

in

COLLABORATORS

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Chapter 1

in

1.1 The MIDI Modules

The following modules are available in the Music Web. The name in brackets (on the description page) is the actual filename of the module (in the MODULES subdirectory). All the modules except 'MIDI In', 'Delay', and 'MIDI Split' are standard 'Filters' with a straight-through data path; they can accept up to three input path connections, but the packets that arrive on them will all emerge from the common output connector. 'MIDI In' is a 'Source' with just a single output connector. 'Delay' and 'MIDI Split' are multiconnector elements -- see their descriptions.

Connections between the MusicWeb and the outside world of MIDI:

These are the two basic elements that normally act as the input and output end of your configuration. (You can also send the MIDI events to an 'Instrument' element that uses the Amiga's internal voices. See 'Miscellaneous Modules' below.)

- * Read events ('messages') from MIDI In and supply them to a Web path

MIDI In

- * Send events arriving on a Web path to MIDI Out

MIDI Out

Modules that modify MIDI Event parameters:

These elements change the value of specific parameters (channel, velocity, and so on) in MIDI events passing through them. They don't make any changes in the sequence of events itself.

- * Change Volume of MIDI 'Note On' events

Loudness

- * Transpose all notes up or down a specified number of ↔ semitones

Transpose

- * Set all (channel-specific) events on the path to selected channel ←

Set Channel

Modules that affect the sequence of MIDI Events:

These modules are used to block specified events (or classes of events), or to divert them onto another path for special treatment. The first three are 'Filters', which select the events to be affected -- and will block these from proceeding further along the path if this is what is desired. If a 'split' is wanted -- rather than simply to discard the events -- these filters are used in conjunction with the fourth 'Split Events' module; in this case, the Filter simply marks the event, and a later Split element diverts it onto the alternate path. (See the module descriptions.)

- * Filter out (block) or mark selected types of MIDI events

Msg Filter

- * Filter out or mark selected notes of the scale

Key Filter

- * Pass a selected Keyboard note range -- filter or mark the rest ←

Key Range

- * Split marked events to separate path

Split Events

Miscellaneous Modules:

- * Block all 'System' type MIDI events (hex code Fx)

Block Sys Msg

- * Join up to three Web paths into one

Join

- * Generate a delayed version of an incoming event stream

Delay

- * Play the amiga's audio as a MIDI instrument (using 8SVX voice) ←

Instrument

- * Monitor (display in a screen panel) events on a path

Monitor MIDI

Element 'Control Panels' are opened by clicking on the element while ←

in 'Param' mode, or choosing 'Param' from the 'Select' mode panel (see Control Buttons in the Reference.GUIDE). Each panel has a default position in which it will appear (and will overlay other instances of the same panel if not moved). If you move it to a different part of the screen it will remain there, even if closed and reopened.

Remember that each module is a separate program that must be run (normally

by the startup script) for the Web to be able to access it. For more information on the relation of Modules to the Web as a whole, please refer to the main Reference.GUIDE .

- * Some modules not shown in the buttons (MIDIBranch, FileReq, Load8SVX) should also be running:
 Ancillary modules

1.2 MIDI In

MIDI In [MIDILink]

Converts MIDI messages ('Events') arriving at the Serial Port into Web packets for processing by other elements. It is obviously the first element in a configuration. Also, only one instance may be placed at a time (unlike most other elements of which there may be many instances). Both this and 'MIDI Out' are actually in one module. It has no control panel. This revision does not yet handle 'System Exclusive' MIDI messages (Sorry -- but my present setup doesn't generate them...) Any SysEx sequences that arrive will be ignored (untested).

1.3 MIDI Out

MIDI Out [MIDILink]

Converts (relevant) Web packets arriving on an input path to MIDI messages which it sends out the Serial Port. As with 'MIDI In', only one instance may exist at a time, but more than one path (up to three) may converge on it -- and of course still other paths may have merged earlier in the diagram. Like other 'Filters' it has an output connector, so potentially it need not be the last element in the chain either; at the moment, about the only element that you could meaningfully connect beyond it is the 'Monitor'. 'MIDI Out' is with 'MIDI In' in a single module, and has no control panel.

1.4 Loudness (MIDI volume)

Loudness [Loudness]

Adjusts the volume (actually Velocity value) of Note On events passing through it according to the per cent slider setting in its control panel. '100' means no effect, '1' means that all notes will be reduced to minimum velocity,

and '200' doubles the value if possible.

No volume is ever brought down to zero unless it is already there, because you usually don't want played notes ever to *completely* disappear.

The maximum value cannot of course exceed the MIDI limit of 127, so the actual increase in volume will be clipped to this if necessary.

(Things like 'Note Off Velocity' and aftertouch are ignored by this module.)

1.5 Set MIDI Channel

Set Channel [SetChan]

Sets the MIDI channel of all (relevant) events passing through it to that set in its control-panel slider. It does this regardless of the channel they might have on arrival. If you want it to apply only to certain channels or events, you should filter that path to contain only those events beforehand. (However, the current set does not contain a Channel Filter! With a single MIDI event source (i.e. keyboard) it isn't really needed, but it might make sense in more complex setups.)

1.6 Message Filter (blocks or marks specified event categories)

Msg Filter [MsgFilter]

Applies a 'Filter' to events of specified categories; filtered events may be either simply blocked from proceeding further on the path, or marked for later action by a

Split module. The cycle gadget at the top of its control panel selects whether blocking or one of the four possible marks is desired.

In the default 'Block' setting of the cycle gadget, events that meet the filtering criteria are simply removed from the stream at that point. On the other hand, any of the 'Mark' settings (1..4) simply cause that mark to be set in criteria-meeting events; events aren't ever removed in these cases -- they all continue along the path. A mark remains attached until it is used later in the path (at present only by a Split element).

There is a button for each class of MIDI message in the control panel. When a button is 'checked' that class of message is filtered. Be aware that "Note Off"

is a special case, as there are two conventions for this (a 'Note Off' message class or a 'Note On' with a volume of 0). This filter treats both these as "Note Off".

1.7 Key Filter (block or mark specified notes of scale)

Key Filter [KeyFilter]

Filters Note events corresponding to particular keys within the octave; filtered notes may be blocked, or marked for diversion by a later

Split element, as selected by the cycle gadget at the top if its control panel.

In the default 'Block' setting of the cycle gadget, events that meet the filtering criteria are simply removed from the stream at that point. On the other hand, any of the 'Mark' settings (1..4) simply cause that mark to be set in criteria-meeting events; events aren't ever removed in these cases -- they all continue along the path. A mark remains attached until it is used later in the path (at present only by a Split element).

There is a button for each of the twelve notes in the octave; 'checked' means filtered. Each button applies to all octaves equivalently; you can achieve other effects by combining with the 'Key Range' filter, say, in multiple parallel paths. Events other than notes are always passed unaffected.

1.8 Key Range limiting

Key Range [KeyRange]

Sets upper and lower limits to Note events that will be passed 'unfiltered'. Notes outside the set limits will either be blocked or marked for diversion by a later

Split module, as selected by the cycle gadget at the top of its control panel.

In the default 'Block' setting of the cycle gadget, events that meet the filtering criteria are simply removed from the stream at that point. On the other hand, any of the 'Mark' settings (1..4) simply cause that mark to be set in criteria-meeting events; events aren't ever removed in these cases -- they all continue along the path. A mark remains attached until it is used later in the path (at present only by a Split element).

The values set in the two sliders on the control panel refer to MIDI note numbers (60 being middle C). Use in conjunction with a Split element to create a simple keyboard split; multiple and overlapping splits can also be set up using range elements in parallel paths. Events other than notes are always passed unaffected.

1.9 Split Events to another path

MIDI Split [MIDISplit]

This element separates individual MIDI events out of an original stream into two independent paths, according to 'marks' applied by a previous selection element (or elements). It is a multiconnector element with one 'through' path (in and out) labelled 'Original', and one 'diverted' output labelled 'Split'. Events marked with any of the tags that the element is set to act on will be diverted out along the Split path; all others will pass through on the Original one.

There are four possible marks that may be affixed to an event. Ccheckbox buttons in the control panel of the Split element select any or all of these to cause diversion of an event. By default, all are selected, (all buttons are checked) so any mark causes the event to be diverted to the Split path.

If a particular mark is selected for the element, that mark will be *cleared* on all events as they leave. Marks that are not acted on by the element are also left unchanged for possible action by a later element.

Current modules that can set marks:

Msg Filter

Key Filter

Key Range

A practical note: splitting is an 'either/or' ←
happening

-- an event goes out one path or the other, never both. This may or may not be what you want. For example, sustain-pedal on/off signals should usually go to all channels, regardless of any split. You may need to include separate bypass paths for such things.

1.10 Transpose notes

Transpose [Transpose]

Shifts Note events up or down by the number of semitones specified by its slider. The range is plus or minus two octaves (24 notes). Be aware that you may go off the end of your instrument's range with large shifts; the result might be ugly, pleasant, or just silence... (If the shift would go outside the MIDI range of 0..127, the original will be left unchanged.)

1.11 Block System Messages

Block Sys Msg [NoSysMes]

This is a simple way of blocking out unneeded 'System' MIDI messages from a path when you aren't concerned with them. In many setups these can be quite frequent ('Clock' or 'Active Sense' events for instance) and could create an unnecessary load on a multipath configuration. There's no control panel -- just place it in a path if you want its effect. (This module only blocks events -- no marking is ever done.)

1.12 Join Streams

Join [Joiner]

A 'null' filter that simply lets you merge paths when it would be inconvenient to do so on any particular type of filter. It has very little load on activity.

1.13 Delay Events

Delay [MIDIIDelay]

A multiconnector element that generates copies of arriving events after a specified delay. It has a single input connection, and two outputs. The default output is a Source of delayed events; the other is just the continuation output for input events so that they may be fed to other elements as well. Short delays can be used to 'fatten' sounds (provided that your instrument supports multiple voicing of the same note, or you can feed it to a different channel); longer ones can give you 'multiple beats'. Two particular points: only *one* immediate path may be connected to the input (any merging must be done on filters earlier in the path), and delayed events are *copies* of the originals, so both are available for further use (e.g.

merging).

Delay is specified by the control panel slider in 600ths of a second, up to one second. 'Cutout' disables the delayed events if selected (the originals continue as usual).

Normally, 'System' messages are **not** copied to the delayed stream: if for some reason you should need these, select 'Sys Mes Too'.

[If you have a lot of delay elements in a configuration, you might want to raise the module's process priority when started (to about 30), though in most cases -- unless perhaps on a slower machine -- this won't be necessary. If you do this, beware of locking yourself out with a zero-delay loop!]

1.14 Amiga Audio 'Instrument' (plays 8SVX IFF files)

Instrument [MIDI_Instr]

This element lets you play the Amiga's own audio channels as a MIDI-controlled instrument (or instruments -- you can have several elements active at once, subject to the hardware-imposed overall maximum of four simultaneous separate sounds). You need an 8SVX IFF file as the source of the instrument's voice; this can be loaded by clicking on the 'New...' button, which invokes a file requester through which you can specify the file you want. (Note that two 'server' modules --

FileReq and Load8SVX

-- must be running, otherwise the request will not ←
work.)

The module responds to Note On and Note Off messages, and also to 'Sustain pedal' messages (MIDI Controller 64) if the 'Sustain' gadget is set to 'Pedal'. If the gadget is set 'Off', pedal messages are ignored, and notes are silenced by Note Off events; if 'On', Note Off messages are ignored as well -- effecting a permanent Sustain [this is just the thing for percussion, which sounds ugly if cut off abruptly, but you probably don't want to use it with instruments that repeat indefinitely!]. If, for this or other reasons, you get a 'stuck note', clicking 'Shut Up!' will turn off all sounding notes (in that instrument).

As only four voices can be sounded at once, the module must make decisions as to which ones. The rule followed here is simply to discard the oldest (regardless of instrument) when a new sound needs to be added and there is no free channel. Channels are not tied to a particular instrument: any channel may be used for a note as it becomes available. (Remember that the Amiga's audio is stereo! As the four sound channels are split between the two stereo channels, a note may appear on either randomly. Make sure both are connected to your audio system. It is probably best simply to merge them.)

If the instrument voice in use is unable to play high octaves (a function of how the file was recorded), the module will shift those notes down one or more octaves into the playable range. If you find this objectionable, insert a suitable Key Range limiter into the preceding path to silence those notes altogether.

(The module makes no attempt to play samples longer than those that can be handled directly by the Audio Device, as an instrument file will usually be well within this restriction. The limit is 128K each for the oneshot and repeat parts.) At present, it ignores any ATAK and RLSE chunks the instrument may provide. Certain purported 'instrument' files may not follow proper conventions, and therefore may not get played as they are intended to be. See

8SVX
for more...

This module accepts an optional startup command line parameter (most do not) to specify the default directory in which instrument files are stored.

1.15 Monitor MIDI Events

Monitor MIDI [MIDI Mon]

This element lets you observe the MIDI events passing through it (provided that they don't come faster than it can handle). Its panel has no control gadgets -- just displays of the attributes of arriving events. The bottom line gives a complete numeric breakdown of the event (number of bytes and their contents in decimal and hex). The two left hand displays above it show a more human-oriented description of event types. The lower of these is devoted solely to 'Active Sense' messages, showing when these are arriving; all the other displays ignore these, so that they don't get overwritten before you can read them. (My setup does not generate 'Clocks' -- I guess these will have the same problem...)

The upper display shows the class of messages other than these. The two displays to the right of these are devoted only to note events, showing note number and volume respectively.

1.16 Ancillary Modules

Ancillary Modules
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There are a few other modules besides the Web itself and the visible MIDI modules that must be running for a complete system. (And don't forget

that the Traveller module must be resident for any messages at all to flow!) Package Components Travelling the Web

MIDIBranch is the module that manages branch points in the diagram; you will not be able to place them if it is not running. (It is not quite the same as the 'standard' Web Brancher, as it is adapted to speed the processing of MIDI events.) This module should be included in the Web startup script.

FileReq is a server that provides a standard File Requester (only for the Instrument module currently). Having this as a separate module prevents a traffic jam when you open a requester. This module should be included in the Web startup script.

Load8SVX is the server that actually reads an 8SVX file into memory on request from Instrument (or other modules later). [The current version does *not* know about packed sound files; this is an omission, but I haven't yet actually encountered any packed ones...] This module should be included in the Web startup script.

1.17 8SVX Instrument Files

8SVX 'Instruments'

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The 8SVX 'Instrument' format seems to be a very confusing one -- not least to those who have previously implemented players for such files! Both the Sequencer and Sampler software I own -- both of which shall remain anonymous here -- make a complete mess of it. So far I've only found DMCS 2.0 (I have the demo) that seems to get it right. As a result you may well have some supposed 'instrument' samples that won't play properly. This outline may help you to understand any problems.

The main components of an 8SVX file are its 'header' and 'body'. (There are also 'attack' and 'release' segments, which may be included, but they don't seem to be respected much at the moment -- even by DMCS... the demo samples have them, but produce no detectable effect. I won't discuss them further.) The body contains blocks of waveform data for one or more octave ranges of the instrument; the header describes this data so that it can be played at the correct pitch and so on.

The waveform data is a representation of the sound produced by the original instrument, sampled at a specific rate to produce a sequence of numeric values; if these are played back at the same rate, you get (a reasonable facsimile of) the original note. If you play the sample back at a different appropriate rate you'll get another note; hence the computer can generate a complete musical scale from just one block of data.

To decide at exactly what rate you need to play it back to get the desired note, all you really need to know is the number of samples for each cycle of the fundamental frequency. You know the cycles per second for the note you want to produce (e.g. 261.6 Hz for middle-C) so the playback rate will just be this times the number of samples per cycle. A proper Instrument file should therefore have this information in its header. [And the above nameless Sampler software give the user no means of supplying this -- my reaction to this discovery is probably best left to the imagination...]

So what's this about 'octave ranges'? Why can't we just use one original sample and produce all the notes we want? Well, there are two problems, only one of which is really solved by the 8SVX scheme. The one that *isn't* is that a real instrument probably produces a different waveform for each note -- not just the same mix of frequencies shifted up or down a bit. The ultimate sample format would probably have one waveform for each individual note of the instrument's range (as I believe a lot of synths in fact do) but this would be pretty heavy on memory. A reasonable compromise is to have one sample block for each octave, and to restrict the range for each to just its own octave. This *can* be done with 8SVX but there are other restrictions, which I won't go into, that may make it difficult to do. [Especially with the software I have seen...] Nevertheless, some available instrument files seem to have a good sound over their range, and probably do it properly.

The other part of the problem is that if we record a note at a certain sample rate, to play it an octave higher we have to use a playback rate twice as fast. If the original sample rate is adequate to give good quality we won't be able to increase it all that far before we run into the hardware limits of the machine. To go any higher we need another set of data with a more suitable sampling rate. So, typically we will provide a series of samples, each of which can take over from the previous one as the playback rate reaches its limit. In 8SVX these samples must be an octave apart, and each must be exactly half the size of the one preceding. Often each is produced simply by chopping out every alternate value from the preceding block.

One thing 8SVX doesn't explicitly specify is which octave range should be played at which physical octave -- say relative to middle-C. You *could*, if you wanted, play a waveform with two samples per cycle at middle-C, using a slow enough rate; you wouldn't get much tone-colour, though! However, it turns out -- given the system clock rate and audio limits of the Amiga -- that there is a convenient set of 'standard' playback rates for the notes of the scale; using these, middle-C and its octave (octave 5 of the MIDI range) have 32 samples per cycle, and hence a 2 samples-per-cycle waveform will play at MIDI octave 9.

On this basis, and assuming that the most detailed sample possible should be used for a note, you can make a suitable choice of octave data. This is what MIDI_Instr does. However, both the sequencer and sampler I have make other idiosyncratic choices -- a flute can end up sounding quite like an accordion!

One thing I do not yet do is take any account of the *original* sample rate (available in the header). It is possible for the basic sample to have been recorded at a higher rate than the 'standard' playback base rate, so that it is never quite played at the original fidelity. It should be possible to have a scheme that extends the set of playback rates in such a case.

The remaining point you should probably be aware of is the difference between 'one-shot' and 'sustained' instruments. The waveform data can have two parts (either of which may be missing): an initial 'oneshot' section that is sounded just once when the key is struck, and a 'repeat' section that will cycle continuously as long as the key is held down (or while 'sustain' is on if that feature is enabled). Things like drum and piano sounds normally only have a oneshot part, while an organ will certainly have a repeat part but might not bother with a oneshot. Electric guitars need the oneshot, but usually also have an indefinite sustain using a repeat.

For the best effect, you should choose the 'Sustain' mode to suit the instrument. Drums sound far better if every beat is allowed to run to completion, so Sustain should be 'On'. Pianos of course should have the 'Pedal' mode set, but even guitars with repeat sections sound good with a judicious use of pedal. For proper simulation of organs and the like, Sustain should be off, but again occasional use of the pedal may be attractive.

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