same aerial and reach the set down the same piece of wire. Which one we actually watch depends on which TV channel we select on the set.

With MIDI, the information sent down the MIDI cable can be transmitted on any one of 16 Channels selected

on the master keyboard. Similarly, the sound modules may be set to receive on any of the 16 channels. If, for example, you set the master keyboard to transmit on MIDI Channel 1 and connect up three different MIDI modules set to receive on Channels 1, 2 and 3, only the first module, set to Channel 1, will respond. The others still receive the information, but the MIDI data tells them that the information is not on their Channel and so they ignore it. Of course, you can set all your modules on the same MIDI Channel and have them all playing at once if you really want to. So, by switching Channels at the master keyboard end, up to 16 different modules (set to the 16 different MIDI Channels) can be addressed/played individually, even though they are all wired into the same system.

Most MIDI instruments have three MIDI sockets – In, Out and Thru – though some older models may not have all three. The master instrument always sends information from its MIDI Out socket, which must be connected to the MIDI In socket of one of the slaves. The MIDI Thru of the slave is then connected to the MIDI In of the next slave and its Thru connected to the In of the next one and so on. What you end up with is a daisy-chain which, in theory, can be of an indefinite length. Not so in practice, however, because the MIDI signal deteriorates slightly as it passes through each

instrument. After passing through three or four, the MIDI messages may start to become unreliable, resulting in notes that stick on or refuse to play at all.

A better way to interconnect multiple instruments in anything other than the smallest MIDI system is to use a so-called MIDI Thru box. This takes the Out from the master keyboard and splits it into several Thru connections, which then feed the individual modules directly. In practice, many people use a combination of MIDI Thru boxes and short daisy-chains of instruments. Although the MIDI Outs of the slave units are normally unused during performance, they are useful when you want to hook up your keyboard to a MIDI sound editor or librarian program running on a MIDI-equipped Mac.

In Cubase, you have to verify that the appropriate MIDI output port appears in the Output column for each MIDI Track used in the Arrange window. If you can't see the Output column, drag the split-point at the left edge of the Parts display, click in the Output column name field of a MIDI Track and a pop-up menu will appear containing available output ports that you can choose as appropriate. Check that Cubase is both receiving and transmitting MIDI data by selecting a MIDI Track and monitoring the MIDI In/Out activity indicators as you

play a connected MIDI device. Also make sure that you have MIDI Thru activated in the System dialogue of the MIDI Setup sub-menu found under the Options menu.

to OMS or not?

As mentioned in Chapter 2, one of the first choices you need to make before you start recording is: do you use OMS or not? OMS is essentially a protocol that enables you to see what instruments/modules you've got plugged into your system. If you're not running OMS, all Channels say Printer Port (USB) instead of the connected device. MIDI allows only 16 Channels per port, so without OMS you're reduced to 16 Channels – a total for all modules – even though all MIDI modules are capable of 16 each. OMS allows you 16 Channels per module, not per port, which is an advantage if you're running a basic four in/four out interface or better. But be aware that there are problems with OMS. It's not particularly stable and has always been a bit flaky. This is a particular problem for new Macs since OMS is still in 64K code, not PowerPC. Since there's a good chance that OMS won't ever be rewritten for PPC code it will continue to make life with new Macs rather unpleasant.

As mentioned earlier, older Macs used a modem or printer serial port for MIDI interfaces while the newer

Macs use USB. If you're running a G3, G4, iMac or PowerBook, you may experience some difficulties with USB MIDI interfaces, depending on which brands you choose and how you configure your system. Some critics have even suggested that a combination of USB and OMS is problematic because you can't always control which other signals, over and above those your MIDI stream is generating, could be floating about on the USB bus. To minimise these problems, try to ensure that:

- You don't overload your USB interface with extraneous signals when working with data-intensive areas of MIDI
- If you have two USB connectors, try to keep the MIDI interface on one and put any other USB devices on the other
- If performance deteriorates, you re-install OMS and keep an eye on your MIDI supplier's Web site for driver updates
- If the manufacturer of your sequencing software also produces a MIDI interface, or strongly recommends a particular brand, you use it

The problem with USB MIDI interfaces is that all too often a device will work fine on one particular Mac configuration but won't, inexplicably, work on a similar

configuration. This is another reason to use a small Extension set and watch out for programs that could cause conflicts. As a matter of information, I've had experienced users tell me that the ideal Mac for music is an original beige G3 because it has two serial ports and an internal floppy drive. There's a lot to be said for opting for the path of least resistance and until there's more choice for music add-ons with USB support, it's worth keeping in mind. However, the real trick is to simply get your system, whatever it might be, running smoothly whether you know why things work or not.

working practices

In both music and recording, I've always been an advocate of the heuristic approach. Once you understand the basics of how Cubase works, the best way to master it is to get in there and start experimenting. Trial and error is an excellent teacher, and finding things out for yourself is always more valuable than being spoon-fed someone else's opinions every step of the way. After all, that's the only way you'll ever develop your own unique approach and creative method. But before we study some actual studio and recording tips, let's look at some of the other peripheral equipment you will need to really get the best results out of Cubase and yourself.

Once your Mac, MIDI and Cubase are sorted out, there are a few additional priorities that you can't really afford to neglect if you're interested in making serious recordings. Firstly, if your budget is tight and you have to cut corners, whatever you do, don't skimp on your mics. This is one bit of advice that cannot be overemphasised. Think about it: the final sound you ultimately produce will never sound better than the original source signal. If your budget is limited, buy one or two high-quality mics rather than several lower-quality ones. Actually, to begin with, buy only one exceptionally good mic if money is tight. You can do more with one good mic even though in some instances it might seem like having several cheaper ones would make sessions more convenient. However, if you can have only one mic, try to have something like an AKG C-414. There's practically no sound that this mic doesn't do at least a good job with, and they're usually slightly under £500 (\$800). However, if you shop around you might find them cheaper. If that's still out of your price range, the AKG C-3000 or the Audio Technica 4033 are both pretty decent mics, which go for under £300 (\$450). There are also a number of other modestly priced condenser mics coming onto the market that are also worth a look. If you're really on a budget, the Shure SM57/SM58 is a good-performing workhorse that can also be used for reasonable recording. If you can't come up with that, well, how serious are you?

Secondly, particularly with the range of VST plug-ins available, you don't need a rack full of signal processors to make a pro-quality recording. That sort of stuff looks impressive but, when you come down to it, it's not essential. If you can run to it, one or two good reverbs and a couple of quality compressors could be useful, and there are several decent, low-priced reverbs available including the Alesis Quadraverb, the Lexicon LXP-1, and the Yamaha REV-500. You can also find acceptable low-priced compressors such as the DBX 160A and the RNC at reasonable prices and it's always worth trying to pick-up second-hand units as well. While there are advantages to some of these hardware processors, as mentioned earlier, you should definitely check out the range of VST plug-ins that offer digital equivalents of all these sorts of effects processors. Okay, none of the hardware units I've mentioned is going to startle the world or give you an instant hit, but if they're used correctly and creatively they can yield surprisingly professional results without sending you to the bank for a second mortgage.

Since you're recording directly to your hard drive, you don't have to worry too much about things like ADATs or multitrack tape. However, a DAT recorder or mini-disc can be useful for dubbing down your master mix or for use in mastering and CD pressing. While the mini-disc format is a good, cheap, digital medium, do keep in mind

that it does some very funky data compression and, depending on how you use it, this can occasionally wreck all the harmonics and overtones.

If you're serious about production, at some point you're going to need an external mixing desk. A good one to start with is the 16-channel Mackie or the Spirit 12-channel Folio. Some people seem to really like Tascam mixers as well and, like everything else, it's worth shopping around and checking out second-hand sources. It can also be a good idea – if you can afford it – to pick up a quality mic pre-amp. This is not to say that the pre-amps in all mixers are particularly 'bad'. The ones in the Mackie, for example, are pretty good. But even many mid-to upper-level mixing desks can have mediocre mic pre-amps. The only reason for this that I can think of is that most pro engineers have their own outboard mic pre-amps they like to work with – and probably won't use the ones in the console anyway. Thus, the manufacturers don't jack up the pre-amps – and the price – when nobody is going to use them anyway. Low-priced pre-amps to look for are the Symetrix and DBX units, though they may not be a great improvement. Really good mic pre-amps cost at least as much as top-notch mics and if you've got the cash (or the credit), spring for an Avalon or Focusrite pre-amp. However, be warned: once you use one, you'll never be happy with anything less.

Monitor speakers will also have a great impact on the finished sound of your mixes, so don't use those three-ways that came with your JVC stereo system. In the affordable range you could consider models like the JBL and the industry standard Yamaha NS-10, which don't 'sound' all that incredible but seem to mix very well once you're used to them. The problem with just plugging into your home stereo is that consumer speakers have built-in EQ curves and so on to sweeten their sound. What you want to hear for a mix, however, is the absolute sonic truth. Pro audio monitors don't lie well – at least not nearly as much, anyway – and it's also worth keeping a pair of really cheap Sony boombox speakers, or the equivalent, around just for reference. After a few hours mixing, your ears tend to go woolly and you'd be surprised how a mix can sound like the voice of God over good speakers and, later, like muddy trash over your friend's Audiovox car system. So, have at least two sets of monitors: a set of good ones and a set of garbage ones.

If you want a reasonably serious studio system, you can put together an adequate home/project studio for around £4,000 (\$5,800) if you shop around. Anything less and you're probably better off just going out and paying somebody who has some gear to do your recording for you. However, even with all the power and functionality of Cubase, it's worth remembering that

you don't have to have 64 tracks to make a damn fine recording. As the old cliché goes, The Beatles' *Sgt Pepper's* album was cut to eight tracks – two four-track machines synchronised together. Cubase and your Mac have already given you a much bigger edge than this. So, to create a truly great album, you just need to be sure that the peripheral gear you do have is top notch and, most importantly, you need a good understanding of how to maximise its potential. Of course, great performances from the musicians never hurts either.

session planning

Without going into a lot of detail on how to plan your recording session, it is worth mentioning a few basic practices that you may already be familiar with. How you actually structure your recording session will, of course, depend on the generic style of your music and the instrumentation and arrangements involved. However, in most instances it's best to start by laying down rhythm and bass tracks, either to a click track or a guide vocal or, perhaps, to a main MIDI track. Once you've got the rhythm, bass and chord parts down, you've effectively established the structure and shape of the song and you can build, layer and arrange from there. The nice thing about Cubase is that it makes it easy for you to adjust the mix as you record new parts

so that by the time you've got everything recorded, you've got a mix that will be pretty close to your desired final sound.

While this may be restating the obvious, it is absolutely imperative that you tune all of your instruments with a tuner before you start any recording session. Despite what a lot of musicians may claim, most of us don't have perfect pitch – or even relative pitch – and a properly tuned instrument is one of the first key steps to getting a good recording. It also avoids problems later when you start laying down a track with a new instrument only to discover that somewhere in the previous mix of tracks something is out of tune. Incidentally, most MIDI instruments are tuneable as well, so ensure that all your instruments are at least in tune with each other. It will make life a lot easier.

Once you get into recording sessions you'll discover that there are several different ways of doing the same job, and most people will simply choose the one they like best and use it most of the time. As mentioned earlier, how you decide to organise your sessions depends entirely on the type of music you play, your line-up of instruments and the generic sound you're trying to achieve. So, let's hunker down and see what we can achieve.

studio sessions

part one

*'I just don't hear anyone else making the music
I'm making in my head, so I'll have to do it myself.'*

– Bob Dylan

For most musicians, the music is the message, and getting the best sound and performance, either by playing live or in a studio, is really what it's all about. Creating and playing music should also be fun, so there's no reason why recording it shouldn't be fun as well. As you've probably gathered by now, your Mac and Cubase VST provide the equivalent of a hugely powerful studio system at a fraction of the cost of a traditional tape-based set-up. And, as an added bonus, you can even set it up and record in the comfort of your own home. So, unlike so many other things in life, Cubase VST and your Mac offer a wonderful and convenient opportunity to be creative, make music and have fun all at the same time.

While Cubase VST running on a suitable Mac fitted with MIDI and audio interfaces will enable you to perform

most of the tasks you'd be able to perform in a traditional recording studio, don't forget those important extras mentioned in the previous chapter, such as a reasonable monitoring system, reasonable-quality microphones and, perhaps, mic pre-amps and external recording facilities such as DAT, mini-disc or CD burner. It's also worth mentioning a few simple tips on studio lay-out, which might help to make the whole recording process run a bit smoother.

Unless you want to use only MIDI sound sources that can be generated within your Mac, you'll definitely need an external mixer and some external sound modules. The mixing desk has always been the centre of a traditional recording studio, so you'll want to keep your mixer close to your Mac so that you can operate both without moving from your ideal monitoring position. MIDI keyboards and samplers can be positioned to one side (or even underneath) your keyboard position and you can experiment with racking or tiered arrangements. Just remember that nothing should be placed or racked higher than the bottom of your monitor speakers or placed anywhere between the monitors and your head. Make sure your cables are kept out of harm's way and avoid running mains leads alongside signal cables. Don't ever remove any earth leads from any equipment, and if you use multi-plug

extension blocks, once you've plugged everything in, leave it plugged in. Plugging in and unplugging mains plugs will weaken contacts and you could end up with dodgy connections or annoying pops and crackles. If you tend to work alone, try to get hold of a combined mic, pre-amp and compressor for your audio recording. These work reasonably well for voice or instrument recording. Make sure you've got a reasonably long mic lead as well, since you'll want to get your mic as far away from your computer and peripherals as possible to avoid picking up hum and fan noise. I've got a layout with a computer-style desk housing the G3, monitor, CD-burner, Jaz drive, and a MIDIman Omni i/o integrated desktop audio station connected to a MIDIman Delta 66 audio card. A top shelf above the monitor holds a Spirit Folio mixer and a bottom shelf is occupied by a Yamaha A5000 sampler. On shelves to the right and immediately behind me, I've got a Roland SoundCanvas keyboard, mixer, DAT recorder and additional tape players. Small monitors are positioned on a shelf above the unit just above ear level, and for vocal and other mic recordings I run the mic out into the kitchen or into a small cupboard with a door that can be shut to block out the majority of extraneous noises. While real voices and miked instruments are affected by the acoustic environment in which they're recorded, you can do quite a lot with Cubase to

enhance, process and fix that sound. So don't panic if you don't have total isolation facilities or you get a bit of bleed-through or background noise. One of the disadvantages of the digital revolution in music has been a sort of compulsive obsession with perfectly pure audio hygiene. Personally, I think a completely clean sound is over-rated and rather sterile and generally, unless you're an anally obsessed audio geek, totally inoffensive to the average ear. The natural world is full of interference and unintended reverberation and rarely, particularly in a live performance, do we hear music played in the acoustic equivalent of a hermetically sealed environment. Let's face it, some genres of music actually benefit from a 'lo-fi' approach and, despite what you might hear from the cultural prudes, a bit of audio dirt can, in many instances, add an important element of warmth and soul.

economy and scale

When you record, always record 'dry'. Effects like reverb and VST plug-ins are extremely heavy on processing power and it's always advisable to add effects after you've laid down your tracks. A general tip for both music production and for Cubase in general is 'less is more'. Just because you have the functionality it

doesn't necessarily mean that you need to use it. And when it comes to arrangements and mixes, don't put six violins in if you can use two and so on. Use what you need only when you need it.

The cool thing about Cubase VST is that it's designed to be easy enough to use without even reading the manual. You can make a recording simply by pressing the Transport Bar Record button and you can easily end up with something. However, if you want to get the best out of the system, do read the manual and do plan your recording session. Otherwise, you might be disappointed with the results – and that would defeat the whole purpose of trying to make a recording in the first place. Remember: depending on the style of music you play and the way you want your final recording to sound, there may be whole sections of Cubase VST that you'll never bother to use. This is not a problem. If you can produce a recording that accurately reflects the sound you want to hear, then you're probably using everything you need.

recording MIDI

In many respects, recording MIDI tracks with Cubase could be considered easier than recording audio tracks. With, say, a MIDI keyboard, you can essentially record all

of the different parts of your musical score, one at a time, and then play them together in perfect synchronisation. Even after recording, sounds can be changed, tempo altered, and it's extremely easy to experiment with the musical arrangement by copying verses or drum breaks to new locations, looping sections and so on.

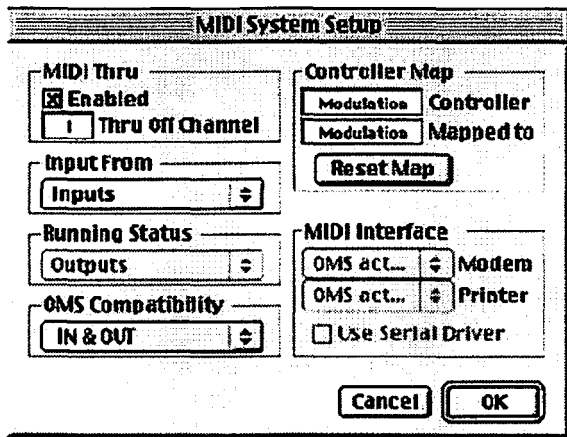
To get the best out of MIDI, ensure that your keyboard is velocity sensitive. This means that it responds like a real instrument: the harder you hit the keys, the louder the notes will be. This is important to the overall dynamic of your song and will make your various MIDI parts sound more natural and expressive.

Before you begin your MIDI recording session, always check the following:

- Is your MIDI interface connected and working?
- Have you connected a MIDI keyboard or other controller and a MIDI sound source?
- Is your sound source General MIDI, GS or XG compatible?

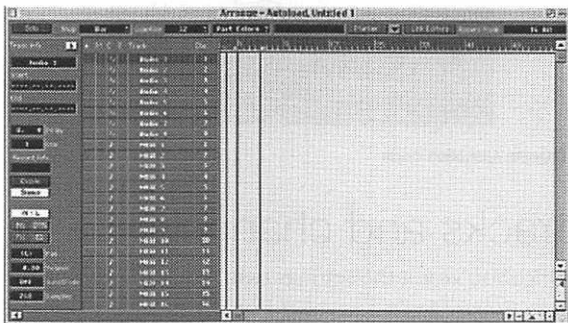
If your keyboard or sound source is not General MIDI compatible, you won't be able to select sounds from the pop-up menus in Cubase VST. Make sure that your MIDI keyboard is connected to the MIDI In of your

MIDI interface. You can check this is working via the In MIDI activity indicator on the Transport Bar while you play a note on the keyboard. Also, make sure that the MIDI Out of the interface is connected to the MIDI In of the keyboard. Check also that MIDI Thru is enabled by selecting MIDI Setup/System from the Option menu. Let's start with a simple MIDI recording in the Arrange window, Cubase's usual location for MIDI recording.



To keep it simple, I'll assume that you're using one MIDI-interface connected to the Modem port or USB and that you have no problems with the MIDI Thru

settings. Start with the 'Autoload' song displayed on-screen. The song has an Arrange window – 'Untitled 1' – with 16 Tracks (set to MIDI Channel 1 through 16) and is loaded when you start the application if it's in the same folder as the Cubase program. Let's assume that you have one or more MIDI instruments, each set to one MIDI Channel, or that you have a multi-timbral instrument with each sound set to one MIDI Channel.

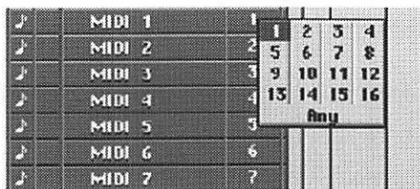


Default Autoload screen with 16 MIDI and eight Audio Channels

about Autoload

On the left side of the screen you have the Track List. It now displays 16 Tracks set to send on MIDI Channels 1 to 16. Locate the Chn Column. Click on the MIDI Channel value for the first track. If you click once with

the arrow, a menu appears for reallocating the Channel Number of the Track. If you double-click on the value, a small box opens up from which you can change the value by entering a new one via your keyboard. Use any of these techniques to set the first Track to the right MIDI Channel.



Channel Allocation menu

tracks and channels

Once you've got the settings right, you can play sounds into Cubase from a keyboard or, if you have a General MIDI-compatible device, you can select instrument types from a pull-down menu in the Instrument field in the Inspector on the left side of the screen. If you're using a sound from a keyboard, you can either enter that name in the Instrument column for your chosen Track or you can change the Track name to reflect the instrument you're recording. To do this, simply double-click in the Instrument column on the first

Track and a small box opens up into which you can enter a name for the sound or instrument you use. You can do the same in the Track column. So, type in whatever sound you'll be playing into that Track and press Return when you're finished.



Pop-up box for naming instruments in either the Track or Instrument column, plus the Instrument menu on the left for selecting GM instruments

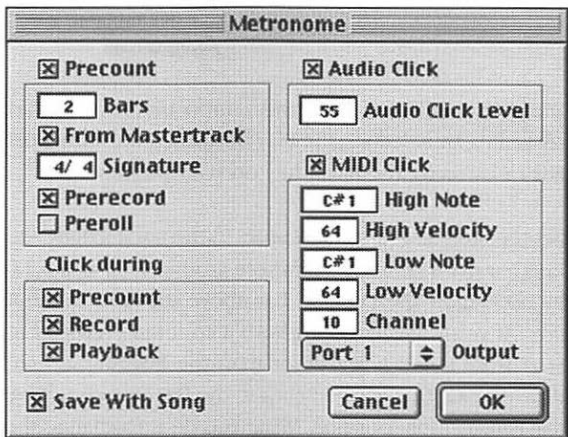
For this example I've loaded in a number of sampled instruments including a mandolin, 12-string guitar, violin, ensemble strings, acoustic bass and a harmonica, and knocked out a set of Irish tunes. I've loaded each instrument twice to make it easier to play different Parts on the same instrument. Since everyone will have a different MIDI instrument set, I won't go into detail about all the wiring and settings. This is one instance where you should read the manuals, both the

Cubase manual and the ones that came with your MIDI devices. MIDI can be temperamental, so be prepared to play around. Generally, no matter what your configuration is, you should remember to make MIDI Thru active. You'll find this in the MIDI Setup dialogue box under the Options menu.



The loaded-up Track List

Make sure that you set the Metronome (Options menu) for an appropriate Precount and click track. If you tick the Precount, Prerecord and MIDI Click boxes, Cubase sets a Precount of two bars. You can set the MIDI Click Channel and Output to a drum or percussive sound if one is available, and MIDI Channel 10 is the standard Channel for drums and percussion sounds. The default C#1 as the note for a MIDI click is the standard setting for a 'rim-shot' sound. If you want to use this, make sure the Audio Click is deactivated.



Set your click track and Precount intro

Set your key signature and tempo to the settings you want for your Song on the Transport Bar. Before you start recording, make sure the Click button is activated so the guide click track will play through your speakers or MIDI instrument. For now, leave all other Transport Bar-settings in Cubase default positions.



Set your desired tempo and key signature and ensure that the Click button is activated. Note that the In/Out readout will light up to indicate whether or not your MIDI instrument is playing through

You can check the Click and tempo before you start recording by selecting the Play button on the Transport Bar or by using the Enter key on your numeric pad.

Set the Stop and Return Locators to the track length you need or use a setting somewhere around 1.1.0 and 5.1.0 by clicking in the Position Bar above the Arrangement area. If you want recording with a count-in Precount to start from some point other than the beginning, hold down the Option key and click in the Bar Display (above the Parts) at that position. What you do is to change the settings of the Left Locator, and the new setting is shown

numerically in another box on the Transport Bar. If you hold down the Command key and click in the Bar Display you set the Right Locator. Also, make sure that the Cycle Record mode is set to Mix so you can add to the recording on each lap of the cycle. When you're ready, click the red Record button on the Transport Bar (or the * key on the numeric keypad) and, after the two-bar count-in, start playing for as long as you wish.



Click the red Record button to lay down your first Track

When you are finished, click the Stop button (or press 0 on the numeric keypad). A black rectangle should be displayed on the first Track. This is a selected Part, and shows your recording on a Track. A Part can be dragged around on the screen. If you hold down the Option key while dragging you make copies by duplicating the Track. The first Track I've recorded here is a mandolin track and, using that as a guide, I'll add additional Parts, which I can then mix into a finished Song.

	♪	pizzcato vio	2		
	♪	mandolin	3		mandolin
	♪	12 string	4		

The first mandolin Track, recorded on Channel 3

Click on the yellow Stop button (or press the 0 key on the numeric part of the computer keyboard twice) to get back to the beginning of the Song and click on Play or press Enter to play it back. After playing back the Track, return to the beginning of the Song again and sort out what you want to play next. As before, select a new Track by clicking on it, set it to the MIDI Channel for the next sound you wish to record on, and enter an instrument name for that as well. Record on the second Track in exactly the same way as you did the first. You can listen to your first Track while you're doing this and, if you make a mistake somewhere, you can Undo the whole recording by selecting Undo from the Edit menu.

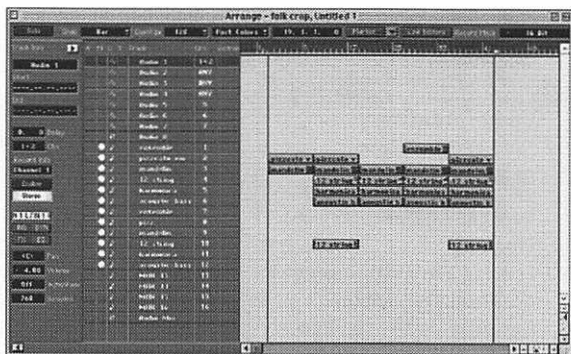
Once you've recorded a track you can quantise it to sort out any timing discrepancies in your playing – this is undoubtedly an extremely useful facility but it shouldn't be regarded as a substitute for good timing and playing! If you want to quantise a recording, however, first set the right Quantise value. There is a box at the top of the screen labelled 'Quantise'. If you click inside that box, a menu comes down from which you can select a Quantise value. Any value you enter here remains valid until you change it. Now select a Part by clicking on it. Then, pull down the Functions menu and select Over Quantize.

Functions	Panels	Options	Score	Windows
Quantize	Q		- folk crap,Untitled 1	
Quantizing Type			<input checked="" type="checkbox"/> Over Quantize <input type="checkbox"/> Note On <input type="checkbox"/> Iterative <input type="checkbox"/> Analytic	
Undo Quantize	U			
Freeze Quantize				
Groove Control				
Logical Editor	%L		Groove: 2) 16th+4	
Logical			16th Shuffle ▶	
Freeze Play Parameters			8th Shuffle ▶	
Convert To Groove				
Convert To IPS Phrase...				
MIDI Functions				
Audio Functions				

Quantise your tracks to fix any timing discrepancies

Continue to record as many more Tracks as you need for your Song. If you want to use an instrument or a sound that has been used before, press the mouse button with the pointer in the Instrument column and select that instrument/sound from the menu that comes down. The Track is then automatically set to the right MIDI Channel.

If you want to make a Track send out on another MIDI Channel, just change the Chn value for that Track. Once you've laid down all the Tracks for the various instruments you need in your Song, you'll end up with something that looks a bit like this:

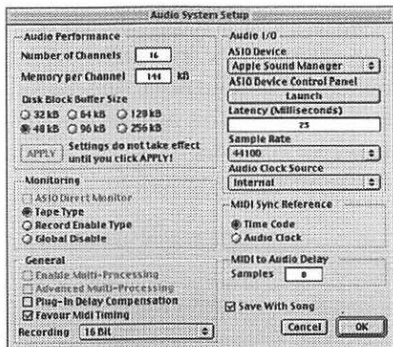


All the Parts that are created can be moved freely between Tracks and duplicated if you wish. They can also be split, joined, lengthened, shortened, grouped and much more...even while the music is being played. If you pull down the Tools menu, a Toolbox appears that you might want to experiment with. Refer back to Chapter 3 if you've forgotten what all the tools are for. If you want to delete one or more Parts, select them and press the Backspace key. When you're happy with your piece, pull down the File menu and select Save As. Enter a name and save to disk just as you would in any other Macintosh program.

That should give you a reasonable feel for how simple Cubase is to use for recording MIDI. Now let's have a go at recording an Audio Track.

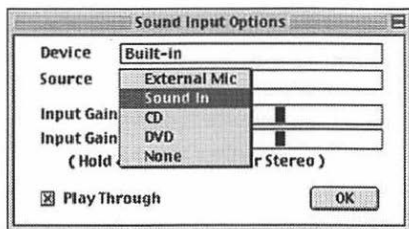
recording audio

You record audio tracks in Cubase in much the same way as you do with MIDI. It's all managed in the Arrange window, and you can input audio directly into your Mac's mic input or through an audio card. To begin with, let's assume you're using a basic audio card with two-in/two-out or the built-in audio on your Mac. We'll also assume that you're using a microphone with the signal fed into a standard stereo in/stereo out audio card. If you're using a mono source, connect the cable to the left input socket, if you've got them available separately. If you're not using a mixer, you'll have to make sure that Sound In is enabled on your Mac. To do this, choose Audio System Setup from the Option menu in Cubase.

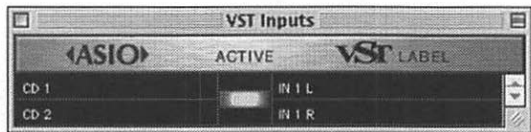


For now, stick to the default settings and choose Launch

From this dialogue box, choose Launch. Hold the mouse down on the Source box and choose Sound In. Also make sure the Play Thru box is ticked if you want to hear what you've recorded when you come to laying down another track.



To ensure your inputs are activated, select VST Inputs from the Panels menu and you should see a list of available input ports in the left-hand column. Choose the one you want to use and make sure the indicator in the middle column is lit. This signifies that that input is active. It's always a good idea to switch the light on and off just to make sure your devices are awake.



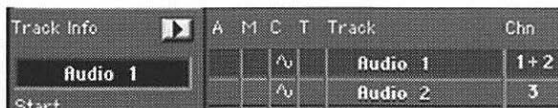
Default available inputs vary depending on your audio card/configuration

Before you start recording audio, you also have to set the sample rate. This setting determines the quality of your audio recordings and the higher the value, the better the quality. It's a bit like scanning. You should always scan at a higher resolution than you require for your final illustration. The same applies here. But remember: as with graphic files, higher quality uses more disk space and processing power. 44100Hz is the usual sample rate for CD-quality audio, and you also might find that some audio hardware will support only a limited number of sample rates. For now, leave the Record Mode on the Status Bar in the Arrange window at the default 16-bit setting. We'll look at the ramifications of 24-bit and 32-bit recording later on.

mono and stereo recordings

It's important to know that each Audio Channel in Cubase can play back one mono audio recording at a time. Stereo recordings play back on two Audio Channels, with one for each stereo side. In the Channel column you'll notice that stereo Channel pairs always consist of an odd Channel and the next even one. In the illustration you can see that the Channel is 1+2. So, for stereo, always select an odd-numbered channel to set up your Track. To set up an Audio Track, simply click on one or create one from the pull-down

menu in the C column. Set the Track's Channel, as before, in the pull-down menu in the Channel column. Name this track just as you did with MIDI Tracks.



If you're recording in stereo, click the Stereo button in the Inspector to activate it.



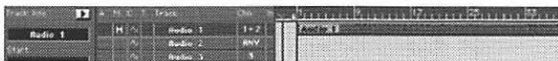
To select a folder to store your audio files in, click the Enable button located just above the Stereo button. The first time you do this, Cubase opens a dialogue box asking you to select a folder somewhere on your hard disk. If you can run to it, it's a good idea to store your audio files on a separate, fast hard disk for better performance. Once you've done this, you still have the option of changing the folder for your audio files during a recording session by pulling down the Options menu and selecting Audio Files Folder from the Audio Setup sub-menu.

You can monitor, or listen to, the signal you're recording in three different ways: if you're using an external mixer and audio card, you can listen to your connected equipment or sound source directly from the mixer, either through speakers or headphones. If you're using a very basic configuration, you can manually activate the Through or Monitor feature of the audio card either through the card's ASIO Control Panel accessed via Cubase's Audio System Setup dialogue box, via the Mac's Sound Control Panel, or via a mixer application that comes with your card. Or, you can monitor directly via Cubase with audio passing from the input into Cubase and back to the output so you can control the monitoring from settings within Cubase. If you choose to monitor via Cubase, it's automatically activated when you Record Enable a Track. An advantage of monitoring through an external mixer is that it avoids latency issues and timing problems associated with laying tracks and overdubbing. Latency is the length of time it takes for an audio signal to get through your entire audio system and the length of time it takes the system to react to that signal. Essentially, with digital audio, it's the delay you get between playing a sound and hearing it.

As mentioned in previous chapters, when it comes to recording levels, digital recording isn't nearly as forgiving

as analogue recording. While it's common practice to have 'peaks' in traditional analogue recordings where you've got plenty of audio 'headroom', in Cubase, this sort of behaviour will result in some extremely unpleasant distortion and hard clipping. You also have to be careful not to record your input signals too low or you won't have enough gain to work with. You can get around both of these problems in Cubase by accurately using the Input meter on the Channel Mixer to check your levels and adjust your input. We'll look at these internal mixers in greater detail in the next chapter.

Once you've done all that, set your Locator Bars in the same way as you did for your MIDI recording and also set your Metronome, Tempo and Signature. Ensure that the Sync, Master and Loop buttons are inactive on the Transport Bar. Start your recording just as you did for your MIDI Tracks, and when you've finished click the Stop button. You should now have a Track that looks something like this:



If you don't like what you've recorded, don't panic. You can always undo or delete the Track and start again. However, you should be aware that, unlike with MIDI

Parts, when you delete an Audio Part, the Segment and audio file aren't really deleted. Sure, they disappear from the Arrange window, but the audio file is still hanging around on your hard disk and the Segment is having a great time swimming round the Audio Pool. This is no great problem, it just means you've got to delete these unused Segments and files later.

why bit depth matters

To understand why resolutions far higher than the human ear can perceive – and higher than CD can accept – are important, one need only consider the analogy of scanned graphics. Nearly all artwork is initially scanned at resolutions far higher than it is possible to print on even a high-end imagesetter. The reason is that a large file of this type contains masses of data, segments of which may or may not turn out to be critical when the image is finally reduced (dithered) down to a more acceptable size. Only by first processing the file and then trying various test prints can one be sure.

Digital audio, like digital graphics, is a peculiar thing, and some levels may, for no reason you will ever learn, come through in the supposedly finished product more (or less) than they should. The best solution is to

have more data than you need – that way you retain freedom of choice. But to do that you have to capture it in the first place, which is why top-end audio recording systems now offer 24 and 32 bits of resolution, whereas commercial CDs can handle only 16, and DAT tape (a format for showreels) uses 24. The Mac's built-in sound ports can handle 16 bits of data, which, if you intend making your own CDs, is a bit like scanning at the resolution you intend to print at. If you want to go higher than that – and professional sound recordists do – you have to purchase an approved (ASIO-friendly) audio card. Oh, and the best pair of speakers you can afford, otherwise the entire investment is wasted.

Recording digital audio can be a bit like trying to perform an ancient magic spell from a modern translation of some old and dusty tome. All the symbols are probably there, the ingredients are readily available, but the phrasing and order for completing the great work may have got slightly muddled along the way.

If you find yourself confronted by a veritable entourage of unexpected or unwanted demons, draw a circle around your Mac, pause, and ask yourself the following riddles:

- Are my cables and connections faulty or is it the input signal itself? The source is switched on and active – or is it?
- Have I thoroughly tested my audio card to be sure it's installed correctly? Is there some sort of impedance mis-match between my source audio signal and the card? Is the card switched on in the Input and Output port lists in the ASIO Setup panel?
- Have I confused the left and right inputs on the card and have I chosen the correct input on the selected Audio Track?
- Are the inputs for the audio card active with the green light on?

a matter of size

As I've already mentioned, audio files are huge compared to Cubase VST Song files, MIDI files, or other Mac files such as word processor documents. To give you an example, for each minute of recording at 44.1kHz mono, you will burn through five megs of hard disk storage per mono Audio Channel. So, you don't have to be a Carol Vorderman to figure out that this means that to record continuously on four channels for three minutes, you'll need a massive 60Mb of hard-disk space. Keep that in mind when you start thinking about using real instruments or live vocals.

Okay, that's your first recording session and you should have managed to lay down a number of Tracks. If you've experienced any additional problems so far, particularly with recording audio, and you've tried the tips mentioned above, they're probably due to the savage inexplicable intervention of gremlins in the range of parameters related to the audio hardware you're using. So, don't despair. As I said earlier, the best way to get the sounds you want is to continue to experiment and try functions out as you feel you need them. And, if you really have to, get all the manuals that come with your various add-ons, put them in the loo, and read them at your leisure.

studio sessions part two

'Romantic realism. In our music, we make the machines sing.'

– Ralf Hütter, Kraftwerk

According to Frank Zappa, cigarettes and coffee are food. So, while we stop for a little food break, let's think about where we are. If you've adopted a suitably heuristic approach, you should be reasonably confident about getting some basic MIDI and Audio Tracks into Cubase. But, like working in a traditional recording studio, the whole creative process doesn't stop there. You need to think about layering instruments, cutting up sections, sorting out timing and adding various effects that will ultimately enable you to create the perfect finished mix. Cubase VST provides you with an impressive assortment of virtual mixing consoles and effects racks, which include sophisticated EQ controls, adjustable reverb, delay, chorus, and other fun toys for achieving just the sound and feel you're looking for. While you're on a food break, it's also a good time to reflect on the fact that

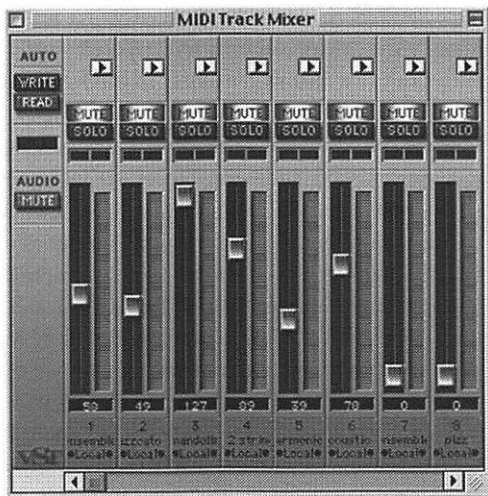
the whole concept of multitrack mixing can't really be separated from the rest of the recording process. And in the digital studio, the neatly packaged tasks common to traditional studios become blurred, so that in a sense you're building your mix and final sound in a much more fluid and flexible manner, which allows for more artistic control at each step in the process. And, best of all, you're not paying for studio time by the hour.

That being said, even Cubase can't work miracles. If you make a recording with crap sound input, don't kid yourself into thinking that you can fix it in the mix. Sure, you can always improve on what you've got, but make sure what you've got is the best you can get and keep the phrases 'silk purse' and 'sow's ear' in mind at all times. Even clever features such as quantising won't fix a totally out-of-time rhythm, and no amount of effects or processing will turn a tuneless dirge into a rock anthem.

mixing MIDI

As you might expect, the easiest way to mix, change levels and other settings is to use the MIDI Track Mixer. To mix MIDI Tracks, your MIDI instruments have to respond to volume and pan messages and if they happen to support Roland's extension of General MIDI

(called GM) or Yamaha's version (called XG), you'll be able to control a whole range of other parameters such as effects, filters, envelopes and so on. You can access the MIDI Track Mixer from the Panels menu and it looks like this:

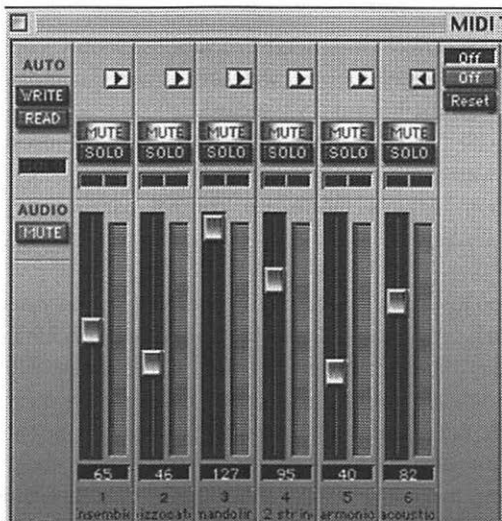


Each Channel also includes a Level/Velocity meter to the right of the fader. The buttons beneath the Mute/Solo buttons control panning

The way this Mixer works is by sending out MIDI controller messages to your MIDI devices and

instruments. You might notice that a number of these Mixer settings are also found in the Inspector section of the Arrange window. Inspector settings made for a Track will be reflected in the MIDI Track Mixer, and settings made to the Mixer will affect the Inspector settings for the Track. Individual Parts are not affected, and Inspector settings made for single Parts won't reflect in the Mixer. Any Mixer automation created with the Write/Read buttons also won't reflect in the Inspector.

The Mixer works in virtually the same as any real-world analogue mixer: you slide the faders to increase or decrease volume. Each Channel has a Mute and Solo button. The Mute button silences the output of the selected Track and the Solo button silences the output of all other Tracks shown in the Mixer. You can, of course, have several MIDI Tracks set to the same MIDI Channel, but it will mean that mixing one of these Tracks will affect all other Tracks set to the same MIDI Channel. At the bottom of each fader you'll see a little window that displays a value for the MIDI Volume message that's sent out on the corresponding MIDI Channel. I'll explain how you can automate these level settings using the Write/Read buttons a bit later. At the top of each Channel is an arrow button which, when clicked, extends the Channel strip to display a variety of other settings for effects, synths and so on.



The extended Channel strip. Click the top Off button to display more settings

When you first install Cubase VST, the following modes are available (you can also add custom-made modes yourself if you like):

- XG 1: Effect & Sends – various sound-control parameters for use with instruments compatible with the Yamaha XG standard
- XG 2: Global Settings – these are for instruments compatible with the Yamaha XG standard

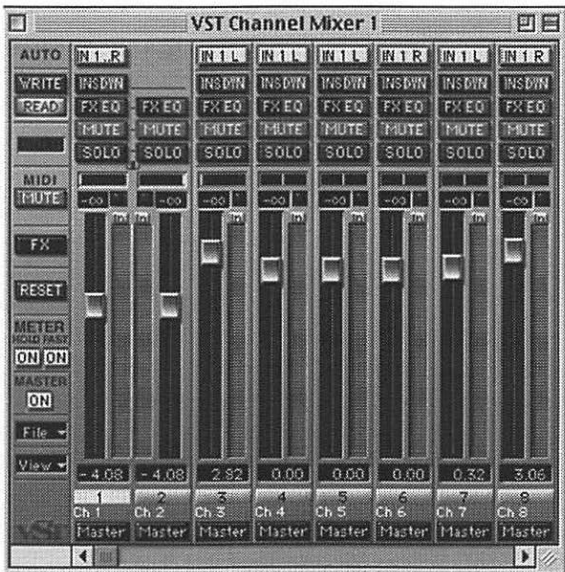
- **GS: Effect and Sends** – various sound control parameters for use with instruments compatible with the Roland GS standard
- **GS: Global Settings** – for instruments compatible with the Roland GS standard
- **Off:** In this mode, no control parameters are available

If you just want to work with your MIDI Tracks, you can switch off all Audio Tracks in your Song by clicking the Audio Mute button on the MIDI Track Mixer. Incidentally, the flashing green Level meters next to each fader show the velocity values of the MIDI information being played back. This means that the faders themselves don't affect the meters, but simply adjust the volume of the instrument. In case you hadn't noticed, the MIDI Track Mixer enables you to perform real-time mixing and automation the way you can with audio mixing. Another clever thing about the MIDI Track Mixer is that it automatically expands or contracts if you add or delete a Channel, and you can expand up to 128 tracks. If you ever need that many, it's probably worth investing in a second monitor. I have seen studios set up that way, and since the Mac is so easy to use with two monitors the Arrange window can be on a large screen while the Transport Bar and various tools and plug-ins can be on another one.

Okay, that's a quick over-view of the MIDI Tracks Mixer. Now let's look at how you can use a similar Virtual Mixer for audio.

VST Channel Mixer

For mixing your Audio Tracks, Cubase provides two VST Channel Mixers, which you access, as with the MIDI Track Mixer, from the Panels menu. Again, we are presented with the familiar fader metaphor and each Channel will be labelled with the value that you have already set in the Chn column for that particular Track. At the top of each fader, above a cluster of little buttons, you'll find a button displaying the name of the Input that you've selected for that Channel. If you've selected Stereo, you need to select different inputs for the two Channels, as described in Chapter 4. In the following illustration of this Mixer, you'll notice that Channels 1+2 are set up as a stereo Channel pair. Like the MIDI Track Mixer, this one also has Mute and Solo buttons as well as Pan controls for setting the stereo position of each Audio Channel. Depending on how you want your final mix to sound and where you want instruments positioned, you can play with the Pan controls or simply set a more-or-less traditional pan with the left Channel hard left and the right Channel hard right.



To the right of each fader, which varies the level of audio output, is a Channel Level meter that registers the level of audio input or output signals. At the top of this meter is a small Input Metering switch which, when activated, shows input signal, and when deactivated shows Channel output level. Sitting on top of this box is another box which registers peak level and clip indicators. If it lights up, you've over-loaded the signal and you'll have to reset the indicators by clicking on them, lowering the fader, and then trying again until you don't get any clipping

If you click the Mono switch in the Master Mixer, it won't matter how you've set your Pan settings since

they will have no effect whatsoever – more on the Master Mixer later...



Parametric EQ module

The cluster of buttons located at the top of each Channel fader provide you with access to a range of VST settings for adjusting EQ (four bands parametric), Dynamics, Effects and so on. You can click on each of these options and individually set the parameters for each Channel.

On the left is a duplicate of the selected VST Channel fader, an Insert Effects section, two rows of Effect Send knobs, and four EQ control modules linked to

an EQ Curve display. If you happen to be using a stereo Channel pair, as shown, when you change equaliser settings for the left Channel, these same settings will be applied to the right Channel in the pair. Clicking the On buttons below the EQ Curve display lights up the box and activates the modules and you adjust the EQ by twiddling the knobs. For each module that you switch on, a point is automatically added to the Curve Display. You can also adjust this Curve display graphically, a new feature in version 5. When you set the EQ for the sound you want, close the Channel Settings window. You will then be able to turn the set EQ on and off from the VST Channel Mixer window.

Above the EQ button in the Mixer window is the DYN button, which gives you access to something called a Dynamics Processor. You can use this for altering the dynamic range or level of your audio Tracks and the module itself contains five separate processors including AutoGate, AutoLevel, Compress, SoftClip and Limit. It works in pretty much the same way as the EQ module and we'll look at its functionality and the application of effects in much more detail in Chapter 9. Like the EQ module, once you've made your settings, you can turn them on and off in the VST Channel Mixer.



VST Dynamics control module

Master Mixer

Once you've got your individual MIDI and Audio Track balances the way you want them, you need to open the Master Mixer and set the levels for your final mix. To do this, simply repeat the procedure for opening the VST Channel Mixer. At the bottom left-hand side of the Mixer, you'll see a Master button. Click it on and your VST Channel Mixer will be magically transformed into a VST Master Mixer.

Check to see if your Mixer has opened with the In buttons and the Read/Write buttons switched off. The Read and Write buttons are used for automating Mixer movements but, for now, let's do it the old-fashioned way and mix by hand. Your VST Channel Mixer

Channels are routed by default to the Master faders on the right of the panel. You can re-route to other output buses using the Output routing system, but the Master faders provide a kind of normal output through which you can send your final stereo mix.



VST Master Mixer desk

Just like in a traditional studio you'll need to activate playback and use the faders on the Mixer to set the desired volumes for your Audio Channels. For any stereo Channel pairs in your mix, both faders will be

linked and move together. If you do need to change one of the pairs and not the other, you can do it by holding down the Option key and dragging the fader. Watch the Clipping indicators and don't let them light up in the Master Mixer. Remember what I said earlier about the horrors of digital distortion?

overdrive

Although over-driving digital audio signals is generally to be discouraged, some experimental musicians and groups actually do this on purpose to create textured distortion effects. So, just because someone says you shouldn't do something doesn't always mean that you shouldn't do it. Often, particularly in more adventurous music, serendipity, or even a major mistake, can add an unexpected and positively creative element that makes the recording special.

Set your Pan controls to the levels of separation you desire. When you're changing Pan for a Channel, the setting is shown numerically in the Level display under the fader. If you click the Mono switch in the Master Mixer, all of your audio playback will be in mono and the Pan settings won't have any effect. Play around with the other various effects and apply them here in your final mix. If you like what you hear, stop. Play

back your song and have a really good listen and see if there's any way of improving it – but don't add more effects or 'stuff' just because you can. If you're satisfied, you can now burn your song onto a CD.

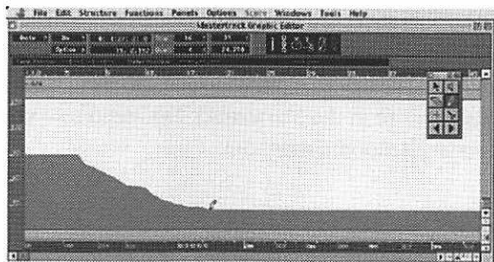
To record onto CD, DAT, MiniDisc, or whatever, go back to the Arrange window and make another Audio Track and save it under a new name. Play your newly mixed Tracks so the output goes into your Mac and is recorded onto an Audio Track. If you're using an external mixing desk, take the output from your desk that goes into your Mac – or wherever your MIDI output goes – and into the Mac sound channel. Play your Track, see if it shows up in the Audio Mixer, and check your levels. If your signal isn't loud enough, you can fix it in Cubase or other editing/'mastering' apps like Peak. Normalise the song in the Wave window. Start with the default, but, as I've said before, you basically need to experiment until you get the right result. Or, as the say, play it by ear.

click, time and tempo

You've got two Editors for adjusting your Song's tempo in Cubase: the Graphical Mastertrack, and the List Mastertrack. The Graphical Editor enables you to 'draw' tempo changes in a very intuitive Mac manner and provides a useful visual indication of tempo changes.

The List Editor is better for fine-tuning tempo settings and allows for more precision and detailed adjustments. When the Mastertrack button is on in the Transport Bar, your tempo is controlled by the Tempo Events in the Mastertrack. When it's off, the Song's tempo is controlled only by the setting in the Transport Bar. Generally, it's easier to switch off the Mastertrack when you're recording and use it later to adjust the tempo if necessary.

The Graphic Mastertrack is opened from the Edit menu and you can either edit or add tempo changes with the Pencil tool by holding down the Option key as you drag or reshape the tempo, or make quick changes by clicking and dragging with the Line tool.



To change an existing tempo, just drag it up or down using the Pencil tool in the Graphic Editor window and

watch the Tempo Indicator box. To delete any Events or changes, use the Eraser tool. Time signatures can also be inserted by clicking in the Time Signature Bar with the Pencil tool and editing the values of time signatures in the Info Bar. You can also insert Hitpoints to mark important movements in the time scales or meter of your Song. In MIDI, adding Hitpoints can be a good way to mark passages of audio in order to create a tempo map. You can add Hitpoints in Cubase in normal play mode as long as the Graphic Mastertrack is open. Essentially, if you need to have tempo changes within your Song you need to use the Mastertrack. The Mastertrack is always in Replace mode, so any tempo changes you record will replace existing data. You can record tempo changes in real-time by ticking the Record Tempo/Mute option in the Options menu and, when Cubase is in Record mode, you'll be able to record any tempo changes you make and they'll automatically be put in the Mastertrack. If the changes you've made or drawn sound too abrupt, use the Smooth feature in the Mastertrack Do menu to – you've guessed it – smoothe them out.

Incidentally, these functions work best with MIDI Tracks. Although Cubase provides functions for changing tempo of Audio Parts, you don't really want to go there unless it's absolutely unavoidable. If you're going to change tempo after you've made a recording,

plan to leave any audio recording until after the changes have been finalised. If you happen to be working with loops, plan to put down basic Tracks with loops first and then add MIDI parts later.

You can use these features to vary the tempo within your Song and you can also transfer Tempo Events from one arrangement to another. Since the Mastertrack works like all other Cubase Editors, you can copy and paste Tempo Events, time signatures and so on between arrangements. Or, you can use Export and Import commands to transfer an entire Mastertrack to another arrangement.

For the majority of tempo settings, you can adjust the Transport Bar integers. The value shown is in BPM (beats per minute) and, as shown earlier, you can adjust speed and time signature here. The easiest way to set the tempo is to activate playback and adjust the tempo on the Transport Bar while listening to the metronome click, which is generated on each beat. Remember: to hear the metronome you need to ensure that the Click button on the Transport Bar is on.

In more complex recordings, you may decide that you want to record a piece out of time but still be able to view it in an Editor with all its notes positioned on their relevant beats. The solution in Cubase is something called

Timelocked Tracks, which are essentially fixed in time so if you change the tempo anywhere, the Events on your Track still stay in their same positions. You can time-lock a Track by clicking in the T column in the Arrange window, which will then display a padlock icon. If you do time-lock a Track, any Ghost Parts will automatically become real Parts. Oh, yeah...Ghost Parts are a bit like Mac 'aliases' since they're simply copies of existing Parts, which borrow and reflect the data of the original. For example, if you have a sequence or break that repeats, you can record it once and then use Ghost Parts anywhere else in the song that you need that riff or sequence. Then, if you make a change in one Part, that change happens in all the Parts. To create Ghost Parts, just hold down the Command key and drag the Part you want to copy to a new point in your Song. You'll be able to recognise Ghost Parts since their names appear in italics.

As you've probably gathered, this is just a brief glimpse at some of the things you can do to manage and manipulate tempo and time signature Events. The Graphic Mastertrack and, particularly, the Mastertrack List are jam-packed with advanced features which are simply too techie for this sort of book. If you want to get your head around all of their functionality, don't be afraid to experiment. Just don't experiment on anything that's really important...

editing tracks

'They're just songs. Songs that are transparent, so you can see every bit through them.'

– Bob Dylan

Few musicians can go into a studio and lay down a perfect track first time every time. Sure, there are exceptions and probably a lot more who just think they're exceptions. But, for most of the rest of us, it's nice to know that if we don't get something right the first time, we can either do it all over again or, if we're using Cubase, get right down inside the song and try to fix it or modify it. As Dylan might have put it, Cubase makes your song so transparent that you can see every bit of it in exceptional detail. This means that, in many instances, you can edit your song and alter its overall sound visually. So far, we've looked at some of the main techniques for getting your tracks recorded at the arrangement level. But once you've recorded your parts, you can then begin to use Cubase VST's powerful tools to carry out a wide range of editing functions that will help you manipulate your tracks and arrangement until your song sounds the way you want it to.

As mentioned in Chapter 5, all the Parts that you create in the Arrange window can be moved freely between Tracks and duplicated as you wish. They can also be split, joined, lengthened, shortened, grouped and much more...even while the music is being played. Cubase also provides a number of specific Editors that enable you to look at and work with the contents of each Part in more detail. You can re-size your Arrange window using the buttons in the lower right-hand corner to enlarge even the most complicated arrangement or individual Part.



With Cubase, it's extremely easy to edit and manipulate Parts in the Arrange window, and most of the techniques for simple tasks such as changing the order,

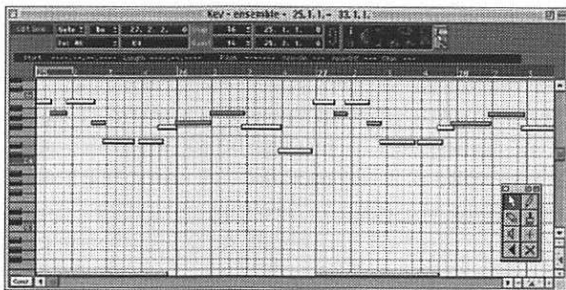
moving, duplicating, splitting, joining, changing length, deleting and creating apply to both MIDI and Audio Parts.

- **Changing Track order:** click on the Track you want to move and simply drag it to the position you want with the mouse button pressed. When it's where you want it, release the mouse button and the Track is in its new position. All the Parts on that Track are moved with it
- **Duplicating Tracks:** click on the Track name in the Track List while holding down the Option key and drag the Track to a new position. Release the mouse button and a duplicate is created complete with Parts. This also works for simply changing or duplicating Parts. Just click on the Part instead of the Track name
- **Selecting Parts:** like most Mac applications, in Cubase, to work with a Part, you have to select it before you can edit it. Use the Arrow tool to select or deselect Parts. As in other Mac apps, if you hold down the Shift key, you can select multiple Parts, or you can hold down the mouse button and drag a marquee rectangle outline around a number of Parts to select them
- **Moving Parts:** click, hold and drag. The pointer changes to a hand

- **Changing Part length:** select the Part or Parts you want to lengthen or shorten then select the Pencil tool. Use it to click the outline end of the Part and drag it to a new length. Incidentally, if you make a MIDI part shorter, all Events in the missing section will be erased
- **Splitting Parts:** select the Scissors tool and click where you want to cut a Part. New Parts have the same name as the originals
- **Joining Parts:** select the Glue Tube tool and click on the first Part and it will be joined – or ‘glued’ – to the next Part on the Track. If you hold down the Option key and click on a Part with the Glue Tube, all consecutive Parts on the Track will be joined together into a single Track
- **Deleting Parts:** click on a Part to select it and press Backspace like any other Mac app. Or, use the Eraser tool. With Audio Parts, the Eraser doesn’t delete the actual audio file or segment from the Audio Pool. To delete an Audio Part and erase its corresponding file from your hard disk, select the Part and hold down Command while hitting the Backspace key
- **Creating Parts:** while Parts are usually created automatically when you physically record something, you can add an empty Part and fill it with an Event in an Editor using the Pencil tool by drawing it in

editors

While working with your song Parts in the Arrange window you can look at and manipulate Parts in greater detail via a number of Editors within Cubase VST. These include the Key Editor, List Editor and Drum Editor. While the Key and List Editors are essentially designed for working with MIDI data, the List Editor will also display Audio Events.

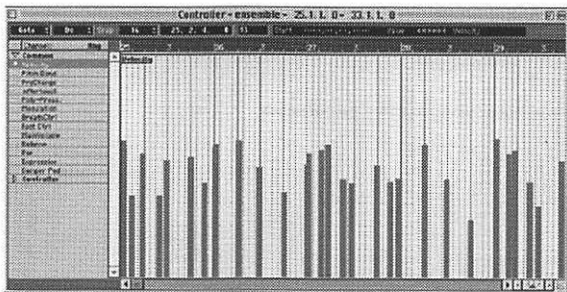


Key Edit window and Toolbar

If you double-click on one of the MIDI Parts in the Arrange window you'll open the Key Edit window. This gives you a more detailed visual representation of the particular Part and, musically, I suppose it resembles an old-fashioned music-box cylinder or an old piano spool. Notes are displayed as graphical strips or bars and when you click on them note characteristics will

be seen in the Information Bar. The keyboard on the left shows you notes being played and you can use the Pencil tool to add, remove, lengthen, shorten notes and so on. The Key Edit window also enables you to view your data as it's being quantised so you can actually see how the notes are being shifted in time. You can also move notes manually to tighten timing to grid lines, although inserted notes will be shifted onto the nearest fraction of a beat according to the Snap Box value, and the length of inserted notes will be governed by the Quantise Box value.

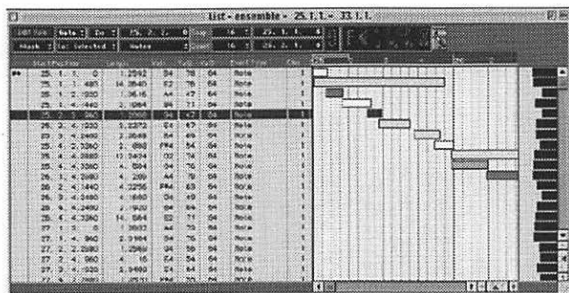
This is a great place to say, edit a guitar part where some of the notes are just that bit too long or overlap. You can also edit out the odd duff notes, edit timing values where a few bars are out, get rid of velocity errors or produce crescendos or fades – graphically and with all the ease of using a Pencil or Pen tool in a drawing program. This window is particularly good for musicians who don't like working with notation but prefer a more visual feel to editing and composition. You can also make sampled and synthesiser instruments sound more realistic by adjusting the phrasing so they sound more like how they might be played. This includes things like easing off when, say, a wind player would have to take a breath or adding 'fret squeaks' to make guitars sound more realistic.



Use the Controller to create fades, adjust velocity, pitch-bend and more

The Controller window is accessed either by clicking on the Contr button found in the lower-left corner of the Key Edit window or by selecting Controller from the Edit menu. You can write new Events into the Controller for any of the menu options with the Pencil or Line tool.

The List Edit window enables you to view and edit most of the various Event types in all of Cubase VST's different Track Classes. The columns in the List represent different values depending on the Track Class and Event types that are present. You can insert any type of Event including notes, and you can set the length of the note manually while you're entering it just as you would in Key Edit. These functions may seem hard to grasp at first but persevere, it's worth it!



The List Edit window

Personally, I find the List Edit window daunting, and unless you're recording massive arrangements that require an extreme level of detail for editing any type of MIDI Event, you may never even need to use it. While the Key Edit window is more accessible, List is probably the province of aspiring sound engineers interested in editing non-note Events and system-exclusive data. However, unlike the Key Edit window, you can edit only one Track or selected Part at a time in List Edit but you can edit Audio Events in fine detail as well as MIDI. Whether or not you ever use it is up to you, and if you're using an external sampler you'll already be doing a lot of this there instead of in Cubase.

However, from a musician's point of view, the Drum Edit and Drum Map are windows that you'll find both

interesting and useful and here, in particular, you might find the more detailed List Edit-type parameters make more sense. In MIDI instruments, drum sounds are usually differentiated between by being placed on separate keys and assigned to different MIDI Note Numbers. This means that when you use a keyboard to record a drum part in a sequencer, you usually use one key for bass drum, one for snare and so on. On many instruments used to play back drum sounds such as drum machines, samplers and some synths, you can rearrange the order in which the sounds of the single instruments are assigned to the keys. Unfortunately, there's little consistency in the industry and most MIDI instrument manufacturers place their drum sounds on different keys and in different orders. This can be a real pig if you've made a drum pattern using one instrument and then want to try it on another. When you switch, it's very likely that your snare drum becomes a ride cymbal, or your hi-hat becomes a tom – you get the picture.

To solve this rather annoying problem, and ostensibly simplify several aspects of MIDI drum kits, Cubase VST uses a Track class called Drum Tracks, and Parts on Drum Tracks are called Drum Parts. The thing that separates Drum Tracks from MIDI Tracks is that everything played back from or routed through a

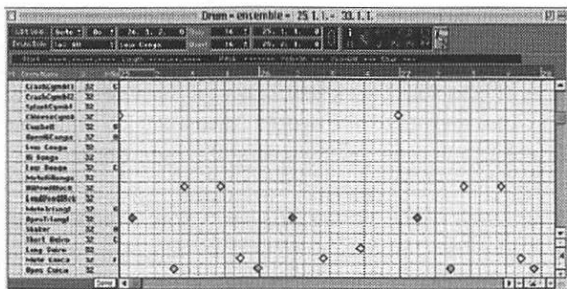
Drum Track is 'filtered' through a Drum Map. Among other things, this Drum Map determines exactly which MIDI Note Number is sent out for each sound in your drum pattern and thereby which drum sound is played at the receiving instrument. So, from a musician's point of view, it would seem to make sense to make up Drum Maps for all of your instruments. That way, when you want to try your drum pattern on another instrument, you'd simply switch to the corresponding Drum Map as well, and your snare drum sound would remain a snare drum sound.

In Cubase, a Drum Map consists of settings for 128 drum sounds, which can be named and set to represent particular drum sounds on your synth, sampler or drum machine. You can have up to 64 Drum Maps in your Song at the same time, so you can create several different Drum Tracks each with its own Drum Map. Keep in mind the fact that each Drum Track uses only one Drum Map at a time, and when you've defined a sound, all notes already recorded with that sound appear as diamonds on their particular line in the note display. One of the loaded Drum Maps that comes with Cubase is called the Default Drum Map and it has the following general properties:

- A Default Drum Map is always present in a Song

- When you create a new Drum Track, it is automatically set to use the Default Drum Map
- When you edit MIDI Tracks in Drum Edit the default Drum Map is used

Not all parameters are available when you edit MIDI Tracks in Drum Edit, but when you load a Drum Map from disk you can choose whether or not you want it to be the default Drum Map.



Default GM Drum Map

For each drum sound you can define what might seem to be a lot of complex parameters. However, for most musicians, only two are important for understanding Drum Maps: the I-note and O-note values. The I-note is a certain key or MIDI Note Number used for playing the sound. Setting the I-note value will let you choose a key

on your MIDI instrument, drum pad or whatever, to play the sound. Bear in mind that two sounds cannot share the same I-note. The O-note is the MIDI Note Number that the sound outputs when played by you or played back by the program. Let's say that you have a rack synth with drum sounds in it but they're spread over the keyboard range in a way that is inconvenient for you. You can get round this by first setting the O-notes in the Drum Map so that they match the actual notes that play back the sounds on your instrument. If the instrument plays back the bass drum on the C2 key, then set the O-note for the bass drum sound to just that, C2, so that the sound plays the bass drum. Now you can rearrange the whole 'drum kit' so that the fingering suits you just by setting the right I-notes.

While each of the 128 sounds has a Note Number, this is neither the I-note nor the O-note value but simply a Note Number used to sort and keep track of the sounds. This may seem like more than you wish to know, but only this 'real' Note Number is recorded. As soon as you open a Drum Part in another Editor, the 'real' Note Numbers will be revealed. If you open a Drum Track in List Edit, or open a Folder Track containing Drum Tracks in Key Edit, the notes will be shown with their 'real' Note Numbers, which could make things rather confusing. Therefore, it's always a

good idea to edit Drum Tracks in Drum Edit only. Like Key Edit, Drum Edit also has a Controller display, but it shows data only for the currently selected sound.

While the Drum Editor makes it relatively easy to create, edit and generally muck about with percussion patterns and even do your Parts from scratch with the Drumstick or Brush tool, using a keyboard in real-time will usually give you a more natural and realistic feel. Try recording whole sections rather than just a few bars that you can loop by copying and pasting. And recording a couple of drum tracks at a time can give a more natural sound than recording each one separately. This is not a hard-and-fast rule, and if you're programming complex break-beat or other dance stuff you may decide to program differently. Also, when you're creating a new Drum Map, it's often a good idea to start with a Map that is similar to the sort you want and simply edit it. After all, re-inventing the wheel is not the most productive use of your creative endeavours.

drumming it in

Here's a brief description, then, of the various Drum column parameters...

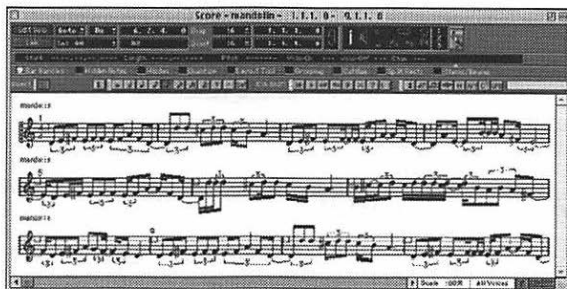
- Drum name: the name of the sound

- **I-note:** when this MIDI note is sent into Cubase VST – as you play it – the particular sound is ‘triggered’, or played
- **O-note:** when the sound is triggered – either by you playing it, or by the program playing back a Drum Part – this is the MIDI Note Number that is sent out
- **Chn:** the MIDI Channel that the sound outputs on
- **Output:** the MIDI Output used by the sound
- **Instrument:** a way of naming the combination of MIDI Channel and Output as in the Track columns
- **Q:** a Quantise value used when editing
- **Len:** a Length value used when inputting notes. Since most drum sounds are one-shot sounds, length is normally irrelevant
- **‘Diamond Values’:** these are four different velocity values, used when you create notes in Drum Edit
- **Delay:** the Delay column shifts the timing of a sound forwards or backwards. This can be useful in compensating for timing variations or glitches when using sounds from different instruments in the same drum map or for special rhythmic effects

Hi Bongo	32	C3	64					
Low Bongo	32	C#3	64	◆	◆	◆		
MuteHiBongo	32	D3	64				◆	
WoodBlock	32	E4	64					◆

Diamond values playing Sounds can be entered with the Drumstick tool

If you do read and write music, Cubase VST has an extremely sophisticated Score Editor, which can be used for editing or composing Parts for your Song. The design and features provided will depend on which version of Cubase VST you have since Cubase VST Score and Cubase VST/32 now include larger Score Editors for pro-level layout and printing. If you're more comfortable with real notation, there are a number of settings that can be made here to clean up the score and amend various 'performance' inaccuracies without having to change the actual MIDI data.



In Score Edit, if you're editing Parts on several Tracks at once, a striped double-bar line at the beginning of the score indicates the active Track

The transparency of Cubase and its ability to let you edit your music at almost any level makes it an exceptionally powerful tool and ally. Essentially,

anything that you can do in the Arrange window relating to playback or recording can also be done in the various Editors. As well as going from the Arrange window to any Editor, you can just as easily go from one Editor to another or have several Editors open at the same time. Editing happens in real-time so you can edit while music is playing or even while you're recording. If you don't want to record in real-time, you can use step recording to input Drum Tracks or other instruments one note at a time. For convenience, you can turn on the Follow Song option from the Options menu so that the window automatically scrolls during playback so your current Song Position is always in view. And if you activate Cycle, you can fine-tune your recording and instantly hear the result without having to Rewind and Play to get to the right section.

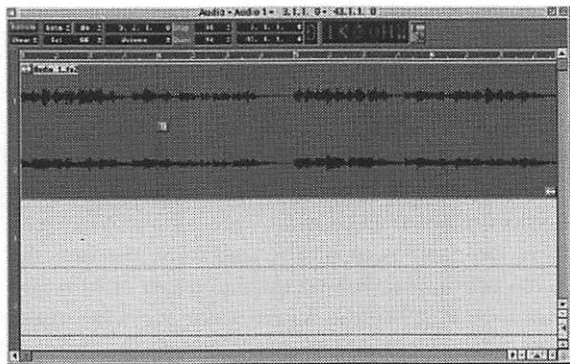
Audio Editor

Like the various MIDI editors, the Audio Editor offers a way to look at, edit and manipulate your audio data in a more detailed way than is possible exclusively in the Arrange window. Audio Parts contain elements that are available for editing known as Audio Events, which, in many ways, are comparable to MIDI Events. As mentioned briefly in Chapter 5, an Audio Event is rather like a box that contains a Segment plus some

additional settings. So, your Audio Part is like a box that contains one of several Audio Events rather like the way MIDI Parts contain notes or other MIDI Events. When you edit an Audio Part in the Audio Editor, you don't change your actual recording or audio file. The editing you perform doesn't alter the audio file but rather the properties of the Segments in the Audio Events in the Part. This means that no audio data is lost and you can always change your settings back to the way they were before you started editing.

Audio Events appear as boxes with waveforms in them and you can have a virtually unlimited number of Events in the Audio Editor at one time since they don't consume any more memory than MIDI Events. Audio Events can be arranged in any way, with gaps between them, overlapping each other and so on. To open the Audio Editor, you click on the Audio Part or Parts you wish to edit. While the Audio Editor is similar to the MIDI Editor windows and should look familiar by now, you will notice that it's divided into horizontal sections called Lanes. Each Lane is labelled at the left end of the window with the Audio Channel of the Part that is being edited. When you edit audio that is on a single Channel, all Lanes will be labelled with the same Channel number. Conversely, when you edit several Audio Parts on different Channels, each Lane will be

labelled with different Channel numbers. You can move or copy Events between Lanes, but the results will differ depending on the Audio Channel setting of the Track that you're editing. By moving an Event between Lanes with different Channel numbers, you change which Audio Channel the Event is played back on, and Lanes are particularly useful for manipulating multiple takes on the same Audio Channel.



The Audio Edit window. If you click at any point in the Position Bar, the Song Pointer jumps to that position

You can move the Events between the Lanes as you like, and add new Events on any Lane. Playback is not affected by which Lane an Event is on. The only reason for you to use more than one Lane when editing a

single-Channel Track is that you'll probably find that it gives you a better overview of what's going on. Remember that in a single-Channel Track, all Events 'compete' for one, single monophonic Audio Channel. So, if they overlap, they'll cut each other off at playback, even if they are on different Lanes. Stereo recordings occupy two Lanes, and these two Lanes use one Audio Channel each, one for each side in the stereo pair. Apart from that, editing stereo Tracks isn't much different from editing mono Tracks. As you experiment you'll discover that Audio Editor Lanes can be used as a means of moving Events between Audio Channels, and even between Tracks.

Recording from within the Audio Editor is no different from recording in the Arrange window, and if you're editing several Parts at the same time you'll be recording into the 'active Track'. The active Part is indicated by the window title, and to activate another Part click in the Lane Info field for that Part. Each Audio Event has a Q point – marked with a 'Q' flag on a vertical line which you can drag to any point within the Event. Once you set this where you want it, it's used by the Snap value to position the Event whenever it is moved or quantised. You use Q points to mark significant points in your Song. In an Audio Track, this could be a down-beat, the start of a break-down, fill and so on.

As within the MIDI Editors, you can move, duplicate, repeat, delete, mute and loop Audio Events and the procedures are essentially the same. Double arrows in the top-left and lower right-hand corners of each Event mark start and end insets specifying where the audio file starts and ends. You generally use these insets to trim Audio Events to specific sections of the audio file for things like isolating a particular instrument or perhaps cutting out unwanted sections of noise or silence. You can also split Audio Events with the Scissors tool.

In case there is one recording that doesn't play back as intended, this is the Editor you'll want to use to check whether several Events are competing for an Audio Channel. If two Audio Events try to play back on the same Audio Channel at the same time, only one of them will be heard. To trace potential problems:

- Select all the Parts that you think might compete for Audio Channels. This may very well mean selecting Parts on several Tracks
- Next, open the Audio Editor, displaying the selected Parts
- Select 'By Output' from the View pop-up menu in the Audio Editor. Now, all Events that play back on the same Audio Channel are put on the same Lane,

regardless of whether they are on different Tracks or on the same Track

- Check for any overlapping Events along the Lanes. If there are any, some audio will be cut off at those points

There are times, of course, when you may intentionally want to have overlapping Events – for example, when you’ve had to punch in on a Track to correct a mistake in a vocal part or something similar. The punch-in recording overlaps and therefore hides the original faulty recording. But since there’s always a chance that you might accidentally get overlapping Parts, this feature helps you find them.

As mentioned, you record in the Audio Editor the same way that you do in the Arrange window. In studio sessions, it can be more convenient in some instances to work on recordings in the Audio Editor rather than the Arrange window – for example, if you’re recording vocals and the singer is having a problem with a particular passage. You can record in Cycle mode and, in the Arrange window, the Track will be recorded as one long audio file. However, when you look at it in the Audio Editor, this track will be divided up into convenient segments and stacked in separate Lanes, each representing the length of a lap

of the cycle. This method means that you're less likely to lose the 'magical' performance in an un-recorded practice take, but it also means that a cycle of lengthy takes will play havoc with your hard-disk space. It can be worth doing, but do watch your processor and storage drain.

You can also import audio by selecting the Pencil tool and clicking in a Lane. A file dialogue will open and you can locate and select the audio file you want to import. This new segment will be added to the display and also to the list of files in your Audio Pool. An audio file will be created at the point where you clicked. You can also drag and drop segments from the Audio Pool, or even drag audio files directly from the Desktop.

housekeeping

Always create a new folder with the project's name to save your audio. Also use sub-folders of the Part type so you have more room in the filenames to refer to the 'quality' of the take. Creating the folders first outside of Cubase is easiest.

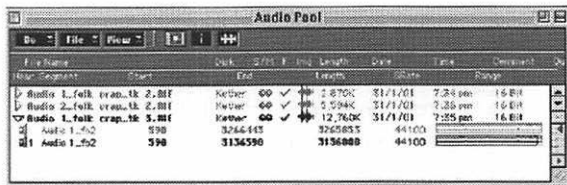
Make sure that all of your audio files are together and save yourself from accidentally erasing a default filename. Use the Prepare Master function: it will copy

only the used segments to a new folder of your choice. You'll have to save a new Song version, which uses these new streamlined files – ideally with a new name in the same audio folder. You will also need the same amount of disk space as it copies the files. Delete the originals once you're happy. It's a kind of combination of the Purge Segments, Erase Unused and Prepare Archive functions.

Audio Pool

If you're used to the way the Finder manages your files and folders on your Mac, you'll understand how to use the Audio Pool to manage your audio segments and files. You can open the Audio Pool from the Panels menu and the window lists all of the audio files in the Song. In other words, it shows the files for all Arrange windows that belong to the Song.

Each file is represented by a line in bold text, preceded by a triangle. For each file there are a number of settings and information, plus a waveform image on the right. The files in the Audio Pool each represent an audio file on one of your hard disks that is, or has been used, in the Song. Files themselves are never used directly in the Song but rather 'segments' are played back from the Tracks. For each file you have one or



more segments that are specifications for a section of a file. Segments are mainly created when you record audio and when you edit in the Audio Editor. To listen to a segment from the beginning, click the Speaker icon to the left of the segment and hold the mouse button down. The entire segment will be played, or it will play until you release the mouse button. If you don't want to audition the segment from the beginning, you can click anywhere in the waveform image at the right of the window. The segment will play from the point where you clicked for as long as you hold down the mouse button. As mentioned earlier, you can also drag-and-drop segments into the Arrange window and import other audio files into the Pool itself. From the Audio Pool, just choose Import Audio from the File pop-up menu. To be allowed into the Pool, files must:

- Be AIFF, Wave, SDII or MP3 format
- Be an uncompressed 16-bit or 24-bit file
- Have the same sample rate as your Song
- Be mono or stereo

AIFF files are most common on the Mac while Wave files are more common on PCs and, of course, you can also import audio files directly into the Arrangement windows using the Import Audio File item in the File menu. If you want to work with increasingly common MP3 files, keep in mind that these are compressed and can't be played back directly by Cubase VST. When you import an MP3, Cubase creates a copy of the file and converts it into WAV format and places the converted file into the Audio Files folder selected for your Song. While the original MP3 may be quite small, the converted WAV file will definitely be a lot bigger.

going global

Cubase provides another set of functions for quickly manipulating large numbers of Parts efficiently called Global functions, which are accessed from the Structure menu. All of these functions work in the same way. The area being worked on is defined by the Locators and any muted Tracks remain unaffected. 'Global Cut' removes the area between the Locators and moves all the following Parts back to create a seamless join. 'Global Insert' moves all the Parts that appear after the Left Locator to the Right Locator, thus creating a break in your Song.

'Global Split' works in the same way as the Scissors tool, except across all Tracks. When selected Parts are split at the Locator points, and if you want to create only one split, then either set both Locators to the same position or move the right one to an empty area of the Arrange window.

Finally, 'Copy Range' copies all Events that fall in between the Locators and inserts them at the current Song position.

Okay, I know, I said I wasn't going to go into a lot of weird geeky tech stuff and I know it's about as dull as the sharp end of a dull thing. But even if you're a practising musician and not an aspiring sound engineer, a basic understanding of a lot of these features in Cubase is important – even if only to allow you to decide not to use some of them. In the world of desktop digital recording, even experienced musicians may be seduced into becoming overly preoccupied with the technical details of their MIDI system and start to forget that the object of the exercise is to create music. We've all witnessed the sad scene in the recording studio when the musicians wait for hours on end while the newly converted programmer grapples with all kinds of arcane and obscure parameters in the digitally misguided quest for musical perfection. If

you're a real musician, then you know deep inside that musical perfection simply doesn't exist. That's why we always strive to do better. And even if this mythical musical perfection did exist, a MIDI sequencer is not what you should use in your quest to find it. As you've noticed, some level of technical involvement is inevitable but, believe me, the true secret is to know the essentials of the software and to have a clear idea of the style, feel and sound of the music you want to record. And remember: the great thing about Cubase is that you can, for the most part, choose how deeply you wish to go and how much comprehension of the various functionality you require for your own individual needs. And as I mentioned earlier on, just because you can do it, it doesn't mean you have to.

VST instruments and effects

'You can synthesise your existence. We created ourselves synthetically. I suppose you might call it "ersatz". But the real meaning of the word synthetic is 'putting together', which is all we are doing.'

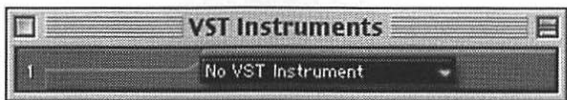
– Ralf Hütter, Kraftwerk

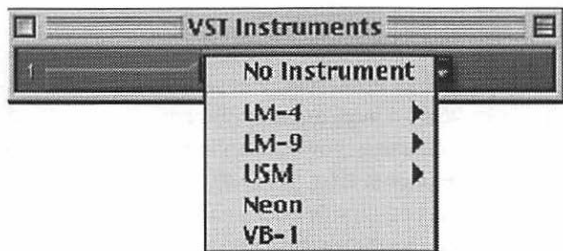
Maybe we can't synthesise our existence just yet, but Steinberg's Virtual Studio Technology, or VST to you and me, provides us with a lot of cool tools for improving and augmenting the music we put together in our digital studio. Cubase VST comes with an impressive array of VST plug-in effects and virtual instruments, and you can buy and download scores more from Steinberg, various sites on the Web, and from other manufacturers and music outlets. Essentially there are two kinds of VST plug-ins: instruments and effects. You'll probably find that VST instruments are being heavily promoted as convenient cheap alternatives to the usual range of expensive hardware synths and samplers. And, in many respects, they are. However, while you can think of these plug-ins as sort

of the musical equivalent of filters for Photoshop or XTensions for QuarkXPress, you must remember that they do take up a huge amount of memory and will eat up your processing power. Another disadvantage to VST instruments is that, generally, there's too much latency. I touched on this briefly earlier but, depending on your audio hardware and its ASIO driver, the latency may make it difficult to play these VST instruments with the kind of precision timing you'd expect from a real instrument. However, in most cases you can work around this problem by playing and recording your parts with another MIDI sound source selected and then switch to the desired VST instrument for playback. All of the VST instruments are played internally via MIDI, and their audio outputs appear on separate Channels in the VST Channel Mixer.

VST instruments

You can access the VST instruments that are bundled with Cubase VST by selecting VST Instruments from the Panel menu. What you'll get initially is a VST Instruments window with no instruments selected.





When you click on the centre pop-up of this window, a menu appears listing all of the VST Instruments currently installed on your system.

Each time you choose an Instrument, it is added to your Bank, which will start looking a bit like this:

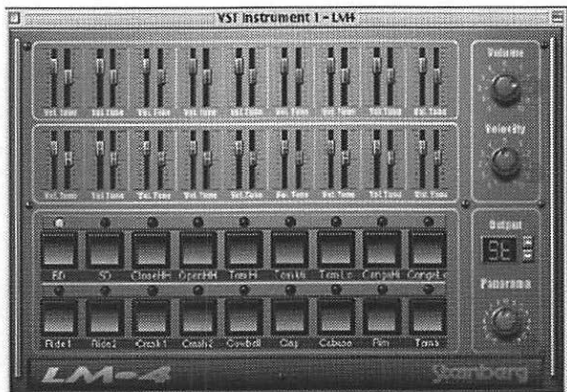


When the red button on the left is on, your Instruments are ready to use. Cubase VST normally comes with LM-9, a simple drum machine, USM (Universal Sound Module), a General MIDI-compatible sound module called Neon, a simple software synth, and VB-1, a virtual bass guitar. I've added LM-4, a more sophisticated drum machine, and with each of these instruments you can also select a number of patches and settings providing direct access to the instrument's controls.



LM4 gives you access to a selection of General MIDI drum kits with a variety of sound styles. Once you've

selected your preferred kit, you can click on the Edit button and access the Control Panel for the device, which looks and operates in a similar fashion to various hardware drum machines. You can adjust volume, velocity and other parameters for each of the elements of the kit you've chosen. The buttons in the lower half enable you to either choose another drum kit set from the menu or to toggle through the list, which appears in the long window.



You play and record your VST Instruments in the Arrange window by selecting a MIDI track and activating the chosen device via the Output pop-up

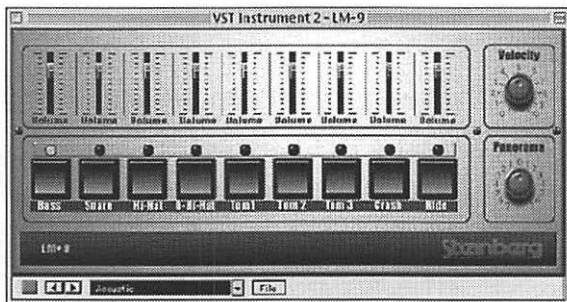
menu for the track. Instruments you're using are automatically added to the MIDI Output list to help you keep track of what you've got active. When you play your MIDI keyboard, the incoming MIDI is sent to your selected Instrument.

LM-9

The LM-9 is a simple polyphonic drum machine with up to nine voices. It receives MIDI in Omni mode (on all MIDI Channels) and you don't need to select a MIDI Channel to direct MIDI to LM-9. LM-9 responds to the MIDI Note On/Off MIDI message and velocity governs volume. LM-9 comes with two sets of drum sounds: Acoustic and Beat Box. Acoustic features samples of an acoustic drum kit and Beat Box features classic analogue drum machine sounds, and the mapping is GM compatible. You use the Program button to switch between the two supplied drum sets, just like you switch between effect programs.

Velocity sets the global velocity sensitivity for LM-9; the higher the value, the more sensitive it will be to incoming velocity data. If set to 0, the sounds will play back with a fixed velocity value. The volume sliders are used to adjust the volume for each individual drum sound. The Pads are used to audition the individual

drum sounds and to select a sound for adjusting pan. Panorama is used to position an individual sound in the stereo image and the setting will apply to the currently selected sound indicated by a glowing yellow LED over the Pad button.



LM-9 note values

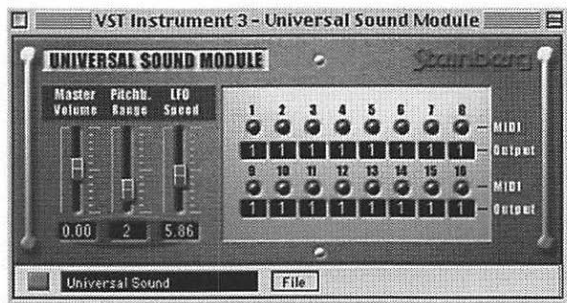
- Bass: C1
- Snare: D1
- Hi-Hat: F#1
- O-Hi-Hat: A#1
- Tom 1: D2
- Tom 2: B1
- Tom 3: A1
- Crash: C#2
- Ride: D#2

Universal Sound Module

The USM is a General MIDI-compatible sound module. General MIDI (GM), as mentioned in earlier chapters, defines a standardised group of sounds and the minimum requirements for General MIDI-compatible synthesisers or sound modules, so that a specially prepared sequence or MIDI file that is sent to the instrument via MIDI will play back the correct sound types, regardless of the make and model of the instrument. MIDI identifies sounds by their Program Change Number and before the General MIDI Standard was introduced, the same MIDI Program Change Number often addressed totally different types of sound in any two synthesisers or sound modules from different manufacturers. For example, a flute sound in one instrument could be a piano sound in the other.

With the introduction of General MIDI Standard-compatible instruments this changed, because these instruments have to use the same Program Change Numbers for the same types of instruments. So, if you want a melody to be played by a 'piano', you can use a certain Program Change command embedded into the sequence to automatically select a piano sound in any GM-compatible sound module. The GM Standard, however, does not specify in great detail how that piano should sound. It is simply assumed that the

manufacturer reproduces an acoustic piano that sounds more or less like an acoustic piano. A consequence of this was that, depending on the GM module used, a song could sound very different, even though the instrument sounds were mapped correctly. USM solves this problem and, with Cubase, you can make sure any music you've created using the USM will sound exactly the same when played back on another computer simply because the sound reproduction is no longer hardware based.



The USM features over 70 megs of sampled waveforms and four stereo outputs. It's polyphonic – with up to 96 voices – and receives MIDI in 16-Channel Multi mode (simultaneous multi-timbral playback on 16 MIDI Channels). In other words, one USM unit can play up to 16 MIDI Tracks, each with a different sound. Keep in

mind that according to the General MIDI Standard, MIDI Channel 10 is reserved for drums, and this cannot be changed. The USM features 128 different sound patches and selecting programs is done by sending Program Change messages, either numerically using the Prg value field in the Inspector, or by selecting from the Patchfield pop-up menu. The USM features four stereo outputs, allowing for flexible routing of sounds to different effects processors and so on and, by default, all MIDI Channels are routed to USM stereo output 1. To select another output, you simply click the Output field below the Channel Activity indicator for the MIDI Channel you wish to direct to another output. This opens a pop-up menu enabling you to select one of the four stereo outputs.

Master Volume sets the master output volume for the USM and Pitchbend Range sets the range for incoming Pitchbend messages, selectable between 1 and 12 semitones. LFO Speed governs the speed of the vibrato and the vibrato depth is controlled via MIDI Modulation messages. MIDI Channel Activity indicators 1–16 light up to indicate activity on the corresponding MIDI Channel. If you click on the Output 1–16 field, a pop-up menu opens enabling you to direct the corresponding USM MIDI Channel to one of the four available stereo outputs.

Neon

Neon is a polyphonic software synthesiser with up to 16 voices. However, since each added voice consumes lots of processor power, the maximum polyphony may be limited by the speed of your Mac. Neon receives MIDI in Omni mode (on all MIDI Channels) and you don't need to select a MIDI Channel to direct MIDI to Neon. Neon also responds to the MIDI Note On/Off message, and velocity governs volume.

When using a software synth, try to remember to pan the two Instrument Channels hard left/right if you want to use MIDI Pan messages. When controlling the synth, Range selects an octave range for the oscillators, 16, 8 or 4 feet, and the basic waveform for the oscillators is Triangle, Sawtooth or Square. LFO Speed governs the speed of the vibrato and the vibrato depth is controlled via MIDI Modulation messages. Osc 2 Detune enables you to detune the 'second oscillator' \pm seven semitones. By setting this to a value close to 12 o'clock, you'll get fine detuning for a warmer, fatter sound. VCF Cutoff is the Cutoff Frequency for the filter, governing the amount of high frequencies in the sound. On Neon, the Cutoff control also serves as a Depth control for the Filter Envelope (VCF Attack, Decay, Sustain, Release), so that the lower the setting of the Cutoff parameter, the more the filter will be

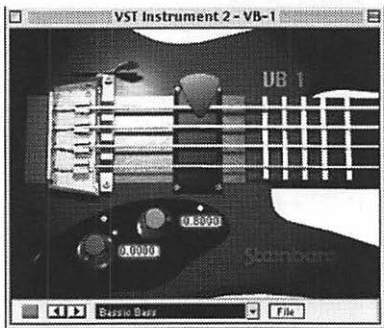
affected by the Filter Envelope. VCF Resonance is a control for the filter. You can raise this for a more hollow, pronounced filter effect: VCF Attack, Decay, Sustain, Release. The Filter Envelope parameters determine how the filter should open and close with time when a note is played: VCA Attack, Decay, Sustain, Release. The Amplitude Envelope parameters determine how the amplitude, or volume, should change with time when a note is played.



VB-1

Although not a pre-CBS Fender Jazz Bass, VB-1 looks like a funky virtual bass built on real-time physical modelling principles. However, with this one it's probably a case of 'nice interface – pity about the sound'. VB-1 is polyphonic, with up to four voices, and receives MIDI In Omni mode (on all MIDI Channels). Like a 'proper'

electric bass, Volume regulates the VB-1 volume and the Damper switch controls the length of time the string vibrates after being plucked. You can adjust the pick-up position and, by dragging the 'mic' left or right, you can change the tone. Positioning it towards the bridge produces a hollow sound that emphasises the upper harmonics of the plucked string and, when it's placed towards the neck position, the tone is fuller and warmer. Pick position determines where along the length of the string the initial pluck is made and controls the 'roundness' of the tone, just like on a real guitar. Wave Morph selects the basic waveform used to drive the plucked string model, but be aware that this parameter can drastically change the sound character. The sounds from the VB-1 aren't all that great and you'll probably be better off using bass sounds from something like Neon.



With each VST instrument you activate, an extra Channel strip will automatically appear on your VST Channel Mixer, offering you control over volume, pan, additional effects, EQ and so on. VST Instruments can be a convenient and economical way of adding high-quality sounds to your recordings providing that you've at least got an external keyboard connected to your Mac to trigger them. If you are planning to use VST Instruments with any regularity, make sure that the audio card you choose offers low latency. Although I said that VST Instruments are real processor hogs, these Tracks can be easily converted to Audio Tracks, which puts a little less strain on your system. If speed and memory becomes a problem, try converting your VST Instrument Tracks into Audio Tracks using the Export Audio choice in the File menu or in the Master Mixer window.

VST Effects

VST Effects are essentially digital simulations of the effects that musicians have traditionally had access to via pedals or rack systems. Many of these Effects are used for live performances as well as for recording and, like VST Instruments, the plug-ins bundled with Cubase VST can save you a lot of money and hassle. Steinberg has improved the whole standard with the introduction

of VST version 2.0, which allows plug-in parameters to be controlled with MIDI information in more or less the same way as hardware effects boxes can be controlled via MIDI. Version 2.0 allows Effects plug-ins to receive MIDI from Cubase VST, which now makes it possible to include things like tempo-based delays as well as MIDI control of pitch-shifters and harmonisers. MIDI Timing information is also automatically provided to VST 2.0 plug-ins that 'request it'. Cubase VST 5.0 comes with a completely new set of Effect plug-ins, but to ensure backwards compatibility with Songs created using previous versions of Cubase, the previous standard set of VST plug-ins is included as well. These are located in the sub-folder cleverly called 'Earlier VST PlugIns' in your Effect menus. If you accumulate a lot of VST plug-ins from different sources, it's always a good idea to move all your plug-ins to a single folder and then direct Cubase to use this folder.

Several of the new VST plug-in Effects can be synchronised to the Song tempo in Cubase VST and several of the VST plug-in Effects affect the stereo image, particularly in panning, stereo enhancement or stereo ambience. However, for this to be heard, the output of the Effect must be routed to a stereo Channel or bus. Otherwise, as you'd probably expect, the output will be mixed to mono. So, stereo image Effects will not

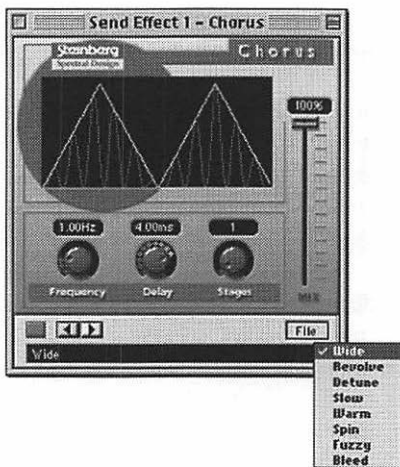
be heard if the Effect is used as an Insert Effect for a mono Audio Channel. If you want to apply an Effect like auto-panning to a mono Audio Channel, either use a Send Effect or route the mono Audio Channel to a Group Channel and apply the Effect as an Insert Effect for the Group Channel. If you decide on the first option, you'll probably want to activate the Pre-fader Send switch and turn down the volume fader for the Audio Channel.

I'm not going to go into great technical detail with these bundled plug-in Effects because the best way to find out what they can do is to have a play with them. To decide what, if any, Effects will enhance your particular recording, you need to hear how the Effect alters your recording. In addition to these fairly common Effects, you can also get VST plug-ins for pitch correction, noise removal, creative distortion, spectral enhancement, vocoding and more. However, as a quick reference, here's a brief run-down of the main new Effects included in Cubase VST 5.0.

Chorus

The Chorus plug-in adds a short delay to the signal and pitch modulates the delayed signal to produce a kind of 'doubling' effect. Chorus is often a nice Effect for

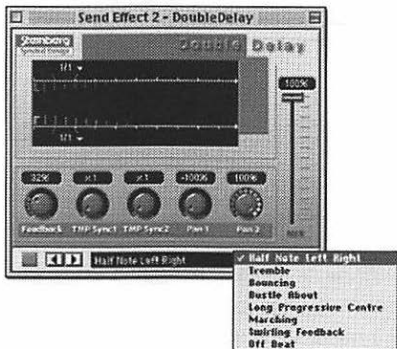
acoustic instruments, particularly guitars and strings, or for rounding-out pad sounds. If you don't over do it, Chorus can create an illusion of movement and help you build a front-to-back perspective in the mix. However, it does de-tune your sound a bit and can get a bit 'samey' if the Effect is too strong.



DoubleDelay

Delay is effectively an echo control, and this Effect provides two, separate, tempo-based delays. Cubase automatically provides the plug-in with the current

Song tempo. Along with judicious use of reverb, delay can be one of the most useful effects in your production process. Delay, perhaps even more than other Effects, should be applied in the mix, not during the actual recording. However, it can be used effectively on guitars, vocals and most other instruments, although you should avoid applying it to heavy bass sounds.



ModDelay

This is another Delay where repeats can also be modulated. It can either be tempo-based or use freely specified delay-time settings. This works particularly well on things like vocals, guitars and pad sounds.



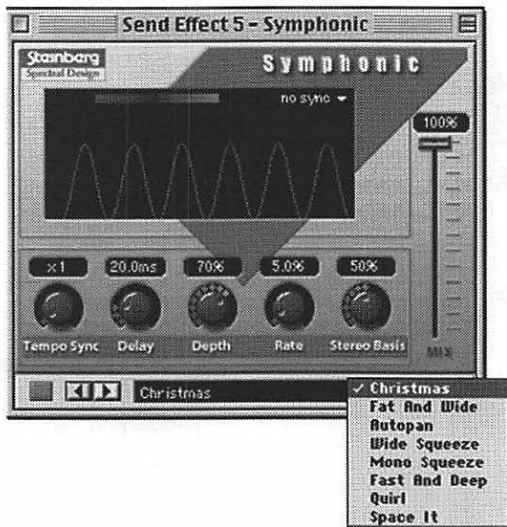
WildFlanger

WildFlanger is a classic flanger Effect with stereo enhancement. Flanging is similar to the Chorus Effect but gives a more sweeping sound, with some elements of the phaser. While flangers can be reminiscent of '80s MOR, this is a really cool effect and can be useful for 'thickening' or sweetening your mix and producing some funky effects with beats. It works well with a whole range of Instruments including bass and strings and this is one Effect that actually works well when combined with other Effects.



Symphonic

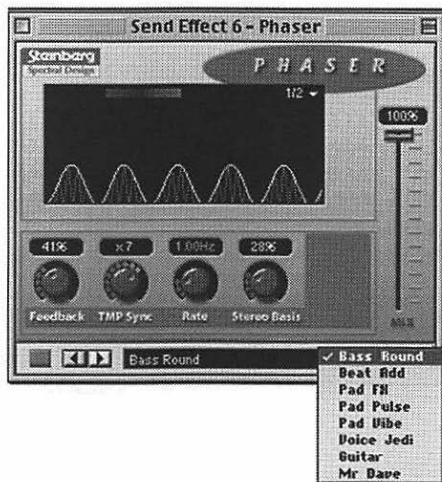
The Symphonic plug-in cleverly combines a stereo enhancer, an auto-panner synced to tempo, and a chorus-type Effect. This is another Effect that works well for fattening up your sound and creating a warmer vibe. It's particularly good for strings and acoustic Instruments and, for best results, you should apply the Symphonic Effect to stereo signals. Great for pad sounds, too.



Phaser

Unlike the classic *Star Trek* weapon that can be set to stun or kill, the Phaser plug-in produces the classic 'swooshing' sound immortalised in stunning iconic rock tracks such as 'Itchycoo' Park' and Status Quo's nearly credible 'Pictures Of Matchstick Men'. (Just kidding about the 'stunning' and 'iconic', by the way...) Of course, this Effect has been used in loads of different ways by loads of different artists, and it works by shifting the phase of the

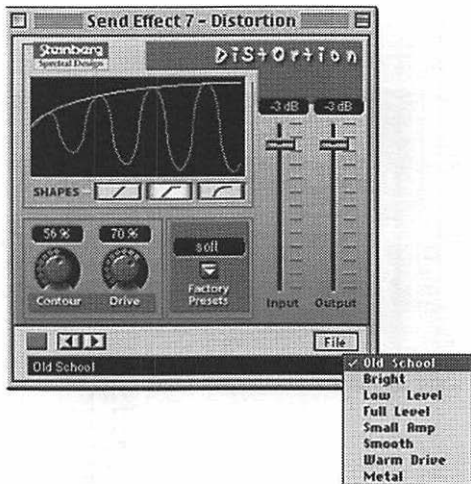
signal and adding it back to the original signal, causing partial cancellation of the frequency spectrum. Very good for pads, but if over-used it can muddy the mix. You can use it effectively in combination with other Effects.



Distortion

The Distortion plug-in is capable of producing anything from a soft 'crunch' to all-out distortion. There's a selection of factory pre-sets available and these pre-sets are not stored parameter settings but different basic distortion algorithms. The basic characters of the

distortion pre-set 'models' are indicated by their names, and while it may not make you sound like Hendrix, you can get a lot of the classic rock/grunge guitar sounds with this.



Overdrive

Overdrive is a distortion-type Effect, emulating the sound of a guitar amplifier. There's a selection of factory styles available and none of these are stored parameter settings either, but different basic overdrive

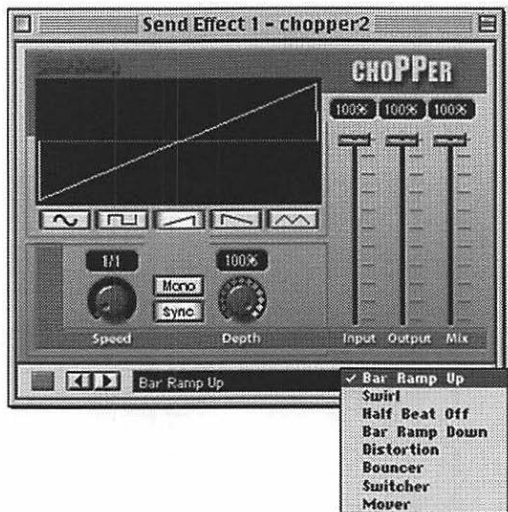
algorithms. Like Distortion, the characteristics of these are indicated by the style names and this one could be helpful if you want to sound like Jerry Garcia.



Chopper2

With no resemblance whatsoever to a Harley Davidson, Chopper2 is a combined tremolo and autopan Effect. It can use different waveforms to modulate the level (tremolo) or left/right stereo position (pan), either using Tempo Sync or manual modulation speed

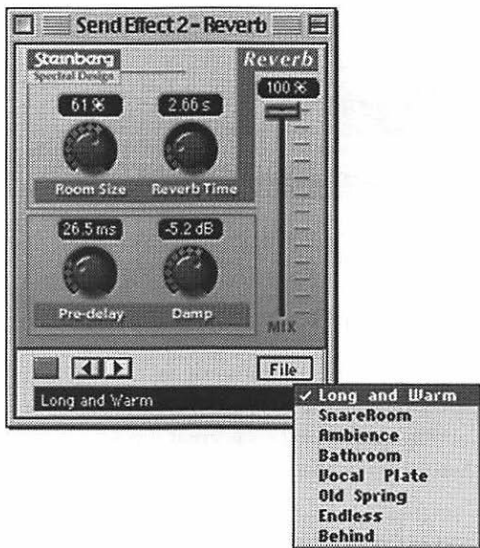
settings. It can be used to produce tremolo-style effects and can also produce autopan effects when set to stereo. Can liven up synth sounds and works well with the Flanger.



Reverb

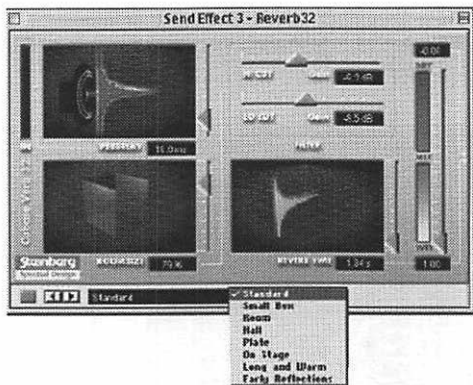
Reverb is used to add ambience and 'space' to recordings and it's one of the most important and most commonly used effects in popular music. Works well on

instruments and vocals but, like all effects, it should be used sparingly.



Reverb 32 (VST/32 only)

Reverb 32 is a reverb plug-in that provides smooth, dense reverb effects. Even better than normal Reverb, this actually gives you dimensional sound and you can control the size and depth of the 'room'.



Metalizer2

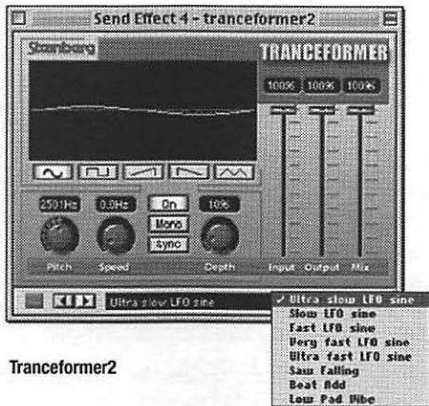
The Metalizer feeds the audio signal through a variable frequency filter, with Tempo Sync or time modulation and feedback control. This is great if you're looking for that Aerosmith or Black Sabbath sound.

Tranceformer2

Tranceformer2 is a ring modulator Effect in which the incoming audio is ring-modulated by an internal variable-frequency oscillator, producing new harmonics. A second oscillator can be used to modulate the frequency of the first oscillator, synchronised to the Song tempo if you wish.



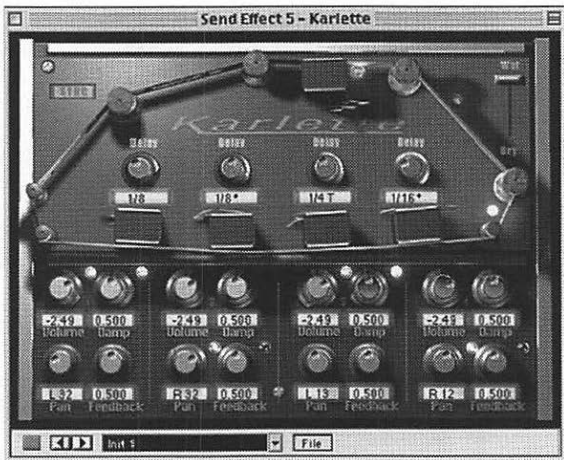
Metalizer2



Tranceformer2

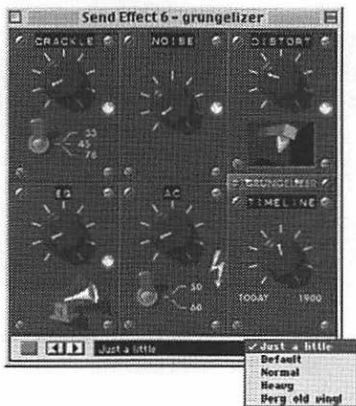
Karlette

The Karlette is a four-Channel delay that emulates a 'tape-loop' echo like – if you cast your mind back far enough – that produced by units such as the 'CopyCat' in the late '60s. The four 'tape heads' can be set to a certain note value, or a certain time, depending on whether Tempo Sync is activated or not. For each of the four tape heads you can set a variety of parameters, and it's great for simulating early Brian Eno effects. The sync feature is ideal for automatically adjusting delay times to the tempo of your Song, and it's a good general Effect for lead or solo instruments.



Grungelizer

The Grungelizer adds noise and static to your recordings. It produces sounds that are akin to listening to a radio with bad reception – or a worn and scratched piece of vinyl. Great for use with beats, samples and for remixes, or for artificially ‘ageing’ a sound. It can also be used with other Effects to create an absolutely filthy guitar sound.



Cubase dynamics

You can radically alter the dynamic range or level of audio material in Cubase with the built-in Dynamic

Processor. Each Audio Channel has its own VST Dynamics section, which is opened by clicking on the FX button of the chosen Channel strip in the Channel Mixer, or by clicking the FX button in the Inspector.



This Panel gives you access to Auto Gate, Auto Level, Compressor, Soft Clip and Limit processors and when you click on one or more of the Processor label buttons, the Dynamic is inserted after any regular Insert Effects and before the EQ section and Channel fader. As soon as any of these Processors is activated, its label lights up and so does the DYN button in the Channel strip. When you've enabled the desired Processors and

made your settings, you can turn Dynamics on and off for particular Channels from the VST Channel Mixer window by holding down the Command key and clicking the DYN button for the Channel. So, what do these Processors actually do?

- **Auto Gate:** this is a noise gate similar to hardware devices found in traditional studios used for cutting out unwanted signals like interference, which may be present between sections of stuff you want
- **Auto Level:** this is an automatic level control designed to even out signal differences in audio material and to boost low-level or attenuate high-level signals
- **Compress:** like standard audio compressors used in traditional studios, this converts loud parts into quieter parts, and quiet parts into louder parts
- **Soft Clip:** this is like an automatic gain control which you can't really adjust. It's designed to keep sounds within certain decibel parameters and create a warmer, valve amp-style sound
- **Limit:** these are generally used to stop an output signal passing above a set threshold, no matter how loud the input becomes – hence the term 'limiter'

These VST Dynamics are available only for regular Audio Channels and won't work with Groups, ReWire or Instrument Channels.

applying effects

Effects in Cubase are applied in three ways:

- **Insert Effects:** these are applied separately to each Channel using the Channel Insert in the VST Channel Mixer and are used when you want all sound from a particular Channel to be processed. You can use the same Effect a number of times in different Insert racks since each Audio Channel has its own set of independent Insert Effects
- **Send Effects:** these are applied separately to each Channel by using the Effect Sends in the VST Channel Mixer and are used when you want to mix the effect with a signal you've recorded 'dry'. You usually use this with reverb, chorus, delay and so on. Send Effects are usually mono-in/stereo-out devices
- **Master Effects:** these accept stereo input and are inserted into the master mix when you want to process the final stereo mix. Here's where you use things like noise reduction, compressors and limiters, or anything that will change the overall characteristics of your final stereo sound

The Bypass buttons on the various Effects mentioned deactivate the Effect or EQ so you can hear your original sound. To save on processor load, switch off any effect you aren't using at the time. As a tip, don't be

tempted into bashing the Send and Return levels of the Send Effects full on and leaving them there. Set the level to around 75 to 80 per cent and adjust accordingly while keeping an eye on the Clip indicator, which is just above the On button in Cubase's Send Effects rack. Remember what we've said about distortion and don't let it clip.

Before you use any Effect anywhere in your music, stop and ask yourself whether it's really necessary. Because Effects are easy to use, it is easy to go over the top with them. Obviously, different generic types of music lend themselves to particular Effects, which would otherwise be about as inappropriate as spats at an Idaho picnic. Remember: effects are there to create an illusion, so don't let them become delusions.

studio sessions part three

'The ability to use digital audio editing tools on Macs gives more power to musicians. It allows guitar-based bands like ours to do our own sampling and producing.'

– Jeff Robbins, guitarist for Orbit

By now you've begun to discover that when it comes to organising a recording session and laying down tracks in Cubase VST, there are a number of ways of doing the same job. Because Cubase VST is so packed with features and functionality, it's easy to become overwhelmed by the sheer potential on offer. However, as I've said before – and will probably say again – think about the style of music you're trying to record and the overall sound you're trying to achieve. Then think about how you like to work: do you like to adjust every possible parameter manually, or are you happy to automate certain tasks and features? Do you want to play every real instrument yourself or are you happy to use samples or MIDI instruments? Are you recording set songs with arranged parts or do you

want to use Cubase as part of the creative process of composing and arranging on the fly? How complicated are your arrangements and instrumentation? What are the limitations of your overall system – your Mac, audio card, external mixer, microphones and so on? Cubase VST is comparable to Photoshop, Quark XPress or any other powerful Mac application in that everyone uses it differently – and you should need no extra encouragement from Apple or anyone else to ‘think different’.

As we’ve seen, it’s reasonably straightforward to select an Audio or MIDI Track, press the Record button, and end up with a Track to work with. But the more you use Cubase, the more you will find that you want a bit more visual feedback to help you get a better idea of what’s going on with your Song at each stage in the recording and polishing process. Depending on the size of your monitor, you’ll probably want to keep the Arrange and Inspector windows open during recording, and you’ll always want access to the Transport Bar. You may also want to keep the VST Channel Mixer open to monitor the level of your input signal. When you start recording seriously, always save all the files relating to your Song in the same folder. It will make life easier later on and you won’t have to go searching your hard disk to find them.

So now you know the basics of audio and MIDI recording and can record Tracks into Cubase. You know what tools to use for basic editing functions and you know how to access VST Effects and Instruments. And you know about the internal Mixers and how you might begin to mix and process the Tracks you've recorded. So, let's get back into the virtual studio and look at some of these features in more detail and also check out some other techniques and functionality that might improve your creative working practice and help you polish that final mix.

more of the same

When you record on an Audio Track you can always go back and record more on to the same Track simply by moving the Left Locator to the position from which you want to start recording. This might be a free area, or at a particular point where something has already been recorded and where you want to 'overdub' another version or a new part. When you position the Left Locator and record as normal, a new file is automatically created. MIDI Tracks, however, behave slightly differently when it comes to overdubbing Parts. With MIDI, when you record over a Part again, what you end up with is determined by the setting of the Overdub/Replace switch on the Transport Bar. In

Overdub mode, your new recording is added to whatever was already on the track, and when you play back you'll hear both recordings. You can remove the bits you don't want later by editing them. When Replace is selected, whatever you record replaces whatever was previously there. So, you can use Overdub when you want to experiment with a number of different variations and then decide what to keep later, while if you've just made a mistake and want to correct it by laying down a new version, you can use Replace.



MIDI Overdub and MIDI Replace

pleased as punch

One of the most useful tricks in any multitrack recording is the ability to 'punch in' sections of a song. While we'd all like to be one-take wonders, the reality of studio recording is that more often than not, you simply don't get an absolutely perfect take first time. For example, you might get a wonderful vocal performance that has a few glitches in the chorus. Or

maybe half of that guitar solo was brilliant, but the last bit was complete pants. Rather than risk a whole retake and, quite possibly an even more inferior performance, you can 'punch in' a new section where the mistakes are and keep the rest of the performance intact. When you punch in, you activate Record while the Track is playing and replace the section you've chosen. To do this smoothly, mark the section you want to replace or note the timing – get the singer or the guitar player to start at the beginning of the section or at least several bars before the glitch – then simply click the Punch In button on the Transport Bar and click the Punch Out button when you've finished. Remember, if you're punching in a MIDI Track, click the Replace button on the Transport Bar before recording the drop in.



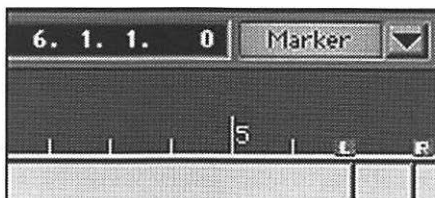
Punch In button activated on the Transport Bar

You can automate the Punch In and Out by positioning the Left or Right Locator at the point where you want the new bit dropped in. Just click the Punch In button

and when your Song plays and reaches the Left Locator, Record will be activated. You can then either Punch Out by clicking the Punch Out button manually, or, you can set the Right Locator to the point where you want recording to stop (activate the Punch Out button as well) and when the Song reaches that point, recording will stop. You can also Punch In while recording in Cycle mode so the Track or section will play back in a continuous loop until you get the part right.

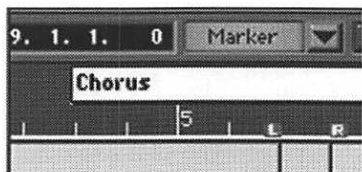
leaving a mark

To make it easier to see which bit of a Track you may want to punch in or make other alterations to, you can define an area with a Marker Track. Marker Tracks give you more visual information and make it easier to move Locators and the Song Position indicator in the Arrange window. To create a Marker Track, click the Marker button at the top of the Arrange window.

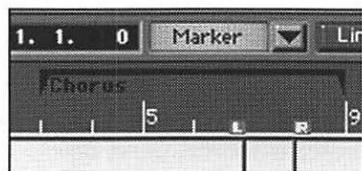


A Marker indicated in the Arrange window

Using the Pencil tool, draw a Part in the ruler. When you've finished, a box will appear and you can name the Part.



Type in a name for the Part or leave the default name for the Track. Now you've got an additional visual marker to help with your arrangement.



You can use the Arrow, Pencil, Eraser, Scissors, Glue and Selection Range tools to edit your Marker Tracks and, generally, these Tracks are handled just like regular Parts. However, Marker Tracks cannot overlap and it's not possible to select an entire Marker Track, nor can you click and drag to select several Marker Parts. If you want to select several Parts on a Marker Track, you have

to hold down the Shift key and click on the Parts one at a time. Or, hold down the Shift key and double-click one Part and you'll select all consecutive Parts. Clicking on a Marker Part with the Selection Range tool selects everything in the Arrange window between the start and end points of the Marker Part. You can use this tool as a quick way to copy and move sections of an arrangement or drag the Marker Part to a new position.

Folder Tracks

A wonderful feature introduced with Cubase 4.0 is the Folder Track. This is a way of reducing the clutter associated with a large number of Tracks in the Arrange window, and also of simplifying use of the Track Mixer window.

Folder Tracks can be used in many helpful ways, but a good way of grasping their potential is by considering how your arrangement breaks down in terms of sections. For example, if you are composing an orchestral piece, you may decide that all the various string sounds you are using (violins, violas, cellos and so on) can be regarded as a section – that is, as a single mixable entity. If you create a Folder Track (called, say, 'Strings') and place all the associated Channels inside that Folder, then not only can you temporarily hide

them within the Arrange window, you can also reduce the number of (temporarily) visible Channels in the Track Mixer merely by closing the Folder. If you are using a lot of instruments – and under OMS it could be several hundred! – then the Track Mixer can be wider than even two 21-inch monitors can display at once. But it also means that, provided you have mixed the components of the Folder relative to one another, you can then close the Folder and use only the ‘Strings’ fader within the Track Mixer to control them all at once. This is the same as using the Group Mixer with Audio Tracks and offers the same convenience.

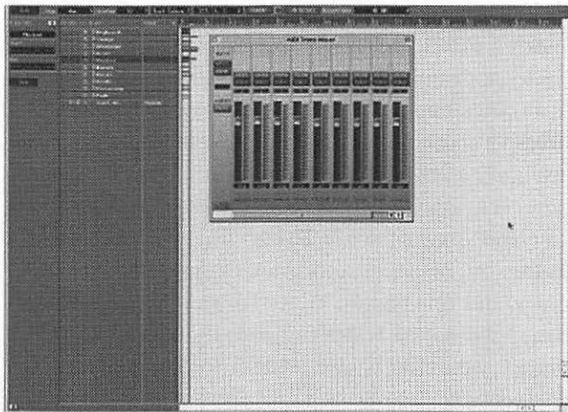
There are times when it’s useful to group instrument Tracks into a single Folder. For example, when you lay down all your drum and percussion Tracks, you could put all of those Tracks into a single Folder. Or, if you want to experiment with different takes, you could group them into a single Folder as well. This is also a good way to Solo and Mute several Tracks easily as well as edit and mix several Tracks as one entity. Consistent with all Mac applications, Cubase Folder Tracks can contain any type of Track, including other Folder Tracks.

Folder Tracks are created just like any other Track. Simply select Create Track from the Structure menu, pull down the pop-up menu in the C column for the

newly created Track and select Folder Track. You'll see a folder appear in the C-column indicating that the Track is a Folder Track and you can name it just like any other Track. You can move any type of Track into a Folder by using drag and drop or by using the Structure Menu. Just click on a Track that you want to move in the Track List and drag it into a Folder Track. Tracks inside a Folder can be edited as one entity by selecting a Folder Track and opening an Editor. However, which Events are shown in the Editor depends on the classes of the Tracks within the Folder. With instruments grouped in folders, you can also pre-mix each of them and then have to 'master mix' only the Folder in the Track Mixer.



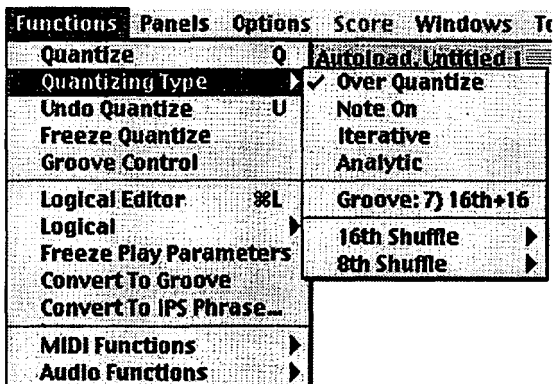
Option-Command-clicking on a single Folder within the Arrange window will open or close all of them at once (Above: Folders open)



Folders closed

quantise

In music, perhaps more than anything else, timing is everything. Without it, your whole composition and performance falls apart. That's why one of the most-used features in Cubase – no matter what style or genre of music you play – is the Quantise function. Although we have looked at this function briefly in earlier sessions, it's definitely worth getting to know it on a more intimate basis. Cubase offers a number of different types of quantise functionality but in principle, what quantising essentially does is shifts notes on to, or close to, the division of the bar set in the Quantise box.



When working with MIDI, you select the quantise type from the Function menu, and you'll note that there are five basic quantising types.

- **Over Quantize:** This is the one you'll probably use the most since it's the Cubase equivalent of a spell-check, or 'auto-correct'. What it does is move your notes to the closest quantise value without changing the actual length of the notes themselves. It also detects if your playing is consistently behind or ahead of the beat and will quantise your chords in a reasonably intelligent manner
- **Note On:** This is probably the least musical method since it uses the Note On element of notes to shift them to the nearest quantise value without giving

much thought to context. It's supposed to leave your original note length unchanged and essentially, it quantises the start positions of the notes just like Over Quantize. But since it doesn't move the end positions, in effect, the note lengths are adjusted slightly

- **Iterative:** This is a good choice if you want to clean up your timing but don't want an overly rigid or precise feel to the music. Instead of moving a note to the closest quantise value, this option moves it only part of the way, and you get to specify how far the notes should be moved towards the selected quantise value with the parameter **Iterative Q: Strength Percentage** in the **MIDI Quantise Preferences** dialogue. In the same dialogue box you can choose **Don't Iterative Q Notes Closer Than**, a value in 16th notes and ticks, which tells Cubase how far to shift notes that are not close enough to the quantise value. Since only notes further away than the specified value get moved, you can allow for a certain amount of 'loose' timing while still being able to tighten up those really dodgy notes
- **Analytic:** This option corrects timing glitches according to an intelligent analysis of your music based on the quantise value and the music's actual characteristics. You'll want to use this option with complex rhythms and solos

- **Groove:** As the name implies, this option is used to create a rhythmic 'feel' or 'groove' rather than simply correcting errors. What it does is compare your music with a 'groove' pattern and then moves notes so that their timing matches that particular groove. You can create your own rhythmic templates or Groove Maps or you can use the selection of grooves included in Cubase VST

In addition to these five quantising types, Match Q is a special function found in the Arrange window Toolbox designed to impose timing and an overall 'feel' on a particular Part. It also works when dragging an Audio Part onto a MIDI part

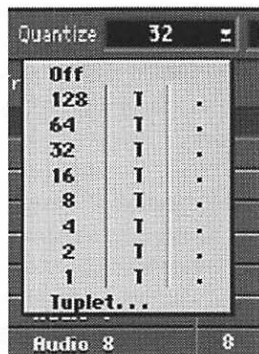
The three quantising types you'll probably use most in Cubase are Over Quantize, Iterative Quantize and Groove Quantize. With MIDI parts, quantise affects only the notes and leaves other kinds of MIDI messages unchanged. Apart from Iterative, your original notes will always be used for calculating any subsequent quantising since none of your MIDI data is changed permanently.

To quantise audio, you're better off working in the Audio Editor rather than trying to do it in the Arrange window. Also, you can use only Over Quantize and Groove Quantize for most audio work, although Match

Quantize can be used to push the timing of audio material onto MIDI data and vice versa.

quantise value

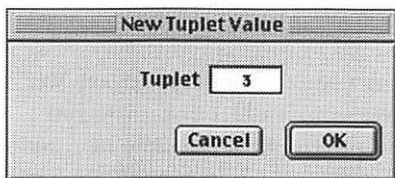
You can decide how accurately – or roughly – to quantise you tracks by setting a value in the pop-up menu in the Status Bar of the Arrange window.



Quantize Value menu

If you select Off, obviously no quantising will take place. The number in the column below the Off option selects basic note values ranging from 1 (or a whole note) to 128 (or a $\frac{1}{128}$ th note). To put it as simply as possible, the larger

the number you choose, the more accurately Cubase will quantise your notes and the grid that it will quantise to will be that much finer. If you choose a large number, Cubase will quantise to a large grid and the match will be less precise. If you drag the mouse to one of the columns on the right, you can add a 'T', which will result in a Tuplet, or, if you select a '.', the result is dotted.



Generally, you'll want to set the Tuplet value to 3 so you'll be able to use triplets for quantise values. Okay, that's great if you understand music theory and notation, but if you don't, just think of the value menu as a graduated control and experiment with the sounds that you get using different settings.

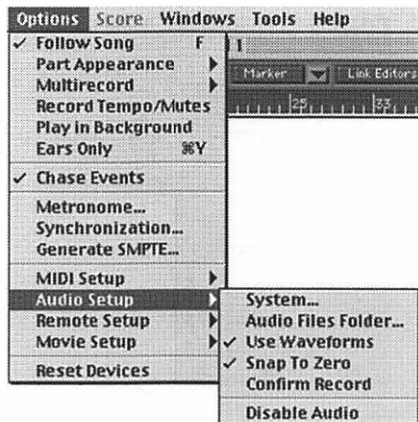
So how do you know if you've used the right quantise option? Simply listen to the result. Is it the sound you wanted? If it is, then you've made the right choice. If not, it's easy enough to go back and try some of the other options.

multitrack recording

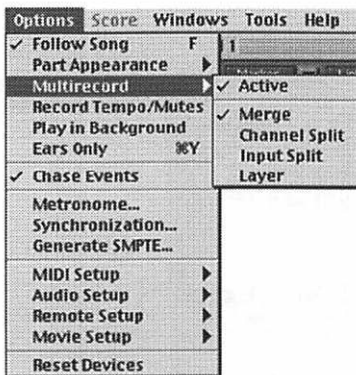
Among all of the cool features of Cubase, there's a function called Multirecord that can seem like a bit of a mystery to dedicated non-manual readers. Although I've been told that this is a popular subject in Steinberg Technical Support, you can get your head around this in a few easy steps and there probably are occasions when using Multirecord will make your recording life a lot easier.

So, what can you do with Multirecord? Well, to begin with, Multirecord enables you to record a band, or number of players, all at the same time and still have their performances appear on one Track each. This can be particularly useful if the Audio Channels you are about to record on are not directly related, but you still want to record them at the same time. If you have a keyboard or other MIDI Controller that can transmit on several MIDI Channels, Multirecord enables you to record different MIDI Channels on to different Tracks. Multirecord also enables you to 'layer' several MIDI sounds and record them on one Track each.

To set up Multirecord, go to the Options menu and select Audio Setup and then System. This will launch the Audio Setup window. Make sure that you have the correct card and driver selected, then close the window.



Go to the Panel pull-down menu and select VST Inputs. At this point, you'll see a list of the inputs that your audio card is capable of activating. The only thing that might throw you off here is that everything is listed in stereo pairs. Example: Channel 1 = IN 1 L, Channel 2 = IN 1 R. This can get extremely confusing, so what you can do to combat the confusion is rename the inputs as simply Input 1, Input 2 and so forth. Now you can set up the Multirecord. Go to the Options menu and select Multirecord. Basically, what you want to do in this case is make sure that Multirecord is set to both 'Active' and 'Merge'. This will ensure that not only will you be able to Multirecord, but also that everything recorded will be recorded to its own Track.



Routing the Audio is the next step. You will notice when the Audio 1 Track is selected, the Input that is selected on the far left is Input 1. Audio 2 will be Input 2. When you get to Audio 3, or further, you will notice that the input that is selected for that Audio Track is Input 1 again. This obviously will not do. So, all you need to do is select a new input for Audio 3. This is done by holding down the Command key and selecting a new input. For example, Audio 3 should be set to Input 3, and Audio 4 should be set to Input 4. You will want to repeat this until all eight of your Audio Tracks have their own selected Audio Input.

Now the setting-up is complete. In order to start multirecording your audio, just 'Enable' the Audio

Tracks that you want to record onto and you are ready to go. As you can see, multirecording is easy to accomplish with just a few quick set-up steps.

samplers

Ever since the the Musicians' Union at the BBC complained about the use of 'synthetic orchestras' when the Mellotron first came into use in the '60s, the use of virtual orchestration has been gaining in popularity and realism. When the Fairlight CMI brought digital sampling to the musical world in the early '80s, it brought unprecedented capabilities that are now commonplace. While an increasing amount of contemporary music relies heavily on sampling, producers and audiophiles seem to delight in maintaining a barrier of mystique around a process that, conceptually at least, is really very simple.

A sampler is essentially like a synthesiser into which you can record your own sounds to use as raw material rather than relying on a set of factory samples or waveforms. Unlike the permanent ROM-based sounds in synths, samplers store everything in RAM memory, so when you turn your machine off, you lose all your sounds. Obviously, some form of larger permanent sound storage facility like a hard drive or a removable

drive such as a Zip or Jaz drive is essential. Otherwise, you'd have to sample a new sound every time you switched on, which can be extremely frustrating and tedious. Most samplers come with a built-in floppy drive, but you can be sure that this will be far too small for most serious sampling work. Unfortunately, the most common samplers also have their own floppy disk format, so you can't duplicate these floppies in your Mac's floppy drive – if you still have one – or transfer your samples directly to your computer's hard drive.

When semi-affordable samplers first came onto the scene in the late '80s, everyone went around smashing bottles, hitting pans, recording the dog and doing all sorts of other wacky things to come up with new musical sounds. With a sampler, often even the most mundane sound can be transformed into something musically useable by shifting it out of its usual pitch range. To make these sounds play back as chords, the sampler needs to work polyphonically in the same way as a synthesiser and, just as on any synth, there's a limit to the polyphony.

After the novelty of sampling the dog barking or cousin Cletus burping, most serious musicians figured out that if they could sample individual notes from instruments, they could also, given enough RAM, sample entire

musical phrases, or whole bars of drum rhythms. That's partly why sampling whole chunks of music is the cornerstone of modern dance music, which is generally built up from a series of drum loops. The term 'loop' here simply refers to a sampled section that can be repeated to form a continuous piece of music. However, you wouldn't normally loop this in the sampler – you'd trigger it once a bar.

Using samples with Cubase can really enhance your final outcome. But, as with so many things to do with digital recording be aware that working with samples always requires more memory than you'd imagine and, more often than not, always needs more than you have. The figure to keep in mind is that a mono sample lasting one minute will require about five megs of RAM at the CD sample rate of 44.1kHz. A minute may seem like a long time, but recording stereo samples will halve the available time. What's more, if you use the sampler multi-timbrally, the memory will have to hold several sounds at the same time, which further reduces the length of individual sounds. As if that wasn't bad enough, some instruments have to be sampled every few semitones in order to create a set of samples that sounds convincing over the entire keyboard range and, again, this takes memory. The good news is that RAM is now relatively cheap and most modern samplers let you

add regular computer RAM rather than expensive proprietary memory boards. So even if you're working on a tight budget, it's worth filling your sampler to capacity as soon as possible.

The process of sampling isn't difficult, but it can be incredibly time-consuming, especially where multi-sampling or looping is required. Loads of high-quality instrument sounds are available from sample libraries provided by companies such as Time & Space. Although sample CDs and CD-ROMs can be expensive, they relieve you of an enormous amount of work. And when it comes to orchestral sounds, for example, few struggling musicians would have the resources to create these for themselves, let alone hire in an orchestra. CD-ROMs do all the looping and keygrouping work for you, while CDs contain audio samples alone, which you still have to loop and organise into keygroups – so I'd strongly recommend that anyone without a CD-ROM drive gets one as soon as possible. Most library CD-ROMs are supplied in a format suitable for Akai samplers, but current Roland and Emu models will usually read each other's formats without too much trouble.

If you get into using a sampler, you will discover that most sounds can become quite unnatural when

transposed too far from their original pitch. Although this can sometimes be a creative advantage, in most instances you probably want an instrument to sound as realistic as possible, especially pianos and orchestral instruments. The only way to maintain a natural sound is to take several samples of the instrument at different pitches, then use each sample over only a limited part of the keyboard. Ideally, you'd take a fresh sample every semitone, but that gobbles up loads of memory and takes forever. In practice, using the same sample over a range of three or four semitones is generally accurate enough even for the most critical instruments, and often you can get away with far fewer samples. Pianos are very critical, but things like bowed strings and wind instruments are more forgiving. To get the most natural sound possible, even though you're playing from a keyboard, try to play instruments with the style and intonation that they're played in real life, so don't play chords on instruments like flutes or other instruments that aren't naturally used for chords.

Sample CDs come in a number of different formats and it's important to know which format will be best suited to your budget and your studio set-up before you buy. This most basic, and therefore the cheapest, way of presenting sounds is on a sample audio CD like the ones you play in a normal audio CD player. Nearly all

releases support this format and it does allow quick access to all the tracks, plus it's an excellent way of auditioning sounds before you fire them into your sampler. On the downside, you do have to do all the sampling, editing, looping and programming of the sounds yourself. And if you're sampling the Mormon Tabernacle Choir or The New York Philharmonic string multi-samples, this can be a real pig to get right and often requires an in-depth knowledge of your chosen sampler platform that borders on the geeky and requires the patience of a particularly patient saint. Some sample CDs consist of longer drum loops or instrument grooves and these are often easier to deal with in audio format than say, a CD's worth of complex orchestral or piano samples.

The best and most efficient way of presenting sampled sounds is the CD-ROM. The main advantage is that CD-ROM stores all the sounds – as well as programmed data, loop points, crossfades, and pre-set names – as good old digital information, which can be fed directly to your sampler via SCSI. Once your CD-ROM is in your sampler's SCSI chain it can be treated like any another independent (read-only) hard drive. Loading up a pre-set or group of pre-sets from a CD-ROM is an extremely quick and easy procedure and, of course, gives you all the sounds you need edited, named, assigned to the

appropriate keys and ready to play straight away. The main disadvantage of CD-ROM samples is their relatively high price. You'll find it's not unusual for sample ROMs to retail around the £150 (\$200) mark, as opposed to their audio equivalents which sit around the £60 (\$90) mark. But, then again, where else could you get a full symphony orchestra to perform on your track for less than half the price of a basic effects unit?

The other main format, which is becoming increasingly popular particularly in the budget section of the market, is the Mixed Mode CD-ROM. As its name implies, this format contains both conventional audio recordings and sample data stored so that it can be accessed via SCSI. These days a common mixture of the two can be found, for instance, in the 'Creative Essentials' library from Time & Space, where, as well as audio files that can be auditioned and sampled from any CD player, the raw sample blocks are presented as WAV and AIFF files so they can be accessed directly by a Mac or PC.

In practice, as a musician, just try to remember that an 'open-minded' approach works best for any sample CD sound source. Don't instantly assume that the sounds you'll end up using in your track will be anything like the CDs you sample from. Keep in mind the vast

number of effects options available with even the humblest sampler. Try to use sample CDs less as a pre-set-bashing exercise and more as a platform for creative experimentation. For example, instead of loading up an entire program of string or choir multi-samples, why not just look at a single sample? What might it sound like an octave higher, or lower, and what happens when you play around with its ADSR envelopes? Could that single cello sound with the sharp attack work nicely as a grindy techno bass noise? Or could you drop it by a few octaves, add a long release time and use it as an underscore for the next series of Roswell High?

If your sampler allows you to play with any resonant filters, think about what effect these might have on the overall sound. This is a particularly common effect used on dance drum loops where the same sample is assigned to a number of different keys, each with a slightly more open filter setting than the last, restricting the top end of the sound. The effect is of a drum loop starting as a sort of distant low-fi grinding noise, each cycle becoming louder and more defined, until the sample is playing back at full bandwidth in all its glory. A neat trick that requires little programming.

Everyone gets stuck in creative ruts, and one of the most enlightening experiences is to watch someone else work

with the same sounds and approach things from a completely different point of view. This also applies to Cubase in general and it's always enlightening to see how other musicians and producers work. Although sequencers and samplers don't normally allow more than one person to work on them at a time, musical collaboration is perhaps more relevant now than it ever was. So don't be shy about inviting like-minded individuals round for an afternoon of playing with your sample CDs to see which sounds they find most interesting. With experimentation in mind, don't be afraid to really get stuck in with external effects processing or even maybe even resampling the same sounds with additional effects. You'll need an additional hard drive or removable drives to store your new versions of sounds, but you'll be surprised at just how much life you can breathe into even the dullest drum loop or bass groove if you beef up the EQ, add some compression, chorus, and perhaps a touch of distortion, mix it to DAT and rerecord it as a new sample.

While software packages such as Steinberg's ReCycle can be a big help in regrooving old samples, fairly simple cut-and-paste editing within your sampler can give you the constituent beats of a loop, which you can then reprogram with a completely new feel, tempo or groove. Once you're happy with the loops, drop them

down to DAT (or similar), with a suitable effect if need be, and resample them as single one- or two-bar loops. And don't be afraid to mix and match your samples. Releases that offer you groove tracks complete with drums, bass and keyboards are often more flexible than you might think. Don't assume that the sax solo from track two, for instance, won't sound great over the drum and bass line from track 24.

There's no doubt that as sampling becomes a bigger and more influential part of our musical lives we will see more and more sounds released in the sample CD format. Some manufacturers even provide downloadable sounds from their Web pages. The most creative implements in the samplist's toolbox are the ones stuck on the sides of your head. If it sounds right, it is right. You might even find that the most useful samples come from your own recordings since the samples will generally display the right style and right kind of character to fit the music. So, maybe it's not a sample manipulation technique as such, but get used to listening for those golden moments in your own material. Sampling extracts from your own music and running them through EQ and effects could send you off on an unexpected journey – if not a completely weird and twisted trip.

studio sessions

part four

'There's a lot of stuff in there that I never use. I go through the menus, and there's just a lot of things I have never even gone into.'

– Moby on using Cubase

In the weird world of audio recording, it's generally agreed that the word 'mixing' means two different things. On one hand it's the process of adjusting the fader levels, balance, equalisation and other settings so that the live sound is properly recorded in the first place. On the other hand it is also the art of turning the live sound you've recorded into a finished, polished masterpiece that's ready to listen to. Okay, so you might argue that I'm splitting hairs here, since the second step involves much of the same kind of adjusting, balancing and so on as the first and, particularly with programs like Cubase VST where these boundaries and processes are conveniently blurred, it might be difficult to see where the boundaries are. I suppose you could say that the techniques and skills involved in recording are more

prosaic, while mixing tends to border on the poetic. Mixing down from multiple tracks to stereo is the second step of the overall process of making a finished song. With Cubase, you'll basically be flipping a few virtual switches on your Mixers, turning it from a recording console to a mixing console. As in cooking, you add seasoning, such as effects and EQ, to taste.

While many people focus on the recording part, most of the creativity and personal satisfaction of the entire recording process can often come in the mixing session. It's the same reason that some people would rather be film editors than cinematographers, I suppose. Mixing is where all the hard decisions get made and can make the difference between a workmanlike recording and a masterpiece of sound. When you finish your mix, you'll need to think about mastering it to a medium like DAT or CD. This also takes some special skill but it's also something you pick up with experience. Before the modern era of multitrack tape and the eventual evolution of desktop digital studios, recording and mixing were essentially part of the same process. You had to get a good balance between the voices and instruments and the best possible sound right there at the session because there was no way of making adjustments later. In these sort of situations, the final recording simply needed to

sound as close to the original as possible. Although that still might be your personal final goal, with Cubase and your Mac you have a lot more flexibility in how you lay down your tracks and how you ultimately mix those tracks to create your own personal sound. When you record, basic monitoring facilities can provide you with a reasonable 'ear' for adjusting a range of things such as level, pan and auxiliary sends. And since with Cubase you'll hear exactly what is on your Tracks as you progress through the recording, if your monitor mix sounds good, you can be reasonably sure that your final mix will sound great. You should regard everything you do as being part of the finished product and make it as perfect as possible.

Ideally, as a musician working with Cubase you'll probably want to start the mixing process as soon as your project gets off the ground. You should have a pretty clear idea of the sound you're aiming for, as well as allowing for a certain amount of scope for creativity and synchronicity – depending on the nature and style of your song. If it's a dance record, for instance, you need to understand the style well enough to know the elements of the music your audience demands and you should always look for new and different sounds and textures to add to those elements to push your particular style that bit further. One of the great

advantages of recording with Cubase on your Mac is that you're completely in control. You're the one who knows how every step of the preparation and recording process is going to contribute to the final mix. This means that without the interference of an extraneous engineer or producer, in theory the mixing stage should be straightforward and painless. However, in practice what this really means is that, among other things, you are totally responsible for getting the arrangement right and selecting the right sounds, making sure the musicians are playing in time and in tune, and obtaining a good performance from the singer by whatever means necessary. If there is a problem in any of these areas, you can only turn a deaf ear to it for so long. And that's about as long as it takes you to get to the mix. Any problems present in your tracks at the mixing stage will have to be somehow disguised, covered up or fixed – if possible. But, as mentioned earlier, because of the enormous power and functionality of Cubase, you should be thinking about 'fixing' things as you go along, and if there's a problem with a performance or with the way a particular track is recorded, those problems should be corrected as soon as they occur. Remember: this is your studio and you're the one that has to play producer and engineer as well as, perhaps, writer, performer, arranger and more.

As more tracks are added during the recording stage, you can be actively working with a mix that may bear a passing resemblance to your finished product. The monitor mix is what you listen to during the recording process and, with Cubase, it's usually good enough to enable you to get a proper feel for the music and good enough to give you a reasonable idea of how the recording is shaping up. In Cubase VST, monitoring simply means listening to the signal being recorded while you're recording, and the exact monitor mix you get will depend a lot on how you've configured your own personal system. As mentioned in Chapter 5, you've got three choices for monitoring in Cubase: via an external mixer and audio card; via Cubase VST where the audio passes from the input into Cubase and back to the output allowing you to control monitoring via settings in Cubase; and directly via your audio hardware where your Mac's audio input is connected directly to its output. You can either do this manually by activating the 'through' or 'monitor' feature on your audio card using the card's ASIO Control Panel accessed through the Audio System Setup dialogue, through the Sound Control Panel in the Apple menu in the Finder, or in a mixer application that might be bundled with your card. Otherwise, if you have ASIO-compatible audio hardware, you can monitor via ASIO Direct Monitor.

Obviously, monitoring via Cubase direct has an advantage since any Effect you apply or other setting changes you may make while recording will also be 'accessible' on the monitored signal on both the recordings you've already made and the playback. If you monitor directly via your audio hardware then this method won't work. The primary disadvantage of using this method is that there will be a certain amount of latency, that unavoidable delay in the monitor signal that we've already looked at. However, latency depends on your audio card and its drivers, and cards with separate ASIO drivers may have a low enough latency to give you a signal accurate enough for monitoring. When you go looking for an audio card, make sure you ask about latency – and make sure your dealer understands what you're talking about. Although most cards now are pretty good, you'll still find dealers tend to skirt round the whole issue of latency and respond to questions about as directly as politicians playing dodge-ums with Jeremy Paxman. If you decide to use Cubase monitoring, always make sure that there's no monitoring or 'through' function activated in your audio hardware mixer applications. With some audio hardware, including your Mac's built-in audio, you can change settings at any time using the ASIO Control Panel found in Cubase VST's Audio System Setup dialogue box.

A fairly traditional style of album recording involves putting down all the basic tracks, overdubbing other instruments and vocals, and then taking a break for a few days before starting to mix the whole lot. The main disadvantage of constructing a whole song at a time, all the way from basic tracks to mix, is that your ears will go woolly and you can easily lose perspective and artistic judgment. Over-familiarity with your song and the recording can mean that you won't be able to judge it in the same way as a punter would. Taking a break between recording and mixing means that you can come back to the song with fresh ears and hear very clearly which bits need to be brought out and which elements play an important, but perhaps subservient, role.

How to mix is fairly straightforward. However, what 'makes' a good mix is a bit trickier to say. Since you're not a sound engineer, using Cubase as a musician means that you don't need to know all the details of how to mix. But as a musician, you do need to be able to recognise when something is right and be able to understand what's missing when it isn't. You need to keep in mind the purpose of your mix. Is it a dance floor mix that should sound great on a club PA? Or is it intended for CD listening at home? Depending on your style and approach, you may even want to do a radio

mix emphasising some sort of 'buy me' factor – whatever you think that might be – that will attract particular listeners to your particular release.

As a housekeeping rule, always sit in the optimum listening position directly between the speakers while mixing. Once you think you've got the sound you want, you'll probably want to wander around the room so you have an opportunity to hear the mix in less than perfect conditions – which is exactly the way the record buyer tends to hear it. Different people listen to music in different ways: in a club with the bass turned up to stomach-pounding volume, on an average home hi-fi, on a car radio in heavy traffic – with a hole in the exhaust. Ideally, your mix has to sell the song in each of these situations, so you'll need to be looking for the overall impact here. If the mix sounds good from any listening position in your studio it's probably okay. Proper monitor speakers will give you a true-ish representation of your sound. But you should also have a cassette copy made so you can check the mix on a cheap stereo system, on a Walkman, or in the car. The more ways you can listen to your mix, the better.

Once you've done your mix, you'll want to transfer it to DAT or burn it onto a CD. Recording geeks still whinge that DAT isn't always entirely satisfactory because it's

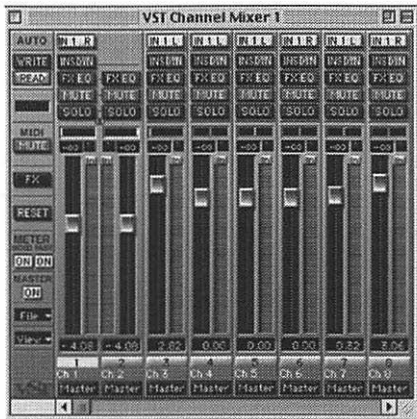
only 16-bit, which means that its sound quality isn't any better than the CDs people listen to at home. Personally, I tend not to worry about things I can't hear. Most work I've done in traditional studios is still dumped to DAT, and CD masters produced from them haven't been noticeably inferior in any way, shape or form. And, despite the warnings about mini-disks in earlier chapters, in a lot of cases these also will work just fine.

Keep in mind that the mix is an evolutionary thing. Virtually every song we do in Cubase, we work through to the mix. The great thing about Cubase is that you never have to get to a stage where everything is finished before you start mixing. It simply evolves in the process.

Okay, even though you can't really separate the mixing process from the rest of the recording process, it is, of course, the one magical point where all your previous efforts finally come together. And, whether we like it or not, the mix can make or break your finished song. In Chapter 6 we looked briefly at the various mixing desks included in Cubase as well as their basic functionality. Now let's see how you can use them a bit more efficiently for the final mixing process and turn our tracks into something splendid.

VST Channel Mixer

When it comes to mixing, if your Mac was the USS Enterprise, Cubase's Channel or Monitor Mixer would be the bridge. Like the huge hardware consoles in expensive commercial studios, this is where the real work of mixing gets done in your virtual studio.



The VST Channel Mixer. To make fine volume adjustments, hold down the Shift key as you move the faders

On mix-down, as well as during recording, the output level of each Audio Channel is controlled either with the faders in the VST Channel Mixer or with the Dynamic

Volume Events in the Audio Editor. In the VST Channel Mixer, each Audio Channel has an accompanying fader for volume control, and you can also use the Mute and Solo buttons to silence one or several Audio Channels. The faders determine the final output level of your stereo mix. If you want to hear only the audio playback, click on the MIDI Mute button to the left in the VST Channel Mixer and this will mute all MIDI playback, letting you concentrate on mixing the audio.

talking volumes

The Volume fader for an Audio Channel is 'mirrored' in the Inspector, so any volume changes you make in the Inspector are reflected in the Channel Mixer and vice versa. Incidentally, remember that only the left-channel volume for stereo Audio Tracks is displayed in the Inspector. You can use the Channel, Group and Master faders to set up a volume balance between the Audio Channels and perform a manual mix by moving the faders and other controls while playing back. You can also use the Write function to automate fader movements and other VST Channel Mixer actions. This means that nearly any action in the Channel Mixer window can be automated by 'writing' them into a special Audiomix Part. When you come to play this back, the Part will repeat your fader movements

and button presses just like you performed them and you'll see the faders and buttons move on the screen – just as you would see on expensive commercial mixers with motorised controls. While the Write button is active, every volume, pan, mute or solo movement you make will be recorded. The Write button also works in Stop mode as well as during playback, so if you activate Write when Cubase is stopped, all changes you make to your mixer parameters are recorded at your current Song Position. You can use this functionality quite creatively if you need, say, initial mixer settings or abrupt changes and so on. To go back and see what you've actually done, activate the automated playback by clicking on the Read button in the upper-left corner of the Channel Mixer. Cubase allows you to have Write and Read activated simultaneously so you can watch and listen to your recorded mixer actions while you're recording fader movements for another Channel.



If you select Undo from the Edit menu, all actions recorded since you last activated Write will be undone. It's a good idea, therefore, to get into the habit of always deactivating Write after each recording 'pass' and listening to what you've recorded. If you find all this daunting, you can make separate Audiomix Parts for the different Audio Channels or recording 'passes' and edit/delete these afterwards. Although Cubase creates only one dedicated Audiomix Track, you can structure your Mixer Automation into different Parts for different Channels. You might find that this makes it easier to edit and redo mixer recordings you're not particularly satisfied with. To use this method, record your fader movements and other mixer actions for the first Audio Channel. Then deactivate the Write function and go to the Arrange window and make a new Mixer Track. It's a good idea to name it after the Audio Channel you just mixed to avoid any confusion later on. After you've done that, move the entire Audiomix Part to the new Track. Open the Channel Mixer again, activate the Write function and record your mixer actions for the next Audio Channel. When you do this, Cubase creates a new Audiomix Part on the original empty Audiomix Track. If you activate the Read function, your previously recorded Part will be played back from its new Track so you can watch your recorded fader movements while you continue with

any new Audio Channels and you can repeat these steps for as many Channels as you like. What you'll end up with is a number of Mixer Tracks playing back simultaneously and affecting different Audio Channels in the Channel Mixer. From here, you can either keep it that way if you like it, or, if you like a clean Arrange window you can Merge the Parts into one or put all the relevant Tracks in a Folder Track.

automating

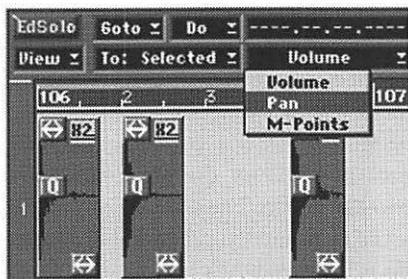
Mix-down in Cubase VST can be completely automated and the following parameter settings can be recorded with the Write function for each Channel:

- Volume
- Pan
- Mute
- EQ Bypass switch
- Settings for 4 EQ modules
- 8 x Effect Send Active switches
- 8 x Effect Send levels
- 8 x Effect Send PRE switches
- Effect Send Bypass switch
- 4 x Insert Effect Program selection
- 4 x Insert Effect parameters (the 15 first parameters for each Effect)

panning

When you're mixing, you've got to decide where in the mix you want each of your instruments, vocals or sounds to be positioned. This involves panning sounds and instruments to appropriate positions in the stereo mix to achieve the desired level of depth and texture. Although panning can be used quite creatively, as a general rule, vocals, bass drum, bass instruments and, often, the snare drum are usually panned centre. In some types of music you may want to pan the snare slightly off-centre. Vocals can also be panned a little to the left or right, but tend to sound better if there's a balancing vocal or similar instrument panned to the opposite side. Other instruments like guitars, brass, keyboards, backing vocals and so on can be panned to either side. Remember to pan stereo effects like reverb fully left and right if you want to create 'width'. Of course, you can pan any instrument, vocal or pad sound back and forth in your mix depending on the effect and 'movement' you're trying to achieve. As with volume, the pan or stereo position of each Audio Channel can be controlled with the Pan controls in the Channel Mixer or with the Dynamic Pan Events in the Audio Editor. Pan controls in the Channel Mixer pan sound between the left and right side of the assigned stereo output bus. If you want to make fine Pan adjustments, hold down the Shift key when you move the Pan control. To select centre Pan position, hold down the

Command key and click on the Pan control. To select whether volume or pan should be shown in the Events, select your Audio Part in the Arrange window and double-click on the Part to open the Audio Editor. Pull down the pop-up menu immediately right of the To: Selected button and select the Pan option.



Remember, as mentioned in Chapter 6, that dynamic data affects the segment that the Event plays, so even if you have Ghost Events that play the same segment, any changes you do to the volume/pan curve for one of the Events will be reflected in the others.

As a helpful tip, don't rely on the Pan controls to keep your sounds separate. Try to get your mix working in mono first and then start panning the various elements. After you get a rough balance in mono using no EQ you

can start playing around with the fine-tuning. When you're actually recording, try to make your up-front sounds slightly brighter while keeping background and supporting sounds less bright. Since it's always easier to cut frequencies using EQ than to add them later, just make sure you've got enough top end in your various recordings. To keep that contrast in your mix, don't process everything. If you do, you'll just end up with a muddy cacophony of competing sounds – or something that sounds vaguely like hip-hop.

disk space

Remember that most digital editing performed in Cubase is non-destructive. In other words, nothing is deleted from your hard drive until you want it to be – even the bits of audio you may have chopped off and forgotten about. This could mean that you end up using much more space on your hard drive – often up to 50 per cent more – until all of the unwanted audio is deleted. Of course, it's best not to do that until your track is completed.

effects

In Chapter 7 we looked at how Cubase handles Effects, and briefly touched on some points to consider before

adding Effects to your tracks or final mix. Although apart from EQ, Cubase enables you to apply Effects in three different ways, for most musicians, the Send Effects option is probably the most common choice for applying Effects to your mix. You can use up to eight Effects and when you use Send Effects, audio is routed through the Effects processors via independent Effect Sends for each Channel – just like on a real mixing desk. The output from each Effects processor is then routed to one of the buses or the master faders where you can mix it with your ‘dry’ signal if desired. You’ll probably find that Send Effects is a good choice for adding Effects such as echo, reverb, chorus and so on where you’ll want to be able to balance the mix of dry and effected signals. When you use this option, effects are mono in/stereo out.

The Insert Effects option is also readily available on all Audio Channels in the Channel Mixer and inserts Effects into the signal chain of an Audio Channel. This means that the whole Channel signal passes through the Effect, which makes inserts suitable for Effects for which you don’t need to mix dry (or direct) and ‘wet’ (processed) sound. A good example of this would be using distortion, filters, EQ, noise gating or other Effects that change the tonal or dynamic characteristics of the sound. Because of the way the signal is routed,

unlike with the Send Effects, the signal level going into the Insert Effects is not affected by the Channel fader level. The Cubase manual says that you can have up to four different Insert Effects per Channel, but the number of Effects you can actually use is restricted only by the processing power of your particular Mac.

The Master Effects option is primarily designed for processing you might want to use for a final stereo mix. Up to four stereo in/stereo out Effect processors can be added to the signal on the the final stereo mix but there is no facility for mixing dry/fx signals like there is with the Send Effects. You'll tend to use the Master Effects for compressor/limiter Effects, noise suppression units, loudness maximisers and so on. As mentioned in Chapter 7, you can get a whole assortment of these plug-ins from third-party suppliers.

the plug-in effect

Some Effect plug-ins may have a certain delay which will be particularly noticeable when you use them as Insert Effects. If you experience delayed audio playback from Tracks with Insert Effects, you should activate Plug-In Delay Compensation in the Audio System Setup dialogue. When this option is activated, the playback timing of the delayed Tracks is adjusted to

compensate for the delay in the plug-ins. You may also need to activate this option if you're using the Channel Settings VST Dynamics panel. Even though these aren't accessed as Insert Effects, technically they are just that and may cause an audible delay.

EQ again

Although some people do insist on adding EQ while recording, as a general rule, it's best not to. One good reason for this is that when you do a mix and find out that it's not what you were hoping for, you can go back to a bland sound canvas by resetting your EQ to flat and starting again. Another is that there's no way that you can really know what EQ a sound finally needs until you hear it in context with the rest of your mix. And trying to EQ an already EQ'd sound can create some ugly noises. Remember, some sounds in your mix will have to take a back seat and won't be heard on their own. So why record them with heavy EQ as if they were up-front solos?

As any producer will tell you, EQ can make or break a mix. Just as a painter will mix primary colours to accentuate certain areas of a painting and draw the eye across the page, so too will the producer mix high, low, and midrange frequencies to achieve subtle colourings

of tone that any good mix demands. Often when you listen back to one of your mixes, two or more sounds operating in the same frequency can combine in synergy to create a new sound, which is greater than the sum of its parts. This blending of sound creates new timbres, as well as forcing sounds apart. The separation of sounds is important in most dance music as a lot of low frequencies infringe on each other's wavelength, for example, bass lines and kick drums. A lot of jungle producers will pitch up their drum loops to allow low basses to sit comfortably in the mix. The same applies to midrange sounds: snares, hi-hats, and bongos all tend to occupy a similar wavelength and will need to stand out from each other. EQ can vastly affect the character of a sound. But, when used subtly, the presence of a sound can be changed without altering its tonal quality and this is the key to the spacious mixes we are all accustomed to. Like effects, with EQ, less is more, so always try taking away frequencies rather than boosting them.

good sounds

General tips for getting a better overall sound are:

- Always listen to the whole track dry, no Effects no EQ, nothing. This will help you determine where

things want to sit. Of course, if the song you're mixing utilises processed samples, this cannot be done. A relatively effective way to reduce effects on preprocessed samples is to use a limiter or some form of compression. You can also target the frequency band where the sample is most affected, reducing the gain. This, however, can lead to unwanted tonal change

- Thin out pads, backing vocals and acoustic guitar parts with EQ. Perversely, it dramatises the dynamics rather than diminishing them.
- Next door is where it's at... Try going into a different room and occupying yourself with something total unrelated to music. Leave your track going – now see what needs doing
- Smooth the curve. Although not to everyone's taste, this is definitely familiar as the radio-friendly 'pro sound' of most modern records. The polished feel seems to rest in the mid band of the EQ, with producers tending to cut frequencies between 200Hz and 4kHz, chopping the most in the 600Hz–1kHz region. Okay, forget the techie crap: on a graphic equaliser, like the one you have in Cubase, EQ carried out like this forms a smooth upside-down curve, which you can just draw in graphically. Professional producers take down the midrange as middle frequencies have a

habit of tiring the ear and blocking the finer frequencies. This holds especially true on tracks with a profusion of guitar. The 'edge' that's apparently so desirable is not achieved by boosting the midrange (which seems natural) but tweaking the top and bottom frequencies so they interact with contrast

I know I said I wasn't going to get into a lot of techie detail here, but when it comes to EQ, it's at least worth knowing a little of about frequency settings for particular instruments. This will at least give you an idea of where to start with your EQ settings in Cubase and you don't have to worry too much about whether or not you actually understand the science. To begin with, an instrument's sound is made up of a fundamental frequency (the musical note) and harmonics – even when playing only a single note – and it is these harmonics that give the note its unique character. If you use EQ to boost the fundamental frequency, you simply make the instrument louder and don't bring it out in the mix. You should also note that a particular frequency on the EQ – say 440Hz – corresponds directly to a musical note on the scale (in the case of 440Hz, to the A above middle C – hence the expression A-440 tuning reference). Boosting the harmonic frequencies, on the other hand, boosts the instrument's tonal qualities and

can therefore give it its own space in the mix. Below are listed useful frequencies for several instruments:

- Voice: presence (5Hz), sibilance (7.5–10kHz), boominess (200–240Hz), fullness (120Hz)
- Electric guitar: fullness (240Hz), bite (2.5Hz), air/sizzle (8Hz)
- Bass guitar: bottom (60–80Hz), attack (700–1,000Hz), string noise (2.5Hz)
- Snare drum: fatness (240Hz), crispness (5Hz)
- Kick drum: bottom (60–80Hz), slap (4Hz)
- Hi-hat/cymbals: sizzle (7.5–10Hz), clank (200Hz)
- Toms: attack (5Hz), fullness (120–240Hz)
- Acoustic guitar: harshness/bite (2Hz), boominess (120–200Hz), cut (7–10Hz)

TrueTape

TrueTape is a new feature in Cubase VST version 5 offering a unique Steinberg technology that emulates the behaviour of a professional analogue tape recorder. While digital audio recording has loads of benefits, some musicians have expressed the opinion that digital sound always tends to be somewhat 'sterile' and 'cold' compared to high-quality analogue recordings. A few years ago, Neil Young was particularly outspoken about the evils of digital sound. However,

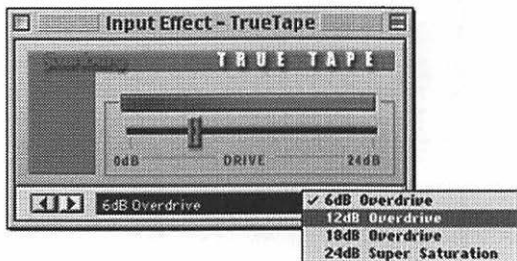
TrueTape claims to remedy this problem by recreating that good-old, open-fire sound of analogue tape saturation at the recording stage. If you're particularly into acoustic music, you might want to play around with this – if your system can handle it, that is.

TrueTape produces 32-bit Float files and all the hard-disk and processor speed considerations of the regular 32-bit format apply here as well. Unlike the regular 32-bit mode, you can make use of the TrueTape mode even if your audio hardware supports only 16-bit resolution. This is because the TrueTape feature converts the signal to 32-bit Float format, and adds audio information in the floating-point domain. However, keep in mind that only Cubase VST/32 can play back TrueTape audio files.



Once you have selected the TrueTape 32-Bit format, you can make settings by selecting VST TrueTape from the

Panels menu, which brings up a Control Panel for TrueTape. You can use the Drive control to adjust the amount of tape saturation effect to your liking and if you're monitoring through Cubase VST you'll hear how the changes colour the sound of the monitored signal. This enables you to try out the settings before actually recording. There's a pop-up menu below the TrueTape panel that enables you to select one of four Drive pre-sets for quick changes. These contain no 'hidden parameters' so selecting the 24dB Super Saturation pre-set is the same as moving the Drive control all the way to the right. Note that any adjustments you make to the Drive control are automatically applied to the selected pre-set. You can also rename a pre-set by double-clicking and typing in a new name. If you raise the Drive level, you'll also raise the level in the audio file and if input level metering is selected in the Channel Mixer you may find that the Clip indicators light up. However, unlike



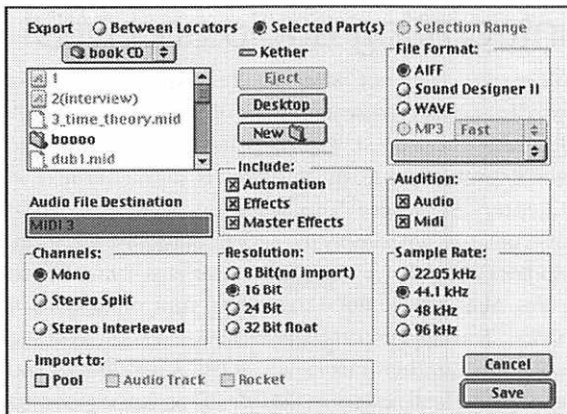
when you're recording in 16-bit format, this is nothing to worry about. Steinberg says it's virtually impossible to get digital distortion in a 32-Bit Float file.

integrating audio and MIDI

More often than not, when you're mixing Audio Tracks you'll also want to use a number of MIDI Tracks as well. Probably the easiest way of doing this, and the one you'll probably use most often, is as mentioned in Chapter 5, where the sounds from the MIDI instruments are simply recorded onto one or more Audio Channels in Cubase, or perhaps onto stereo pairs. After you've done this, mute your original MIDI Tracks, leaving the complete inclusive version as audio only. You can then mix down all the Audio Tracks and master the final results to DAT or CD as you choose via the analogue outputs on your Mac, via the digital outputs of your audio card, or simply by exporting the lot as an audio file within your Mac using Cubase's Export Audio function.

On your Mac, the Export Audio function in Cubase enables you to create stereo files of your whole mix, which you can later transfer to audio CD using a normal Mac-compatible CD-R burner. It also provides a convenient way to mix down several Tracks onto one

Audio Channel or onto stereo pairs to free up space in your audio arrangement or your hard drive so you can extend your recording capacity.



Export Audio window

Make sure you've already set your Locators to the segment or completed Tracks in the Arrange window and have had a good listen to make sure the mix is exactly the way you want it. If you're happy with the mix, pull up the Export Audio dialogue box and set your sample rate, channel options, resolution and so on. You can also decide to automatically import your new file back into the Audio Pool, use automation,

whatever you want to do with it. When you're happy with all your settings, select a folder and a name for your new file and click the Create File button. You'll find that a new audio file is automatically created as a new Part in the Arrange window. Incidentally, you can also use this same procedure for creating a stereo file of your whole mix and you'll end up with a digitally-clean file that will show none of the signs of degradation displayed when audio is traditionally transferred from one medium to another.

Pods

As studios become more compact, solutions for instrument recording follow suit. At present, manufacturers offer a competitive range of amp-modelling hardware and software. The premise of this is simple: a unit simulates the 'genuine' sounds of an amp, including effects. This means no miking up and huge savings on space and money.

The current favourite is the Pod series created by Line 6. A guitar and a bass pod can be had for around £200 (\$300) each and each unit offers pre- and post-EQ effects, a serious EQ and a range of classic amp models. It's possible to create your own user patterns and models as well, which means the classic Marshall valve

you've always wanted can be created with a few tweaks. Even someone who thinks 'Mike' is a good wholesome Christian name will get a sound that engineers train for years to achieve. An alternative to the Pod system comes from the Johnson J Station. This gives guitar and bass modelling with acoustic guitar simulation. Both systems are fully programmable.

and then...

There are a few more things to keep in mind at all times during the mixing phase of your project and if I'm repeating myself here it's probably because it's important – although a touch of early senility isn't out of the question. To begin with, don't constantly mix at high volume. For that matter, don't constantly mix at the same volume. Check your mix frequently using a very low volume and at various mid-level volumes and every now and then crank it up to really hear how things hit hard. Look at your speakers when you do this to help you to identify when you're overdriving them. When the mix is finished, you should listen to it from start to finish at a high level, turning it down again if you need to make further alterations. Your ears can get tired, woolly and even damaged if you listen to loud music for long periods, resulting in a muffled version of the sound that you're listening to. Okay, maybe that

sounds like your parents blathering on about the evils of rock music but, believe me, you don't want to mess with your ears. If you're a musician, you need to keep them in the best condition possible. One final note: a well-arranged and well-tracked song shouldn't require a great deal of fader-riding. You may have to bring up a lead instrument here and there, but that should be about it.

generic recording styles

'A verbal art like poetry is reflective; it stops to think. Music is immediate, it goes on to become.'

– WH Auden

Trying to understand the subtle nuances and permutations of musical genre can stimulate a level of philosophical angst that is remarkably similar to trying to grasp the significance of why kamikaze pilots bothered wearing helmets or agonising over whether or not illiterate people get the full effect of alphabet spaghetti. The dictionary definition of genre settles for 'kind, category, or sort, especially of literary, musical or artistic work'. Not the most lucid or enlightening of definitions, I think you'll agree, but at least it's a place to start.

Although Cubase can be used to record anything from blue grass to hard house, your whole approach and the level of functionality that you'll need to access will vary considerably, depending on the kind, category or sort of music you want to record. In a book like this, it's

impossible to detail all the various permutations for each and every musical genre or to even begin to list the pit-falls and problems you may encounter on the way. So, instead, I've just picked a few general generic areas where I know that Cubase is being used successfully and tried to add in a few extras that you probably wouldn't pick up just from reading the Steinberg manuals. If you want to get into the real nitty-gritty of studio technique and mad sound science, there are a number of other Sanctuary books on the subject covering every conceivable aspect of the process and practice.

dance

Sequencers and dance music are happy bedfellows, and Cubase VST is the ideal recording environment for this stuff. Unfortunately, a generic boundary is a tiny cot to dance's super-king-size double bed. It's impossible to cover all approaches to all styles of dance in a single chapter. There are books devoted to dance genre and all its beat-influenced brethren. So, I'll try to provide only a rough outline of some of the more notable categories.

It's an interesting notion that dance music as it is today would not exist if not for Cubase. Back in the early days, when music was becoming computer based, it was

Cubase and Atari that blazed the frontier with well over 90 per cent of the classic tunes emerging from smoky bedrooms equipped with a Groovebox and an ST. Dance as a general rule exists in the realms of MIDI, drawing its sounds from a vast array of synths. So, sequencers like Cubase are an obvious choice. It's very possible to create dance music entirely on MIDI, but as horizons and CPU power expand, audio is also becoming an integral tool. So – at the risk of sounding old and stupid – here's a very simplistic breakdown of the main dance genres and how (on the whole) they are approached.

house

This is probably the great grand daddy of dance, the blind idiot godfather of limitless permutations. However, house itself is not a single genre but rather a broad heading under which dozens of hybrids shelter.

trance

This is the sharpened product of rave, which emerged as synth potential grew. In many respects, it's simply a four-to-the-floor rhythm layered with electronica and soaring pads. It usually focuses around a breakdown, with either side of the song working on the plus/minus build ethic. A simple riff is repeated and built upon

with the exception of bass breaks and key changes. The integral factor to trance is the depth of the melodies. Trance always attempts the 'epic' and is designed to extract the maximum serotonin at desired intervals.

To get the trance sound you need to start at the drums. Most house uses either the 808 or 909 drum machine. These maps are available on Rolands (the inventors), but most manufacturers offer a similar kit. With the VST plug-in LM9, it's possible to load in multi-samples and create your own drum kits, and 808 samples are readily available over the Internet. So, you have the drum sound. Trance like its father, house, uses a four-four rhythm with syncopated claps or hits and, laid over the drums, dances an arpeggiated bass line. You can create your own with one of VB's synth basses and Cubase's Arpeggiator. The bass line itself need not be too bottom-end heavy as the floor tom carries the really low frequencies. On top of the bass line you need lots of lushly orchestrated pads. With a bit of time and effort Neon can actually create satisfactory results. For a quick pad choose a triangle wave, assign a heavy attack, and pump the release. Now play with VST's bounteous Effects for depth. A common mistake with pads is to saturate them with reverb. They occupy a huge frequency band as is and reverberation just expands their range. For the main melody, either a synth lead or

piano are the trusty guns of trance. The Universal Sound Module has a very convincing 'cheese' piano which is perfect for those floating arpeggios. For a synth lead, overdrive on Neon employing a square wave and maximum LFO can have pleasing results.

hard house

Here's another style that can happily thrive in the oxygen-starved world of MIDI. Hard house follows a similar structural path as house but is speeded up and, as the name implies, is generally harder. Add mild distortion to your synth sounds and phase the hi-hats. Hard house tends to be bass line-driven meaning you want a grooving bass melody instead of the floating lead of trance. Experiment with VST and you'll be surprised at the results.

House doesn't end there. Tech trance, deep house and disco all enter in at some point and similar production rules apply if you're producing pretty much any of them. House is a good entry into dance production, offering accessible drum programming and simple melodies. It's also fully creatable with a stand-alone version of Cubase 5. In terms of EQ, a gentle curve that knocks out the middle is the standard rule since this helps with depth.

drum and bass

The clever naming continues. Drum and bass relies on – wait for it – drums and bass to convey its essence. Born out of jungle, which itself was born out of raregroove and Motown, drum and bass relies on a solid, fast, two-step rhythm rolling in at between 160 and 180 bpm. Two-step is driven by a snare that falls on beat with a bass drum, which itself falls behind every second stroke. The standard drum sounds on LM9 are not adequate for D&B. Practitioners favour real drums time-stretched and pitched up. The pitching up, as well as giving the desired speed, makes room for the spleen-shattering bass frequencies.

acoustic and vocal

At the opposite end of the spectrum from the thunder of dance music is good old acoustic stuff. This is the melodic and soulful stuff stretching back to the likes of Bob Dylan, Paul Simon, James Taylor and running through to the likes of Dave Matthews, Ben Harper, David Gray and Badly Drawn Boy. Although working with audio can be slightly trickier than working exclusively with MIDI, Cubase is powerful enough to enable you to make some stunning recordings of acoustic music. But, just as when you're recording any music, there are things you will need to consider.

Firstly, the acoustic guitar is a rather difficult instrument to record well. The subtle quality of the overtones and such make it a very complex sound to capture. Most musicians and good producers tend to agree that you should never record the piezo pick-up mounted in some guitars. I know, I've heard it done on major-label productions too, but I still think it sounds thuddy, thin and metallic. A good condenser mic (or two) is optimal; however, if all you have is a choice between an SM57 or the pick-up, I'd use the SM57 every time.

Avoid aiming the mic directly at the sound hole since this tends to produce an overly boomy result. Position the mic 8 to 12 inches away aimed about where the neck and body meet (usually around the 14th fret). I normally use just one mic, but for a larger-than-life sound, place one mic as discussed above and a second mic an equal distance away aimed at the bridge. This will pick up more of the midrange and bite and the two signals can be blended to taste in the mix. This tends to work for things like mandolins, banjos, and so on, although with banjos you need to really watch your levels and make sure the sound isn't too tinny.

As with any recording, the quality starts with the instrument itself and no amount of EQ or effects will inject life into strings that are old and dull. I always put

new strings on my guitar before gigging and for recording. Also, there's no way to totally disguise fret buzz, and while a certain amount of fret and finger noise will add to the 'organic' sound, too much can spoil the performance. If you're a singer/guitarist and you want to record both bits in one take, you will get a certain amount of spill between guitar and vocal mics. You can minimise this by using a good directional cardioid mic placed as close to the guitar as possible with a directional vocal mic with a pop-shield no more than 12 inches from your mouth. Although there will still be some spill, it won't be all that serious and can even create an illusion of stereo if you pan the guitar to one side and the vocal mic to the other.

For something a bit more exotic, like an acoustic bass guitar, place your mic 6 inches above the bridge and aimed slightly (to taste) toward the sound hole. For an upright bass, an Audio Technica ATM25 placed just outside the f-hole along with a large- or small-diaphragm condenser just above the bridge works well (on two separate tracks). The bridge mic can then be blended to taste in the mix to achieve the desired amount of attack and string vibration. Keep the mics within 12 inches of the instrument or you're likely to get phase cancellations from the reflections of the sound on the floor. You don't really want a lot of room

ambience on a bass track anyway and even if you decided to put some outboard reverb on a bass track just for fun, the mix would instantly turn to mush.

With other instruments such as violins, flutes, whistles, and so on, start with the mic position around 6 inches from the sound source and then adjust accordingly. Even moving the mic a few inches – or centimetres – can affect the sound quite considerably. The acoustic environment can also play a considerable part in giving your recorded sound particular characteristics. Acoustic sound changes constantly and the level of recording difficulty is increased when you use more than one mic. As with everything, don't be afraid to experiment until you get the mic placement and sound right. Do use EQ, compression or whatever sounds good but don't over-do it. Set EQ within the ambient range of the instrument, for example, guitar and vocal are usually midrange, bass, mid to low... Always try to record acoustic instruments clean. If you want reverb, add it later, but don't over-do it. And don't expect to fix an atrociously bad sound in the mix. Always try to get the cleanest recording possible at source.

Since you can't, unfortunately, tune a singer, the place to start with is his or her environment. For example, although it may sound a bit New Age, a room with dim

lights can relax a singer for a song with a mellower mood. Conversely, a brightly lit room can support a high-energy song. Temperature also affects a vocalist's performance: a cold room can cause the vocal cords to tense up. That is a bad thing and you'll want to make sure that the room where you'll be recording vocals is a comfortable temperature. The standard mic position for recording vocals is about 9 inches from the singer's mouth and slightly above. This way, you have to angle the mic down a bit, thus avoiding pops. Also, if you have one, a pop filter is very useful. If you don't have one, you can make one. Compression is a very useful tool when it comes to recording vocals, too. Vocals will almost always benefit from a little compression. Using Compression in Cubase, start with a -10dB threshold, 3:1 ratio, a fast attack time and a moderately fast release time. Bring the threshold down until the reduction meters are almost always lit and adjust the ratio until you get about 6dB of reduction. This will be a good place to start. EQ is usually helpful to pull the sound of a vocalist out of the mix. If you can, use narrow bandwidths – this will reduce the chance of boosting the same frequency as another instrument.

For all vocals, use suitable compression. Even well-disciplined vocalists tend to sound uneven against the very controlled dynamics of a pop mix, so it helps to

apply a little compression while recording. Err on the side of using less compression than you think you will finally need. Don't be afraid to use more compression on the vocal track once it has been recorded. When the performance is in the can, you can try both subtle and heavy compression within Cubase to see which works best with the track, although if you're using a lot of compression you may need to gate the vocal track first. This will prevent noise build-up in the pauses between phrases. It's at the mixing stage that a compressor with an obvious character can be used to make a vocal seem larger than life. However, don't gate the vocal while recording. A badly set-up gate can ruin an otherwise perfect take, so save gating until the mixing stage. Use the gate before any further compression, but don't gate so hard that you remove all the breath noises preceding words, as these are part of the character of a vocal performance and the recording will sound unnatural without them. And don't run amok with the EQ. Midrange boosting usually results in a nasal or phasey sound, so use as little EQ as you can. If you've picked the right mic, and taken the time to fine-tune its position during recording, you shouldn't need much corrective EQ anyway. Of course, there are times when EQ is used for creative purposes. Use reverb sparingly. Vocals recorded in a dry acoustic environment need reverb to give them a sense of space and reality, but

don't use more than the song really needs. As a general rule, busy songs need less reverb, and slower ballads with lots of space in the arrangement can afford to use more. If the vocals are very brightly recorded, they may cause any added reverb to sound sibilant. Instead of de-essing the vocals (which often sounds unnatural), try instead de-essing just the feed to the reverb unit. You can also experiment with the reverb type and tonality to minimise sibilance and spitting.

Chances are the 'keeper' vocal track will be done as an overdub after the basic tracks are cut. You'll also find that the ability to 'punch in' vocals in Cubase to fix phrasing and bum notes will be invaluable. You'll want to limit the vocal on the way down – the highest ratio you have, the fastest attack time possible, a threshold setting that just grabs the peaks. If the singer insists on some reverb send them a little to their headphones, but record it dry. Apart from eating memory and CPU power, reverb is notorious for masking pitch problems.

electronic instruments

Although instruments like electric guitars often sound better with the amp miked up, you can DI – or direct inject – any electronic instrument that can plug into an amp. You may find that in some instances, you'd like to

use a combination of DI and miked sounds. Be aware that if your instrument doesn't have a pre-amp, plugging directly into your Mac or mixing desk may not work properly because the impedances won't match. However, DI boxes can be very useful since they allow signals from either instruments, pre-amps or power amps to be used as recording sources without the usual hum and impedance mis-match.

Miking amps isn't really all that difficult, but mic position relative to the amp speaker can make a big difference in overall sound. In your studio, don't use huge stacks of amps for recording. It's easier to get a good manageable sound out of a small combo and it will even produce a more natural overdrive when pushed than a massive Marshall stack. Close miking or DI-ed guitars tend to need a bit of reverb to give the illusion of space – but don't over-do it.

Electric instruments like guitars can generate noise and hiss from the amp, which can create interference in your recording. Using the 'gating' function at the mixing stage, you can minimise this noise and maintain silence during pauses or between phrases.

As far as your desired sound goes...well, that depends on whether you're using electric instruments for heavy

metal or producing '80s TV-theme-tune music. Plugging all your instruments in and getting a track laid down is relatively easy. What you do with it once it's recorded is the proverbial horse of a different colour.

epilogue

Steve Jobs, Apple's co-founder and current-sometime CEO, used to be fond of the Zen paraphrase 'The journey is its own reward.' Making music on your Mac can be the start of a beautiful journey that can take you nearly any place you can imagine. Using Cubase and the various other music tools available on the Mac can bring you a lot of personal and creative pleasure and can enable you to produce finished recordings that will easily stand the comparison with commercial or 'professional studio' jobs. However, don't forget that you are dealing with a lot of powerful and sophisticated stuff here and, as in cooking, sex or brewing Grolsch, the result is always better and more satisfying if you don't rush things. As a musician, you'll already know that no matter how experienced you are, there's always something more to learn. The same is true when it comes to using your virtual digital studio. Sometimes the journey is far more exciting than the final destination – and that journey is what continues to keep music interesting

and alive no matter how many boy bands or 'pop stars' continue to hog the charts.

In Antonioni's wonderful film *Beyond The Clouds*, a girl in a Parisian café tells a stranger the story of a group of explorers travelling through the jungle to find a lost Inca city. One day, at the foot of a mountain, the porters simply stop and refuse to go any further. When asked why, they refuse to speak, and nothing can persuade them to go on. After a few days, the porters suddenly pick up their packs and carry on with their journey. When one of the explorers asks the chief why they had stopped, he simply replies, 'They were waiting for their souls to catch up.' So, enjoy your adventure, trust your ears and remember to stop once in a while to let your soul catch up.

housekeeping

After you've put all that time and effort into recording and mixing your songs, make sure you save and back up your files regularly. Audio files are particularly large by nature and can quickly clog up all the available space on your hard disk. If you record audio regularly you'll probably want to back up your files onto another drive or onto removable media such as Zip or Jaz drives. Cubase, like most Mac programs, can read and write a variety of different file formats, which contain different types of information. Some file formats support specific Cubase functions and can be read only by Cubase. Others are designed for importing or exporting information between different programs, so being familiar with these different formats will help you decide which is the right option for saving, opening or moving your own music.

Essentially, Cubase offers two main formats for you to use when deciding on how to save your music: the Song file and the Arrangement file. When you save a Song, your file will include:

- All the arrangements
- The Audio Pool, including all audio settings and audio file references – but not the actual audio files themselves
- The entire Setup including settings in dialogues, menus, Groove Maps, Transport Bar settings, and so on – even Drum Maps
- All preferences that have the ‘Save With Song’ option activated

Song files are good because they contain complete Audio Pool and other audio settings and can also contain more than one arrangement. Song files also save all your settings on all menus and dialogue boxes, and include Drum Maps. However, Song files do take up more disk space, even if you have only one arrangement in the Song. And while Song files contain all audio references, they don't contain the actual audio files. So, if you want to transfer a Song containing audio to another Mac, you'll need to move your audio files as well.

When you save an Arrangement file, you will include:

- All the things you see in one Arrange window including the Tracks, the Parts, Inspector settings, tempo and so on

- The audio file references for your Audio Parts used in the arrangement

You'll probably find that the Arrangement format is generally adequate for saving most of your music. These files take up little disk space, can be saved and opened in another Song and, when opened, Arrangement files don't affect settings in dialogue boxes or menus. However, these files don't contain any audio settings other than the audio file references used in the arrangement and will not give you a complete snapshot of the program's state.

These file formats are called native files because they're designed for use in Cubase exclusively and generally can't be read by other programs. For example, although the Arrangement files and MIDI files both contain MIDI data, MIDI files can be read by other computer programs while Arrangement files can't. Only Import and Export files can be read by other programs. Other native files include Part files, which contain individual Parts, several Parts or Tracks. When you save in this format, your required Parts must be selected or, if you don't select particular Parts, all Parts in the current Track will be saved. Part files contain Audio or MIDI Events and Audio Parts also include audio file references for these Events. This

makes it possible to import Audio Parts into other Songs without having to import their audio files separately in the Audio Pool. Additional file formats, which are more or less self-explanatory, include Drum Map files, Setup files, Window sets, Keyboard layout, Score set, and Preferences files. Like most Mac applications, native file formats are usually opened and saved using the Open and Save commands in the File menu. So, for example, when you choose Save As..., your Song will be saved under whatever name you choose. If you've already saved your Song once using this option and then choose Save Song from the file pop-up menu, Cubase will save your song without asking for a file name or location and will simply overwrite your earlier version.

Since MIDI files usually come in two formats (Type 0 and Type 1) Cubase provides a MIDI file format for importing or exporting standard MIDI files. Type 0 files will always contain only one Track, which plays back on many MIDI Channels. Type 1 files will contain your original Track structure and include two or more Tracks on separate MIDI Channels.

Cubase also has an Autosave feature, which can be set in the General Preferences dialogue box. If you select this option, you can decide how often Cubase saves

your work automatically. There's also a Save Backup feature under the File menu, which enables you to save a backup copy of your current Song. What you get is a complete replica of the original Song with the same name, but with an additional number that corresponds to the number of backups you've made. Backup copies are normally placed in the same folder as your original files. Cubase also has a Revert To Save option, which restores the Song to your last saved version. Any changes you made since you last saved are lost. You can use this command as a way of undoing many changes at the same time. Save your Song, experiment, and if you don't like the results, revert to the last saved version.

MP3

MP3 files are compressed files that are popular for posting and exchanging music on the Internet. Even in version 5, Cubase won't let you play these back as such. However, if you import an MP3 file, Cubase will create a copy of that file and convert it to WAV format. This converted file will be placed in the Audio Files folder you've selected for your Song from the Audio Setup menu (under Options). If you haven't specified an Audio Files folder before converting an MP3 file, you'll be asked to do so when you import it. Just

remember that while MP3 is an efficient method of compression, the converted WAV file will probably be considerably larger than the original MP3 file – no matter how small it was.

customising Cubase

One of the great things about Cubase is that you can customise nearly the entire program to look, feel and work the way you want it to. Some of the things you can customise or personalise include:

- **Preferences:** this is a really good place to start since the various Preferences dialogues on the Edit menu contain many very useful functions that allow you to make Cubase VST look and behave as you want it to
- **Key Commands, MIDI Remote and Toolbar:** if you prefer to invoke commands from the computer keyboard or via MIDI, it's worth noting that a huge number of commands can be set up for key or remote MIDI control. You can connect any key and practically any MIDI message to any function. If you'd rather use your mouse, you can set up your own Toolbar which lets you use graphical buttons for all the same functions that can be accessed from the computer keyboard and via MIDI

- **Window Settings and Sets:** you can move and change the size of the windows, open various types of windows, move dividers and set the magnification to tailor the windows to your needs. Saving this in the start-up Song will make the program appear as you want it. In addition to this you can create Window Sets that enable you to quickly switch between window configurations
- **Tracks:** you can create and name Tracks, set them to different Track classes and so on. For example, if you know you always want a Drum Track that plays on MIDI Channel 10, create it. A more advanced option is to prepare empty Folder Tracks, for example, for various sections in your orchestra. You can also rearrange, hide and resize Track columns
- **Parts:** you can even have Parts in your start-up Song that could, for example, contain libraries of often-used drum patterns or riffs. Or, they could contain system Exclusive dumps of settings that load your instruments with certain sounds. Put the Parts on muted Tracks and drag them onto other Tracks when you need them
- **Transport Bar settings:** you might, for example, prefer to record in Replace Mode, or you might always want to Automatic Quantize your recordings. If you do, simply set this up on the Transport Bar

- **Editor settings and Drum Map:** if you prefer certain settings in the Editors for loops, quantising and so on, set them up and save them with the start-up Song. A perfect candidate for customising is the Drum Map. This includes which Drum Maps to use and how they should be set up
- **MIDI Track Mixer:** you can modify the MIDI Track Mixer to include various 'custom Control Panels'. Preparing such maps and including them in the start-up Song enables you to access many important control functions in your MIDI instruments from the MIDI Track Mixer
- **Mixer Maps:** Cubase allows you to have up to eight Mixer maps loaded in a Song. You might, for example, have different 'editors' for various MIDI instruments in your rig

audio settings

There are a number of things you can prepare that are related to audio:

- **System settings:** mainly done to optimise the number of audio channels, EQs and effects
- **Initial mix settings, Channel naming, Effect settings** and so on as found in the VST Channel Mixers and in the various Effects windows. This allows you to

start with a basic tracking set up every time you begin on a new Song

- Audio buses, sends and so on. This is mainly for those of you using audio hardware with multiple outputs. Preparing this assures all outputs are used for their right purposes for every new project
- The Pool window enables you to determine how you want the files and segments listed

quantise settings

If you have created a few favourite Grooves or made settings for Iterative Quantize, make these part of your start-up Song.

timekeeping

Do you want a click at all? Do you want to hear it via the computer speaker or via MIDI? How long do you want the count-in to be? All this is set in the Metronome dialogue in the Options menu. The MIDI System Setup dialogue, found in the MIDI Setup sub-menu on the Options menu, contains information about your MIDI Interface (among many other things). Since you don't want to have to set this every time you launch Cubase, you should save this setting in the start-up Song. If you have equipment that generates

MIDI data that you don't want to record, use the MIDI Filter dialogue found in the MIDI Setup sub-menu on the Options menu.

sync

Most often you'll synchronise to the same external equipment – for example the tape recorder in your studio. By setting up the Synchronisation dialogue as you want it, activate Sync on the Transport Bar and save this with the start-up Song, Cubase will automatically synchronise as soon as you hit Play on the tape recorder.

microphone magic

When it comes to serious recording, you can never over-emphasise the importance of microphones. Microphones convert the sounds you hear into electrical signals that can be recorded. And, as mentioned earlier in the book, choosing the right mic for the musical genre at hand is critically important to getting the sound you want on your final tracks. No amount of EQ, compression or reverb can change the subtle signature that any particular microphone leaves on your audio tracks.

So, how do you choose that perfect mic without buying and auditioning everything on the market? For a start, you could talk to other musicians and producers to find out what has worked for them in the past and what sort of mics they'd recommend. Reviews in magazines like *Sound on Sound* are always worth a look and before you start shopping around for anything, make sure you're familiar with the basic microphone 'families'. These include mics used for recording vocals and instrumentation.

To begin with, microphone pick-up patterns include:

- Cardioid
- Omnidirectional
- Figure-eight
- Stereo

Microphone pick-up types include:

- Dynamic
- Condenser
- Ribbon

We'll now take a look at these various pick-up patterns.

cardioid

A cardioid mic is more sensitive to sounds directly in front of it than to sounds 90 degrees off to either side. It's even less sensitive to sounds directly behind it. In fact, cardioid mics practically cancel pick-up of any sounds emanating from directly behind the mic. This makes cardioid microphones particularly useful for PA and live recording use, as well as the most popular choice for use in the usually imperfect recording environment of most home studios. To use a cardioid mic, simply aim the mic at the instrument you want to

record and the rest of the stage sound will be at least somewhat quieter than the desired instrument's sound. Most of today's popular microphones have a cardioid pick-up pattern.

There are a couple of variations on the cardioid pick-up pattern that are worth looking at. Supercardioid and hypercardioid mics are less sensitive to 90-degree off-axis sound sources than plain cardioids, meaning that they will do a much better job of rejecting sounds from off to the sides. However, hypercardioids do pick up some sound from directly behind the front of the mic, making them a little bit like a 'figure-eight'. Cardioid mics also exhibit a characteristic called the proximity effect. The closer a sound source is to a cardioid mic, the more the mic will accentuate that sound source's bass frequency output. This can add richness and fullness to a singer's voice or to a saxophone's sound, but it can also muddy the sound of a guitar amp or acoustic bass. When miking from a distance, cardioid mics have a tendency to sound somewhat thin in the bass when compared to omnidirectional mics. For this reason, cardioid mics are usually used for close-miking – with the mic placed less than 2 feet from the sound source – while omnidirectional or figure-eight mics are usually used when miking from further away.

omnidirectional

An omnidirectional mic picks up sound equally from all directions. Omni mics tend to have very good bass response, without the artificial low frequency boost provided by the proximity effect of a typical cardioid mic. Really good omnidirectional condenser mics are great at capturing a sense of 'open space' and 'air', which makes them the first choice for critical reproduction of acoustic instruments in good-sounding acoustic spaces, like symphonic orchestras, vocal choirs, pianos, or string quartets in concert halls. You can also use omnidirectional microphones to 'close-mic' an instrument or vocalist without worrying about the artificial bass boost caused by a directional mic's proximity effect.

Some of the highest-fidelity mics available are of the omnidirectional condenser type, such as mics from Schoeps, DPA (B&K) and Earthworks.

figure-eight

Figure-eight mics have the 'open' sound and good bass response of omnidirectional mics with the added advantage of rejecting sounds from either side of the mic. Since figure-eights pick up sound equally well from directly behind and directly in front, care should be

taken that you don't capture undesirable reflections from low ceilings or nearby walls. A good place to use a figure-eight pattern mic is when you need to cancel reflections from side walls in a narrow-ish room but you still want to capture a good sense of room ambience.

Pick-up types in detail:

dynamic

Dynamic mics use a moving coil to sense the changes in air pressure that make sound waves. The wire coil is suspended over a permanent magnet and when moving air hits the coil, the air causes the coil to move over the magnet, which causes a process called electromagnetic induction to take place. This causes an AC voltage to be formed that is an electrical analogy of the original sound. The electrical signal that appears at the mic's output is a more or less faithful reproduction of the original vibrations present in air, only represented in fluctuating AC voltages instead of air pressure changes.

small-diaphragm dynamic

These are by far the most commonly used mics for PA and stage sound use. Dynamic microphones are

typically very rugged and don't require a voltage source to work properly. Cardioid-pattern, small-diaphragm dynamic mics are most often used as handheld vocal mics, like the ubiquitous Shure SM58, or as instrument mics for stage use, like the equally ubiquitous Shure SM57. There are many other similar dynamic mics from companies like Audix, Electro-Voice, Sennheiser and many others.

large-diaphragm dynamic

While similar to their small-diaphragm siblings, large-diaphragm dynamic mics are typically used for very loud, bass-heavy instruments such as tom-toms, kick drums, and bass amp speakers. The larger diaphragm allows these mics to withstand much higher Sound Pressure Levels (SPLs) with ease, which allows low-distortion reproduction of very loud instruments such as trumpets, trombones and amplified electric guitars. However, the larger diaphragm will also weigh more and has a higher moving mass, which can limit the high-frequency response and transient response of the mic. Some popular large-diaphragm dynamic mics include:

- **Electro-Voice RE-20:** a favourite of radio announcers and a good mic for kick drums

- Sennheiser MD-421: commonly used on tom-toms and hand percussion
- Shure SM7: A large-diaphragm dynamic microphone used for broadcasters and voice-overs, as well as for miking kick drums, brass and bass instruments. Similar to the E-V RE-20

condenser

Condenser mics capture sound using a conductive diaphragm with a capacitive, charged plate behind it. The charge is supplied by a DC voltage source like a battery or the 48-volt 'phantom' power supply present in most mixers and mic pre-amps. Air pressure changes meeting the conductive diaphragm cause it to move, which causes an analogous AC voltage to be formed in the charged plate. These tiny AC voltages are sent to a small pre-amp built into the microphone, which brings the signal level up to where it can drive a typical microphone pre-amp. The signal leaves the microphone through the cable and on to the microphone pre-amplifier stage of the mixer. Because the diaphragm of a condenser mic can be made very thin and light, condenser mics tend to be more accurate and 'faster' than dynamic mics, especially in the midrange and treble frequencies. However, condenser mics tend to be more physically delicate than dynamic mics, so they

are more commonly used for studio recording rather than for live sound and PA. There are a few condenser mics specially designed to withstand the rough and tumble of stage use, like the Shure SM87.

small-diaphragm condenser

Small-diaphragm condenser mics have the best high-frequency response and quickest transient response of all the commonly available microphone types. For this reason, small-diaphragm condenser mics are most often used as drum set overhead mics to faithfully capture cymbals and stick attacks, for acoustic stringed instruments like guitars and violins, and for percussion instruments like vibraphones, shakers, and marimbas. Another common use for small-diaphragm condenser mics is as stereo pairs for ambient pick up of acoustic events in good sounding spaces. The one downside to small-diaphragm condensers is that they tend to be noisier than other types of microphones. Popular small-diaphragm condenser mics include:

- Shure SM81: very flat frequency response; often used on acoustic guitars and as drum kit overheads
- Audio Technica AT-3528: a cardioid model that is a sort of 'poor man's KM-84'

- **AKG C 1000 S:** a good all-around budget favourite
- **Neumann KM184:** this is a truly professional recording mic
- **Oktava MC-012:** from Russia, this is another mic that was made to be similar to the KM-84 but for a lot less money
- **Earthworks QTC-1:** another great professional mic with an extremely accurate response

large-diaphragm condenser

Since condenser mics are intrinsically more sensitive to higher frequencies, it's possible to combine the warmth and fullness of a large diaphragm with the high-frequency detail typical of small-diaphragm condenser mics into a single microphone. These large-diaphragm condenser mics are the mainstay of recording studios everywhere, especially for recording vocals, pianos, horns and other acoustic instruments. Some older vacuum tube-based large-diaphragm condenser mics, such as the Neumann U47 and AKG C12, are collector's items prized for their sonic warmth and smoothly accurate reproduction of aural details. The 1960's vintage Neumann U87 is a FET-amplified, large-diaphragm mic that is more of a modern classic – and well beyond the budgets of most home studios. Popular large-diaphragm condenser mics include:

- **AKG CS 414 ULS:** an industry standard for overhead drum miking and general use; provides choice of cardioid, hypercardioid, omni and figure-eight pick-up patterns
- **AKG C 3000 B:** a budget mic based on the design of the venerable CS 414. Cardioid only
- **Neumann U87:** the standard by which all others are judged; provides choice of cardioid, hypercardioid, omni and figure-eight pick-up patterns
- **Neumann TLM 103:** a new, lower-priced version of the famous U87. Cardioid only
- **Audio Technica AT-4033a:** a fabulous microphone for the price. Cardioid only and great on saxophones

ribbon

When a wafer-thin, small aluminium ribbon is suspended between two mounting points inside a strong magnetic field, you get a microphone that is extraordinarily sensitive to vibrations in air. Ribbon mics can really capture the thump of a plucked acoustic bass or the subtle dynamics of jazz drums. Unfortunately, ribbon mics tend to be extraordinarily fragile. Blow on the ribbon the wrong way and you can stretch it beyond repair. Nevertheless, ribbon mics remain a favourite among well-heeled sound recordists everywhere.

Common ribbon mics include:

- RCA BX-44 and BX-77: the original classics
- Coles 4038: the standard in modern ribbon mics
- Beyerdynamic M-260: a budget ribbon mic; hypercardioid only
- Royer Labs R-121: a new ribbon mic design that is getting a lot of attention

stereo

If you combine two cardioid condenser elements into one chassis, you get a single-point stereo mic. Usually, this is an X-Y type where the two cardioid elements are pointed away from each other at a 90-degree angle. Some stereo mics are of the Mid-Side type, using a combination of a forward-facing cardioid element with a sideways-oriented figure-eight element, which allows for remotely controlled adjustment of the stereo image width. Popular stereo mics include:

- Audio Technica AT-825
- Shure VP-88
- Crown SASS

With so many on the market it won't surprise you that there are mics for both vocals and instruments...

vocal mics

Recording the human singing or speaking voice presents some seriously unique challenges. Most people prefer a heightened sense of presence on human voices, and will often also prefer a mild bass boost for added warmth. As a result, most microphones meant for recording or amplifying vocals have a specially tailored response characteristic. Dynamic vocal mics are designed to be extremely sturdy and produce as little handling noise as possible. They are also designed with a very tight cardioid or hyper-cardioid pick-up pattern, so that there is less 'bleed' from other instruments on the stage. As mentioned earlier, the standard mic of this particular type is the Shure SM58. It can withstand very rough treatment and has very good feedback rejection, making it perfect for daily use on stages where amplified rock/pop/R&B/jazz bands play. The SM58 has a specially-tailored response that reduces bass pick-up from far away – minimising booming from the stage sound – but will boost the bass when the singer comes in close creating a big, warm sound. The SM58 also has a substantial peak in its response from about 2kHz up to about 12kHz, which adds a pleasant sheen and overall brightness to the sound. This helps vocals cut through a dense mix and increases clarity and intelligibility.

You can usually tell if a microphone is designed for live vocal use if it is equipped with a pop filter to protect the pick-up from blasts of air and explosive sounds. The Shure SM58 has a spherical metal screen pop filter that is lined with foam rubber on the inside.

For recording vocals, most studios use large-diaphragm condenser microphones like the Neumann U87 or AKG C12. Like stage mics, these also have a presence peak and proximity effect tailored to enhance the sound of the vocalist. However, because these large-diaphragm condenser microphones are meant to be used in the more controlled environment of a recording studio, they can have wider cardioid pick-up patterns, allowing for a more open sound. For recording a particular musical genre, you need to pick your microphones like a musician picks his instrument. For example, a 'darker' mic will help tame a high, shrill voice while a clearer, brighter-sounding mic will help the vocal cut through a dense mix. Unfortunately, there is no single best microphone for all situations – only a palette of good microphones from which you have to choose the right tool for the job at hand. The standard large-diaphragm vocal mic is the Neumann U87, although some prefer the vacuum tube-based Neumann U47. These microphones have a distinctive upper-midrange to treble/presence boost,

and a warm, rich bass-boost from proximity effect. Similar mics to the U47 and U87 are the AKG C12 and CS 414 ULS, which have the crisper sound characteristic of AKG microphones in general – which some producers love and others hate. There is an increasing number of less expensive versions of these microphones on the market today including mics like:

- RØDE NT1000
- Audio Technica AT-4033a, AT-4047
- AKG C2000S, C3000B
- Marshall Electronics MXL-2001-P
- Joe Meek Meekrophone
- Oktava MC-319

When you use a condenser mic to record a vocalist, it's usually a good idea to hang a pop screen in between the vocalist and the microphone to keep loud 'p', 'b' and 'k' sounds from overloading the mic's pick-up and spoiling a take. You can buy these or make them out of an old pair of tights and a tea strainer.

instrument mics

When it comes to recording instruments, different priorities arise, depending on your musical genre and style. When recording acoustic instruments, the

microphone should be faithful to the original sound. However, instruments used in rock and pop music can be very loud and require a microphone that can withstand extremely high sound pressure levels without distorting. It is extremely difficult to make a microphone that is both sensitive enough to pick up the subtle nuances of a fine acoustic instrument while also being able to capture the brute force of a rock kick drum or guitar amp without overloading. Once again, there is no single best microphone for all situations, and it becomes necessary to choose the best tool for the job at hand.

Dynamic mics are best for loud sounds such as a rock drum kit, guitar amplifiers and the close-miking of brass instruments. There are a select few dynamic microphones that are both rugged and have a smooth sound suitable for recording high-decibel musical instruments, but be aware that these are typically more expensive than dynamic vocal microphones and do not work as well as condenser types on instruments with complex high-frequency information. The Sennheisser 421 and 422 and Beyerdynamic M88 are among the most widely used of this type of dynamic instrument microphone and the Electro-Voice RE-20 is also popular. The Shure SM57 is frequently used on snare drums, hand percussion (congas, bongos, timbales and

so on) and guitar amplifiers, but not usually for bass-heavy instruments like a kick drum or electric bass. You will usually see dynamic microphones used for live stage performances, while condenser mics are more often used in the recording studio.

When choosing a condenser mic, again, the type must be chosen to match the sonic characteristics of the source to be recorded. Orchestral instruments, acoustic stringed instruments and classical music ensembles will usually be recorded with sensitive condenser microphones with a relatively flat frequency response. It's generally acknowledged that small-diaphragm condenser mics such as those from DPA, Schoeps and Earthworks provide the most accurate response, while some prefer the pleasant-sounding colouration of the large-diaphragm Neumann M50 or similar.

When recording an individual brass, wind or reed instrument for a pop or jazz recording, a large-diaphragm condenser microphone such as a Neumann U87 or AKG CS 414 ULS will often be used. If recording a featured solo, the instrumentalist is treated similarly to a vocalist – the microphone may be chosen as much for its desirable colourations as for its clarity, warmth, headroom, lack of distortion and so on. Acoustic piano is treated in several different ways depending on the

style of music and the sound quality desired. For solo piano or classical music, the piano is usually miked from a considerable distance, with careful attention paid to the quality of room acoustics and the degree to which the microphones pick up the ambient sound of the room compared to the more direct sound of the piano. Often an X-Y stereo pair of condenser mics will be used. For rock, pop or jazz piano in a group, the piano will often be miked much closer, often with the lid closed and the piano isolated from the room sound with sound-absorbing blankets. For a robust, rich sound choose large-diaphragm condenser mics; for a brighter, clear sound choose small-diaphragm condenser mics.

drum kits

For rock and pop, the individual pieces of the drum kit are usually miked individually. This allows greater freedom in the mix-down phase to alter the sound to taste. As a general guideline, try the following:

- Snare drum: the most common technique is to place a Shure SM57 so that it picks up the sound from the batter (top) head. Sometimes a second microphone is placed underneath the drum to pick up the sound of the snare wires. The output from

this microphone may need to be reversed in polarity so as not to introduce phase cancellations with the signal from the top snare mic

- **Kick drum:** depending on the sound of the kick drum itself, a large-diaphragm dynamic mic such as an E-V RE20 may be placed close to the centre of the front head, or inside the drum if the front head has a hole in it or has been removed. Experimentation with placement will be necessary to achieve the desired sound
- **Cymbals:** in most cases a stereo pair of condenser microphones will be placed at least 2 feet above the kit to capture the sound of the cymbals and the overall sound of the drum kit. Where it is desired to capture the sound of the tom-toms with the overhead mic pair, it is usually best to use large-diaphragm condenser microphones for the task (the AKG CS 414 works well here). If the tom-toms will be close-miked, it is usually best to use small-diaphragm condenser mics so that the low mids don't build up to an unusable degree. Suitable small-diaphragm condenser mics include the AKG C1000S, Audio Technica AT-4041, Neumann KM-184 and Oktava MC012
- **Tom-toms:** if desired, the individual tom-toms can be close-miked with large-diaphragm dynamic microphones such as the Sennheiser 421. Small,

clip-on condenser mics are also used (such as the Shure Beta 98). Take care to place the microphones so that they will not cause phase cancellations or introduce excessive bleed between tracks

going retro

In the 1950s and '60s, drum kits were often miked with only two microphones, one a couple of feet or so in front of the kit, the other a couple of feet overhead and pointed at the snare drum. Ribbon mics like the RCA BX-77 or Coles 4038 were often used, as well as the newer large-diaphragm condenser mics such as the Neumann U67. While you will not get a stereo spread with this set up, you can get a very accurate picture of the acoustic sound of the drum kit. This can be a very effective technique for making live recordings of jazz groups.

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