

Ultimate MIDI guide



Shedding more light on MIDI, including a MIDI file analysing program...

Your sequencer, as well as being able to store songs using its own (proprietary) disk file arrangements, can doubtless also export the same information (namely all your notes, patch numbers, controllers, pitchbend information, and so on) in so-called MIDI file form. What's the difference?

Quite simply, standardisation. Most sequencers tend, by default, to store sequence data in a fashion best suited to the way the sequencer has been designed, so these file structures tend to vary from manufacturer to manufacturer. If you create a song arrangement using some obscure Whammo MkII sequencer package and store it on disk as a Whammo MkII sequencer file, there ain't no way that Joe Bloggs is going to be able to read it using his copy of Cubase.

MIDI files on the other hand, or SMFs (Standard MIDI Files) as they are sometimes called, provide a standardised way of storing sequenced music. So, if you store a song in this form and give that disk to someone else, they'll be able to load and play the arrangement, even if they have a totally different sequencer! Obviously, for some purposes, like putting MIDI song material on the Web, or creating arrangements to be sold commercially, such standardisation is important.

Now, for some musicians, buying ready-made MIDI file song arrangements is seen as the ultimate 'cheat' but let's be realistic, there are obvious benefits. First, you do not have to be able to physically play the songs. Second, the arrangements will almost certainly be as good, if not better, than you could create yourself. Third, you don't have to spend time creating them.

Nowadays MIDI files can be purchased and used by anyone, regardless of whether they're a musician or not, and there are plenty of good distributors around with huge, reliable catalogues. So, whether you like the classics, country, pop/rock, or more obscure stuff, the chances are that someone, somewhere, will have produced arrangements to suit. In short, you just buy the files, load them into a sequencer or into a utility such as Microsoft Windows' Media Player, hit the start button and off you go!

MIDI files, as anyone involved with MIDI will know, have in fact been about almost as long as MIDI itself. In recent years however the MIDI file scene has suddenly come of age and to appreciate why we need to take a few steps backward and talk firstly about what MIDI was like a few years ago, and then about something called General MIDI..

The almighty MIDI foo bird

The benefit of MIDI has always been the communications standardisation which allows instruments from different manufacturers to be linked together easily. MIDI however has not been without problems and one is the relationship between the sounds you hear on one particular synth or sound module (and the voice-memory-slots related to them) and the equivalent characteristics on another manufacturer's unit.

MIDI allows synthesizer and sound card voice settings to be changed using special messages called Program Changes but originally manufacturers were left to their own devices as far as the Program Change/voice (instrument sound) correspondences were concerned. The result was an annoying situation whereby a particular Program Change message might select a flute voice on one synthesizer, yet the same message sent to another synth might select a grand piano.

The lack of drum-voice/drum-note standardisation made life equally awkward on the percussion front and, as any musician will tell you, re-editing sequence data so that it conforms to alternative voice/channel/drum-note arrangements can be a difficult job.

For the lone musician working with his or her own sequence data, these types of snags are not the end of the world, but the difficulties do increase when sequences are written especially for use by other people. It is simply

not practical to keep changing the equipment voice-configurations each time you wish to use someone else's sequence data. These particular areas of difficulty were identified some time ago with many companies realising that the lack of standardisation was holding back the formation of a large 'pre-recorded sequenced music' market.

Apart from the obvious things like 'music minus one' type songs (karaoke-like backing sequences where you just add the melody), and MIDI versions of instrumental music, there is of course computer game music, CD+MIDI media formats, music educational and business presentation software, and integrated audio-visual (AV) equipment. These types of applications mean big bucks and so it was hardly surprising that much effort went into finding a solution. The outcome was a standard called General MIDI (GM) and it is this which has put most people in a position where they can 'load and play' MIDI file arrangements just as easily as say playing a tape or CD.

Formats for all

It's incredibly easy to get confused between file formats and disk formats so here's the bottom line: MIDI files are simply computer data files which are designed specifically to hold MIDI information and there are two different internal arrangements in common use.

The first regards a 'song' as one long MIDI sequence and is called a 'type 0' or 'format 0' MIDI file. This is primarily designed for playback only applications. The second arrangement, called a 'type 1' or 'format 1' MIDI file, effectively stores the MIDI data as a series of separate tracks and this means that you can have the drums, bass, keyboard sequences, etc, all kept separately within the file. Obviously keeping the data separated like this makes it easier if you ever have to load the file into a sequencer and edit it.

There is, incidentally a third type of MIDI file known as a type 2 format file but I'll skip the details here simply because type 2 files are not commonly seen.

Most sequencers can read both type 0 and type 1 MIDI files, and with type 1 you'll end up with the individual instrument tracks being loaded into separate sequencer tracks. What happens with type 0 MIDI files will often vary, according to the sequencer you are using, but even if the whole arrangement ends up being read into a single sequencer track, it's usually possible to tidy things up with a little editing.

Even oldish sequencer software (like the Dr T's KCS package) is able to split up a multiple MIDI channel track so data from each individual MIDI channel present gets moved to a separate sequencer track, and this sort of exercise invariably makes any subsequent editing easier.

Disk formats have nothing to do with MIDI files as such - rather they're connected with the physical characteristics of the disk being used to store the MIDI files. Although most computers, such as PCs, Apple Macs and Commodore Amigas, use three-and-a-half-inch floppy disks, they tend to use different types of arrangements for storing data on them. The end result is that a standard PC can't read a Mac disk, a Mac can't read an Amiga disk and so on. This means you need to make sure, when you buy MIDI files, that you get them on a disk format that your computer/sequencer will be able to physically read.

PC- or MS DOS-formatted disks, are particularly common and can be read by both PC and Atari machines. And there are, incidentally, plenty of utilities around which do allow one machine to read a disk prepared on another. The Amiga, for example, contains a CrossDOS utility that allows PC disks to be read. Also, it's important to remember that many commercial MIDI file libraries, by the way, can provide their material in various other formats than PC disks.

MIDI file suppliers

Most companies that sell MIDI files ensure the channel/voice settings of their arrangements conform to the General MIDI standard and, depending on their intended use, provide songs as either type 0 or type 1 MIDI files.

They also include either information sheets, or readme files on disk, that provide details of their use. Many companies, incidentally, use the first track in a MIDI file as a sort of 'global conductor track' for controlling tempo and so on - and you'll see this data if you ever need to edit a MIDI file using sequencing software.

For Techie Eyes Only

At the highest level, MIDI files consist of blocks of data called chunks that contain an identifying field, followed by a number that tells you how much information is in the chunk. Two types of chunks are currently defined - header and track chunks - and it's their different arrangements that result in different types of MIDI file.

The type 0 format files contain a header chunk followed by a single track chunk, used for storing a sequence as a single stream of events. Type 1 files allow multiple track sequences to be stored and these contain a header chunk followed by separate track chunks which represent tracks to be played simultaneously. One last type of file

was developed to allow sets of independent sequences to be stored and is known as a type 2 file.

The header chunk is always the first chunk in the file and it currently holds three bits of information: details of the file format (0, 1, or 2), a count of how many track chunks are present in the file, and some timing interpretation details. The events stored in track chunks all start with a time delay field - so-called delta time - that specifies the amount of time which should pass before the specified event should be played. It's worth mentioning that delta times, and a few other MIDI file items, are stored in an efficient variable length format that has to be unpacked before it can be turned into a sensible numerical value.

MIDI file events can actually be one of three types: MIDI events (channel messages), which are just the MIDI messages (notes, patch and controller information, pitchbend, etc) the sequencer recorded when the piece was first played; SysEx events; and a collection of non-MIDI items, known as meta events. I'm not going to go into too much detail about meta events but you might like to know that they start with a special identifier (FF hex), followed by a 'type' field, a byte count and the data itself.

The type field is a number between 0 and 127, with the count field being stored in the same way that delta times are. Two meta events of particular interest, by the way, are those that allow the end of a track, or a change in tempo, to be recognised, although a great many other events have been defined for embedding track names, lyrics, copyright notices and so on.

From the programming view-point, MIDI file reading isn't easy. Chunks have to be identified, their contents extracted and unpacked, and MIDI events have to be separated from meta events. With type 0 files these events are time-ordered by virtue of their positions in the file and their delta times. With type 1 files the situation is more complex and, in order to produce a stream of MIDI data, all the events from all of the track chunks have to be merged in time order. When you realise that running status (the use of implied status bytes) is also allowed within streams of stored MIDI events, it's not hard to see that writing MIDI file unpacking code is no small feat!

As for sources there are so many companies around nowadays it's impossible to list them all here. The details we have included represent just a cross section of suppliers chosen because we've seen, and used, some of their material and know it to be good. Bear in mind that most companies will only be too happy to supply catalogues and recent addition update sheets, and you'll be able to get up-to-date details about many of the suppliers from their Web sites!

J BCK Products

Of late BCK has greatly expanded its range and now has in excess of 1,000 titles available covering pop, easy listening, Latin American and even classical. Prices of all BCK supplied disks are £14.95.

J Hands On MIDI Software

Established in 1989, Hands On was one of the first UK companies to produce commercial MIDI files. The sequence disks vary in price from £4.95 to £11.95 per song and, as with most libraries, discounts are available for quantity.

J Heavenly Music

Another great collection with rhythm patterns, groove disks and song arrangements. If you've got access to the Internet then the Heavenly Music Web site is certainly well worth a visit!

J Keyfax Software

One Keyfax series of interest is Twiddly Bits. Keyfax has spent 100s of hours recording musicians like Bill Bruford and Steve Hackett in order to build disks of neat, and often difficult to play, performance tricks. Disks vary from £12.95 to £24.95 with £19.95 being the average price.

J MIDI Magic International

A good collection of MIDI songs including Rob Young's ShortCuts disk (£14.95) which provides bass/lead lines, drum rolls, and pitchbend effects. In general, individual songs are £6.50 each with discounts for larger orders.

J Newtronic

A stunning collection including buskers disks, professional-quality studio loops and effects, and MIDI file construction kits. The average price of disks is £14.95 and if you're on-line you can get up-to-date info from the Web site.

J Profile Music Agency

As well as almost 1,000 individual titles, there are compilation disks of pop hits, classics (Bach, Mozart, Rodrigo, etc), big band collections and many others. Single songs cost £5 with compilation disks varying from £12.95 to

£14.95.

J Pro MIDI BFP

This company provides another massive collection of individual songs, compilation disks, party packs and so on. Many disks will give you around a dozen songs for just £15.

J Stage 1 Music International

As well as a load of good pop songs you'll find singalong medleys, rock & roll standards and many more in this company's catalogue. Individual songs cost £4 each with a minimum order of three songs. With your first order you automatically become a member of the Stage 1 club which means you're then entitled to extra discounts.

J Words & Music

A small library containing some good 'Classical Collection' volumes, plus Ragtime and Christmas song collections. Each disk costs £12.95 and you can get discounts for bulk orders.