

**MULTI TIMBRAL  
SYNTHESIZER MODULE  
PERFORMANCE EDITOR**

**USER / TECHNICAL MANUAL**

**mozaic**

A MOZAIC Script by Andy Honeybone

## Contents

1	Introduction .....	3
2	Design Goals.....	3
3	Getting Started.....	4
4	The User Interface.....	4
4.1	The Instrument Section.....	4
4.2	The Mixer Section .....	5
4.3	The Memory Section.....	6
4.4	The Status and Import Section.....	8
4.5	Options Only Accessible Through Code Change .....	9
5	Transmission Requirements.....	10
6	Transmission Data.....	10
6.1	Channel Information .....	10
6.2	System Information.....	12
7	Reception Requirements .....	14
8	Reception Data.....	14
8.1	Channel Information .....	14
8.2	System Information.....	16
9	Cheetah MS6 System Exclusive Data Format .....	17
10	MS6 Performance Editor MIDI Implementation Chart .....	19
11	Definition of MS6 Terms .....	20
12	YouTube Demo.....	21

## 1 Introduction

Back in the late eighties, following the glut of digital synthesisers and samplers, there was a renewed appetite for a bit of analogue warmth in the mix. The gap in the market was for a relatively low-cost rackmount polyphonic expander – there were 2 main contenders: the Matrix 1000 from legendary USA synth creator Oberheim and the MS6 from the UK Welsh marketing company Cheetah, better known for its range of computer peripherals.

Long story short, the Cheetah might not have had the name but it used the same Curtis CEM3396 synthesiser chips as the Matrix, was two-thirds of the cost, was programmable from the front panel and was multi-timbral.

It was a great shame, therefore, that the MS6's unique sales point was so difficult to fathom. Fast forward thirty-odd years and I thought it was time to do something about it ...

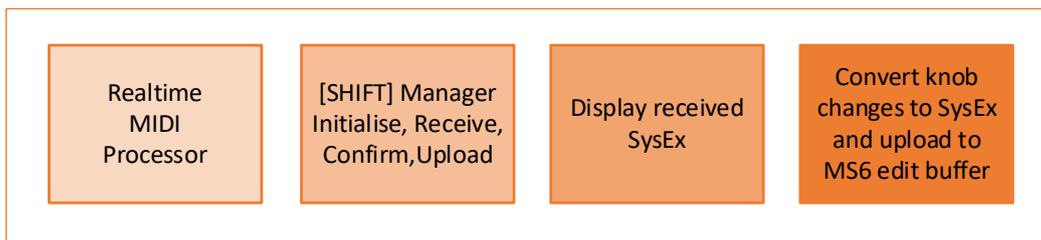
## 2 Design Goals

To create an app to address the 2 main criticisms of the MS6's multi-timbrality, namely:

1. So complex that very few users will ever be able to exploit it effectively
2. Mono audio output

The first point is subjective of course but digital parameter access to the performance parameters through 12 buttons and a 4-digit 7-segment 'alarm clock' display was sufficiently uninviting that I never delved deeper than satisfying initial curiosity back in 1990. The availability of Kristofer Maad's customised ROM firmware in 2002 with expanded System Exclusive messaging opened up the potential to create a graphical editor for the performance parameters but it wasn't until 2020 when Bram Bos updated the MOZAIC plug-in workshop app for iOS to v1.2 to handle MIDI System Exclusive I/O that I felt I had a tool (and the time) with which I could create a graphical MS6 performance editor without too much of a learning curve or costly outlay on development tools.

For the second point, without major surgery to the MS6 hardware, there isn't a lot that can be done with a single jack output but some 'smart' panning of the MS6 output within the audio host was a possibility and I realised that there was sufficient commonality in the required data for the panner to be built in to the performance editor.



The current design therefore comprises the performance editing functions and a realtime MIDI processor. This 'impure' approach has given integration benefits such as note range learning and a dynamic response to controller and program changes.

### 3 Getting Started

In addition to your Cheetah MS6, you will need:

- Kristofer Maad v1.3 upgrade firmware ROM (<http://www.maad.net/ms6/index.html>)
- An iPhone or iPad with iOS version capable of running the following apps:
  - MOZAIC plugin workshop ([ruismaker.com](http://ruismaker.com))
  - A MIDI / Audio host that supports System Exclusive – I used AUM ([kymatica.com](http://kymatica.com))
- A MIDI interface supporting System Exclusive messages (low cost USB ones with hard-wired DIN plugs may not). I used a Yamaha MD-BT01 Wireless Bluetooth MIDI Adaptor.

The basic routing is shown in Figure 1. The audio routing needs to include a balance control that can be automated by a MIDI continuous control. The pan control number default is CC#10 on channel 1 but this can be changed in the @OnLoad section of the MOZAIC script. The MIDI routing is as shown below. The Performance Editor passes thru MIDI data from a source such as a keyboard and this is necessary for the realtime MIDI processing functions. The MIDI output from the Performance Editor goes to both the input of the MS6 and the control input of the audio panner.

Due to technical limitations of the MS6, the expander has to be set to bank 8 (performance mode) in order for the Performance Editor to communicate correctly. One way to achieve this setting is to use the Initialise function described in section 4.3.

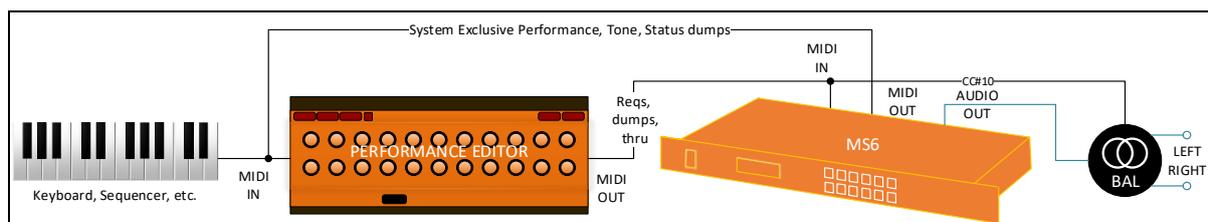


Figure 1: Basic routing for Performance Editor

The user interface of the Performance Editor is described in the following sections.

## 4 The User Interface

### 4.1 The Instrument Section



The Instrument Section groups the performance parameters for a single instrument (other than volume). The Inst knob selects between instruments 1 to 6.

The Tone knob shows both the MS6 displayed patch value and the corresponding program number in decimal. If the Tone knob is turned fully clockwise and released, a random patch will be selected – useful for exploring the onboard sounds or for some inspiration. The Bank knob selects between the MS6’s 4 ROM sound banks 1 – 5 and the RAM sound banks 6 and 7. Note: the MS6 must be in performance mode, Bank 8, for the Performance Editor to function as intended.

Voices sets the maximum polyphony for the Instrument - there is no dynamic voice allocation. The Voices knob will not allow the maximum of 6 voices across all instruments to be exceeded.

The Top and Bot knobs set the MIDI note reception range for the instrument allowing the creation of zones for splits and layers. As on the MS6 itself, there is no checking that the top is higher than the bottom of a range so check these settings if things do not appear to be working. The top and bottom of the range can be learned from a played MIDI note. Rotating the Bot knob fully anti-clockwise and / or the Top knob fully clockwise puts the Performance Editor into a listen mode and the next received note (any channel) will be assigned. Putting both range knobs into learn at the same time is useful when assigning 1-note ranges to the instruments for e.g. voicing a drum sequencer.

## 4.2 The Mixer Section



The mixer section adds volume control to complete the instrument performance parameters – here, however, all 6 instrument volumes are accessible at once rather than via an instrument select knob. The Volume knobs set/reflect the volume settings in a performance patch but they also set a scaling value for any received volume controller messages. Without this feature, volume messages sent e.g. at the start of a MIDI sequence would override any performance volume knob setting.

Above the volume knobs are 6 corresponding pan knobs. While turning the pan knobs will generate pan controller messages, that is not their main purpose. The pan knobs are there to set dynamically an instrument’s position in the stereo field and this is achieved by matching an instrument’s set MIDI channel with that of incoming Note ON messages. So, a Note ON on channel 1 will trigger a check for the first instrument set to that channel with voices assigned and then send out the pan controller message with the position value read from the pan knob for that instrument. The MS6 has just a single mono signal output so the panning has to be done in a host such as AUM that can pick up the pan message and position the MS6 output accordingly. In the simplest case, there are 2 instruments on different channels and their pan positions are set hard left and right. Notes sent to each instrument will be positioned left and right respectively. The success of the effect depends on the input material: playing each instrument separately at different points in a piece will allow more opportunities for post-recording mixing (e.g. split into 2 tracks for separate processing); playing

alternate notes on different channels can create ping-pong effects that can get too much. Using a stereo reverb like Alteza to sustain the left and right after the pan position has changed will help to give a more cohesive effect. The transmitted pan controller number and channel can be altered by changing the assignments in the @OnLoad section of the MOZAIK script. Experiment with balance rather than pan, or any other control that takes your interest.

### 4.3 The Memory Section



The memory section in conjunction with the SHIFT button provides the interface for System Exclusive performance dump transfers between the app and the MS6. The lower protect/Initialise knob has 3 positions: the default anticlockwise position protects the Performance Editor from receiving a download from the MS6; the central overwrite position opens up the Performance Editor to receive downloads from the location specified by the upper knob and the most clockwise position initialises the Performance Editor and the MS6 to a bi-timbral, centre-panned performance.

In overwrite mode, with the upper memory# knob showing eBuffer, the MS6 performance edit buffer can be downloaded to the Performance Editor by a single tap on the SHIFT button. Similarly, a specific MS6 performance memory location can be downloaded by dialling its patch number on the top knob followed by a single tap on SHIFT. The upper knob shows the patch value as displayed by the MS6 and the corresponding program number in decimal.

When the lower knob is moved clockwise beyond the centre, its label changes to Init 1 and the app then waits for a double-tap on SHIFT to confirm loading of the initialised patch data as shown in Table 2 and sets the MS6 to bank 8 performance mode (the MS6 will show patch 11, bank 8 but its edit buffer will contain the initialised patch sent from the Performance Editor).

Changes made to the current performance patch using the Performance Editor are temporarily held in the MS6's edit buffer so to maintain the patch for future use it must be saved to a Bank 8 location. The upper memory# knob is used to select the required destination and then the write operation is initiated by a hold on the SHIFT button. A prompt is then given to double-tap on SHIFT to confirm the upload to the MS6. There is no need to specifically upload the Performance Editor to the MS6 edit buffer as this is automatically performed whenever a MS6 performance parameter is changed.

A summary of upload and download operations is shown in Table 1.

Table 1 - Summary of upload / download operations

Operation	App Memory Protect knob	Memory# knob	SHIFT gesture	Confirmation
Download edit buffer	Overwrite	eBuffer	Single-tap	N/A
Download memory location	Overwrite	Source memory#	Single-tap	N/A
Upload to memory location	N/A	Destination memory #	Hold	Double-tap SHIFT
Initialise Performance Editor and MS6	Init 1	N/A	N/A	Double-tap SHIFT

Table 2 - Initialised patch data

Instrument	Bank	Tone	#Voices	Channel	Bottom	Top	Volume
1	1	11(1)	3	2	C0	B7	15
2	2	11(1)	3	3	C0	B7	15
3	3	11(1)	0	4	C0	B7	15
4	4	11(1)	0	5	C0	B7	15
5	5	11(1)	0	6	C0	B2	15
6	6	11(1)	0	7	C3	B7	15

By moving the default voice allocation and channels, you can configure split, layered and unison performance modes as shown in Table 3.

Table 3 - Adapting Initialised performance patch

Performance Mode	Change to Initialised Performance Patch
Independent bi-timbral, each with 3 voice polyphony on channels 2 and 3	The default initialised performance
Two layers, 1 channel, 3 voice polyphony	Change instrument 2 channel to the same channel as instrument 1
Single split at C3, 3 voice polyphony	Move default allocated voices from instruments 1 and 2 to instruments 5 and 6
Mode 4 Mono 6 x monophonic on separate channels	Reallocate voices to 1 per instrument and edit instrument 5 top to B7 and instrument 6 bottom to C0
Unison mode for supersaw etc.	Reallocate voices to 1 per instrument, edit all 6 channels to the same value, edit instrument 5 top to B7 and instrument 6 bottom to C0

## 4.4 The Status and Import Section



There are 2 functions on this bottom left knob. The first is to trigger a MS6 status enquiry and this is achieved by moving the knob slightly clockwise away from its default position. The knob will immediately reset and the MS6 status will be briefly displayed. The status comprises the version number of the MS6 firmware, the currently selected bank, the current patch number and the basic receive channel. The status is also written to the MOZAIC log screen. Apart from being a convenient communications check, perhaps the most useful information here is the basic receive channel – as this should be set to be distinct from any channel used in a performance, it is handy to be reminded what channel to reset your keyboard to if you drop out of performance mode, for example to edit a tone.



```
8999055 | MS6: v1.3 bank 8 patch 83 (59) rx 16
8999055 | MS6: Status Received
8999055 | MS6: The received Sysex data is 8 bytes long.
```

Double-tapping the knob (or moving it to centre) starts the import function. The banner MS6: <Waiting for import data> is displayed and the Performance Editor enters a mode where it is looking for another instance of the editor to be opened. If the second instance is seen before the end of the timeout period, its performance data and the pan knob positions are imported into the requesting instance. This function is intended to provide continuity for any future updates of the Performance Editor and will allow performance data saved as MOZAIC patches (as distinct from state saving a host (e.g. AUM) project) to be accessed and carried forward.

## 4.5 Options Only Accessible Through Code Change

A few options are not accessible through the application user interface and require changes to the @OnLoad section of the MOZAIC script. Details appear in the script and are summarised in Table 4.

Table 4 - Script level options

Function	Active when	Default
Auto request performance memory from MS6 on receipt of a bank 8 program change	pcDownloadMode = TRUE	FALSE
'Live' Mode: PB, AT and MOD channelised to follow note channels (use with multi-zone, multi-channel keyboard). See Table 5.	fControllerFollowNotechannel = TRUE	FALSE
Pan Controller. See section 4.2	Always	10
Pan Controller Channel. See section 4.2	Always	0 (channel 1)

After making the edit, the script must be reloaded using the upload button on the Code page of MOZAIC.

## 5 Transmission Requirements

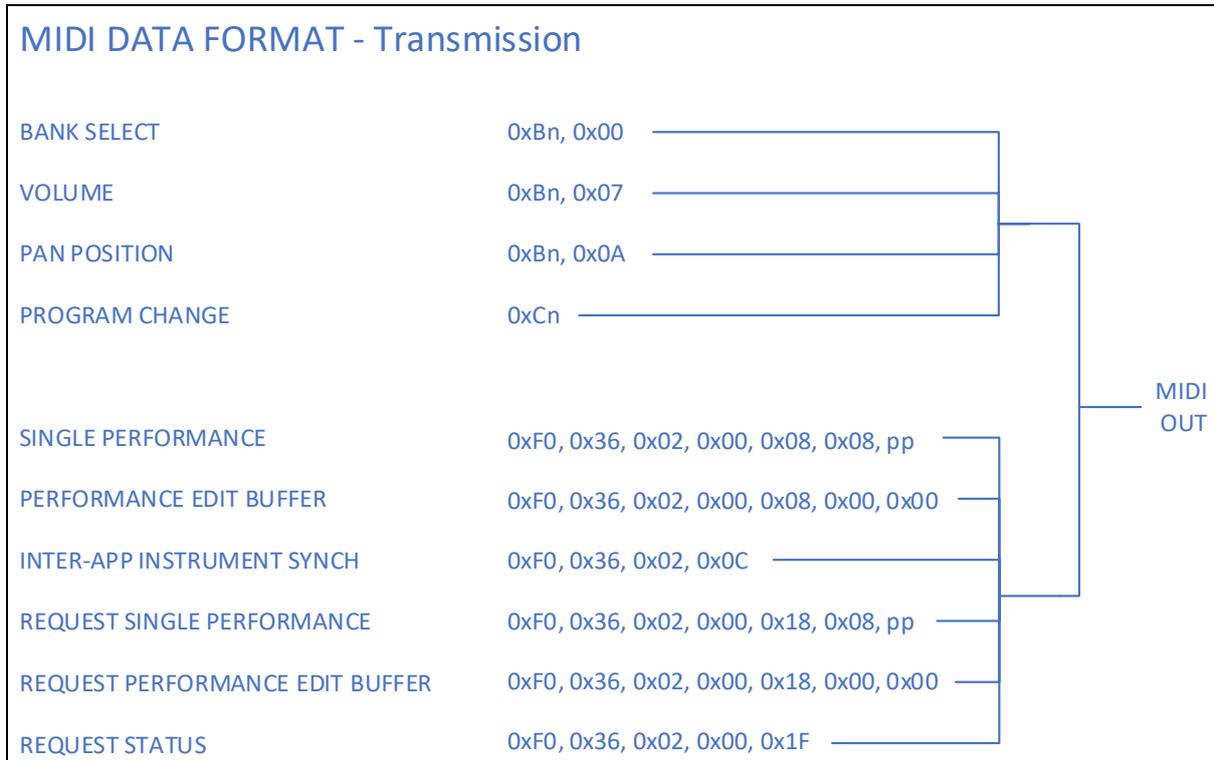


Figure 2 - Transmission Data

Note: the above figure only includes messages that are actively processed and sent out by the MS6 Performance Editor. Messages that are only passed thru (including those rechannelised) are not included but are described in the following sections.

## 6 Transmission Data

### 6.1 Channel Information

Depending on the chosen mode, the MS6 Performance Editor either retransmits incoming MIDI messages with their received channel information or channelises modulation wheel, pitch bend and aftertouch to follow the channel of incoming Note ON messages.

Table 5 - Default and 'Live' modes

Received Message	Transmitted Channel - Default	Transmitted Channel – 'Live' Mode
Note ON/OFF	Channel as received	Channel as received
Modulation Wheel		Channel follows Note On/OFF channel
Pitch Bend		
Aftertouch		
Other Controllers		

The default 'passthru' mode is intended for when the Performance Editor receives multi-channel MIDI messages from a sequencer. The 'Live' mode was created to allow the normally fixed channel controller wheels and pressure to be used within each zone/split of a multi-

channel keyboard setup; these controllers are reset to a neutral position at each change of received channel.

#### 1) Channel Voice Messages

- Note ON/OFF

Range 24 – 119 (C0 – B7)

Note ON/OFF messages are passed thru with Note ON 0x90 with zero velocity being automatically converted to a Note OFF 0x80 message. Note: the MS6 uses the MIDI note convention Middle C (note 60, 0x3C) = C3 whereas the MOZAIK NOTENAME function displays middle C as C4. A workaround has been used to keep the Performance Editor display in step with the MS6's display.

- Control Change

Bank Select

Bank Select messages (CC#0) are transmitted in 2 circumstances:

1. If a Bank Select has been received, it is held and output prior to transmitting a Program Change so the PC is directed to the intended bank
2. When the initialise function is selected, to put the MS6 into Bank 8 Performance Mode, patch 1 (shown on the MS6 as 11).

Modulation Wheel

Range 0 – 127

Modulation Wheel is passed thru according to the mode setting. See Table 5 - Default and 'Live' modes.

Volume

Range 0 – 127.

Received Volume Control Changes (CC#7) are scaled before transmission according to the Performance Editor Volume settings for the corresponding MIDI channel. Same value, same channel combinations are not transmitted. Where the same MIDI channel is common to several instruments within the performance patch, the first (lowest numbered) instrument matching the channel will take precedence. Volume messages on channels not included in a performance are passed thru unaltered but with duplicates filtered out.

Pan Position

Range 0 – 127.

The instrument pan position set on the Performance Editor is transmitted as CC#10 when the channel of incoming note data matches that set for the instrument. Pan position is therefore generally transmitted on a change of channel. The pan controller number and channel may be altered by changing the variables panChannel and panController in the @OnLoad initialisations block.

Pan positions are reset to centre on initialisation.

- Program Change

Table 6 - Program Change - ranges and display

Range:	Banks	PC	MS6	MS6 Display
	1 – 6 & 8	0 – 63	1 – 64	11 – 88
	7	0 – 31	1 – 32	11 - 48

Program Change messages are transmitted when received on the basic receive channel and when the initialise function is selected.

- Aftertouch

Aftertouch is passed thru according to the mode setting. See Table 5 - Default and 'Live' modes.

- Pitch Bend

Pitch Bend is passed thru according to the mode setting. See Table 5 - Default and 'Live' modes. Note: MS6 has 7-bit PB resolution.

## 6.2 System Information

### 1) System real time messages

System real time messages are not processed. Active Sensing messages are filtered by MOZAIC.

### 2) System Exclusive messages

- Parameter Change

System Exclusive messages to control individual parameters are not available. Continuous Controllers are assigned for this purpose.

Making a change to an Instrument Parameter on the Performance Editor causes the performance edit buffer dump to be transmitted to the MS6. A consequence of this is that voices sounding at the time of the change will be cut off.

- Bulk Data

See section 9 Cheetah MS6 System Exclusive Data Format.

The current settings of the Performance Editor can be transmitted to a nominated bank 8 memory location in the MS6 by a long press on the SHIFT button and a double-tap when asked to confirm.

- Dump Request

Dump requests are transmitted to obtain performance and status dumps from the MS6.

As requesting a specific single performance dump from the MS6 does not bring that performance into play, the received dump is transmitted back to the MS6 edit buffer to allow its audition. This echo back is not required when requesting the Performance Edit Buffer or when autoDownloadMode is enabled (MS6 performance memory download triggered on receipt of a Program Change on the basic receive channel).

Unlike the performance dumps, the status request does not require memory protection to be turned off or second step confirmation as the status information is read-only.

- Experimental System Exclusive Features

The inter-app instrument synch system exclusive message is an experimental feature designed to allow integration between the performance editor and e.g. a future version of the MS6 Control Panel tone parameter editor. The synch message is transmitted when the performance editor displayed instrument is changed, when the tone, bank or channel of an instrument is changed or when a Program Change is received on an allocated instrument's channel. Although this SysEx message uses the Cheetah Marketing ID code, it originates purely in this MOZAIK application.

The Performance Editor passes thru dump requests and single tone and tone edit buffer dumps as a further experimental feature to allow integration between the performance editor and e.g. a future version of the MS6 Control Panel tone parameter editor or a hardware controller. It is anticipated that a tone editor app would be routed in series to follow the Performance Editor and therefore to receive tone dumps, they must pass thru the Performance Editor.

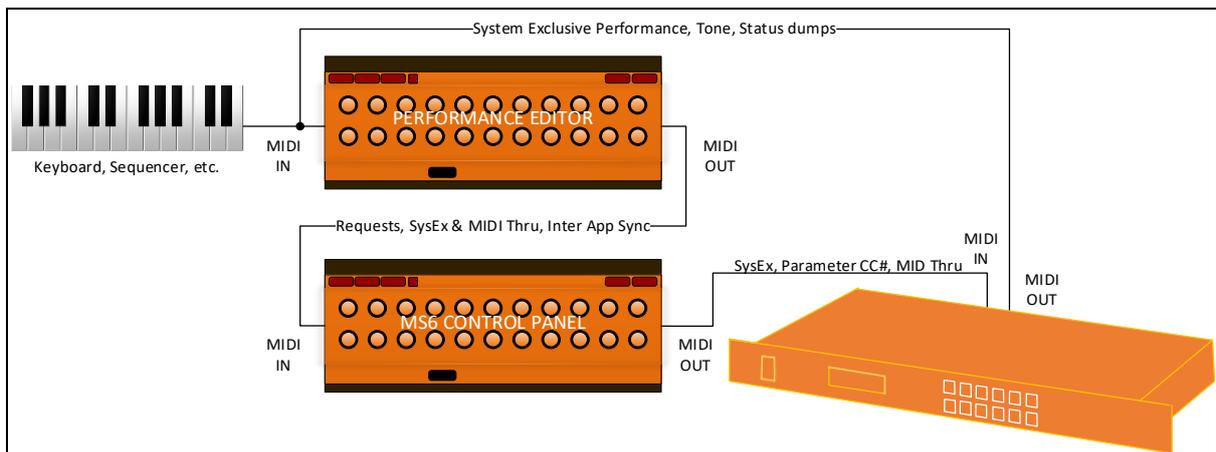


Figure 3 - Experimental Use with Control Panel

## 7 Reception Requirements

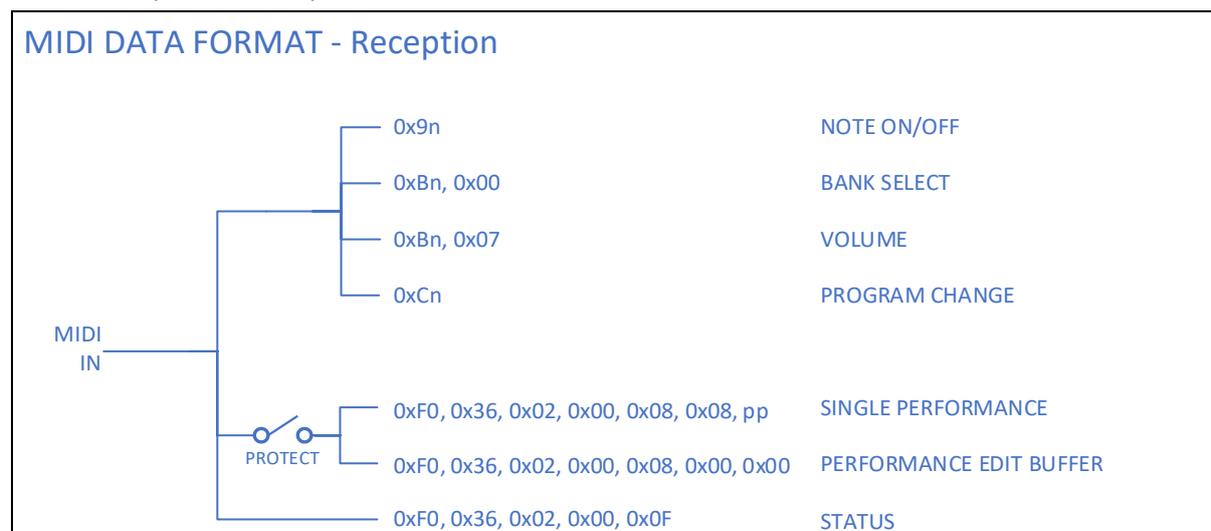


Figure 4 - Reception Data

Note: the above figure only includes incoming messages that actively trigger processing events (i.e. are responded to). Messages that are passed thru (including those rechannelised) are not included but are described in the following sections.

## 8 Reception Data

### 8.1 Channel Information

The MS6 Performance Editor retransmits incoming MIDI messages with their received channel information. MIDI messages are not channelised.

The basic receive channel should be chosen to be distinct from any channels set for individual instruments in the performance patches to utilise the v1.3 ROM bank switching capability to the maximum.

#### 1) Channel Voice Messages

- Note ON/OFF

Range 24 – 119 (C0 – B7)

Note ON/OFF messages are passed thru with Note ON 0x90 with zero velocity being automatically converted to a Note OFF 0x80 message. Note: the MS6 uses the MIDI note convention Middle C (note 60, 0x3C) = C3 whereas the MOZAIC NOTENAME function displays middle C as C4. A workaround has been used to keep the Performance Editor display in step with the MS6's display.

The received Note ON channel number is used to generate pan position messages. See section 4.2 for further detail. The received Note ON channel is optionally used to channelise wheel and pressure controller data as set out in Table 5 - Default and 'Live' modes.

- Control Change

Bank Select

Bank Select messages (CC#0) are held and marked for action when a Program Change is received on the same channel.

Bank Select messages received on channels for which MS6 instruments have voices allocated will update the Performance Editor Bank and Tone settings after a Program Change is received on the same channel. These changes are communicated to the MS6 within a performance patch system exclusive update rather than through CC and PC messages.

Bank Select messages received on the basic receive channel are transmitted when a Program Change is received also on that channel to allow remote switching of the MS6 performance patches. Note that switching the MS6 away from Bank 8 will prevent the Performance Editor from accessing the MS6 edit buffer and limit its functionality.

The MS6 does not recognise Bank Select LSB (CC#20), i.e. bank 8 is selected with MSB (CC#0) set to 8. It may be necessary to multiply the required bank number by 128 if using a 14-bit Bank Selection.

## Volume

Range 0 - 127

Received Volume Control Changes (CC#7) are scaled before transmission according to the Performance Editor Volume settings for the corresponding MIDI channel. See section 6.1 for further details.

- Program Change

See Table 6 - Program Change - ranges and display for reception details.

Program Change messages received on the basic receive channel are re-transmitted preceded by a bank select control change if one is pending.

If autoDownloadMode is enabled, a received Program Change on the basic receive channel will trigger a MS6 performance memory download.

Program Change messages received on channels for which MS6 instruments have voices allocated will switch that instrument's tone patch. See section [xx] on received Bank Select messages for further details.

When a Program Change is received on an allocated instrument's channel, an inter-app instrument synch system exclusive message is transmitted

- Aftertouch

Aftertouch is passed thru according to the mode setting. See Table 5 - Default and 'Live' modes.

- Pitch Bend

Pitch Bend is passed thru according to the mode setting. See Table 5 - Default and 'Live' modes. Note: MS6 has 7-bit PB resolution.

## 8.2 System Information

### 1) System real time messages

System real time messages are not processed. Active Sensing is filtered by MOZAIC.

### 2) System Exclusive messages

- Parameter Change

System Exclusive messages to control individual parameters are not available. Continuous Controllers are assigned for this purpose.

- Bulk Data

See section 9 Cheetah MS6 System Exclusive Data Format

- Dump Request

There is no mechanism to initiate dumps that can be handled by the Performance Editor from the MS6 itself, therefore dumps are typically only received when requested by the Performance Editor. It is possible, however, to send a performance or status dump request message from another source to the MS6 and for the received dump to be handled by the Performance Editor.

Dump requests are passed thru the Performance Editor to facilitate the above.

The Performance Editor passes thru single tone and tone edit buffer dumps as a further experimental feature to allow integration between the performance editor and e.g. a future version of the MS6 Control Panel tone parameter editor. It is anticipated that a tone editor app would be routed in series to follow the Performance Editor and therefore to receive tone dumps, they must pass thru the Performance Editor. See section 6.2 for further detail.

Unlike the performance dumps, status receipt does not require memory protection to be turned off as the status information is read-only.

## 9 Cheetah MS6 System Exclusive Data Format

PERFORMANCE MEMORY (MS6 Firmware upgrade v1.3)

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### HEADER

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Byte	Value	Description
0	11110000	EXCLUSIVE (MOZAIC ADDS THIS)
1	00110110	CHEETAH MARKETING I.D. CODE
2	00000010	PRODUCT DESIGN CODE
3	00000000	MS6 SYNTH MODULE DATA PACKET
4	00001000	PERFORMANCE DATA IDENTIFIER
5	00001000	8 = SINGLE PERFORMANCE 0 = EDIT BUFFER
6	00PPPPPP	PATCH 0 - 63 OR 0 FOR EDIT BUFFER

### INSTRUMENT 1

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Byte	Value	Description	Range
7	0000TTTT	TONE NUMBER 1ST DIGIT	TTTT = 1 - 8
8	0000TTTT	TONE NUMBER 2ND DIGIT	TTTT = 1 - 8
9	0000BBBB	BANK NUMBER	BBBB = 1 - 7
10	0000VVVV	VOICES USED	VVVV = 0 - 6
11	0000LLLL	MIDI BOTTOM LIMIT 1ST DIGIT	LLLL = 1 - 7
12	0000LLLL	MIDI BOTTOM LIMIT 2ND DIGIT	LLLL = 0 - F
13	0000MMMM	MIDI TOP LIMIT 1ST DIGIT	MMMM = 1 - 7
14	0000MMMM	MIDI TOP LIMIT 2ND DIGIT	MMMM = 0 - F
15	0000VVVV	VOLUME	VVVV = 0 - 15
16	0000CCCC	MIDI CHANNEL	CCCC = 0 - 15

17 - 66 INSTRUMENTS 2 TO 6

67 11110111 END OF EXCLUSIVE (MOZAIC ADDS THIS)

### MS6 STATUS

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#### HEADER / DATA

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Byte	Value	Description	Comment
0	11110000	EXCLUSIVE (MOZAIC ADDS THIS)	
1	00110110	CHEETAH MARKETING I.D. CODE	
2	00000010	PRODUCT DESIGN CODE	
3	00000000	MS6 SYNTH MODULE DATA PACKET	
4	00001111	STATUS DATA IDENTIFIER	0x0F
5	000VVVVV	VERSION	Hex e.g. 0x13 for v1.3
6	0000BBBB	BANK	BBBB = 1 - 8
7	00PPPPPP	PATCH 0 - 63	PPPPPP = 0 - 63
8	0000CCCC	BASIC RECEIVE CHANNEL	CCCC = 0 - 15
9	11110111	END OF EXCLUSIVE (MOZAIC ADDS THIS)	

INTER-APP INSTRUMENT SYNCH

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HEADER / DATA

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Byte	Value	Description	Comment
----	-----	-----	-----
0	11110000	EXCLUSIVE (MOZAIC ADDS THIS)	
1	00110110	CHEETAH MARKETING I.D. CODE	
2	00000010	PRODUCT DESIGN CODE	
3	00000000	MS6 SYNTH MODULE DATA PACKET	
4	00001100	STATUS DATA IDENTIFIER	0x0C
5	00000III	INSTRUMENT	OIII = 1 - 6
6	000VVVVV	VOICES	OVVV = 0 - 6
7	0000BBBB	BANK	BBBB = 1 - 8
8	00PPPPPP	PATCH 0 - 63	PPPPPP = 0 - 63
9	0000CCCC	BASIC RECEIVE CHANNEL	CCCC = 0 - 15
10	11110111	END OF EXCLUSIVE (MOZAIC ADDS THIS)	

## 10 MS6 Performance Editor MIDI Implementation Chart

	Transmitted	Recognised	Remarks	
<b>1. Basic Information</b>				
MIDI Channels	16	16	1 - 16	
Note Numbers	No	0 - 127	Channel used for switching	
Program Change	Yes	Yes	TX when RX on MS6 basic receive channel only	
Bank Select response?	No	No	MSB Only	
Modes supported 1, 2, 3, 4, Multi	*****	*****		
Note-On Velocity	No	No		
Note-Off Velocity	No	No		
Channel Aftertouch	No	No	Channelised in 'Live' Mode	
Poly (Key) Aftertouch	No	No		
Pitch Bend	No	No	Channelised in 'Live' Mode	
Active Sensing	No	No		
System Reset	No	No		
Tune Request	No	No		
Universal System Exclusive	No	No		
Manufacturer System Exclusive	Yes	Yes	See Note 1	
NRPNs	No	No		
RPNs 00 - 05	No	No		
<b>2. MIDI Timing and Synchronisation</b>				
MIDI Clock	No	No		
Song Position Pointer	No	No		
Song Select	No	No		
Start Continue Stop	No to all	No to all		
MIDI Time Code	No	No		
MIDI Machine Control	No	No		
MIDI Show Control	No	No		
<b>3. Extensions Compatibility</b>				
General MIDI, DLS, SMF, XMF, SP-MIDI	No to all	No to all		
<b>Control Number Information</b>				
<b>Control #</b>	<b>Function</b>			
0	Bank Select	Yes	Yes	LSB ignored
1	Modulation Wheel	No	No	Channelised in 'Live' Mode
7	Volume	Yes	Yes	Scaled by instrument vol. where channels match
10	Pan	Yes	No	CC# and channel defined in code
Notes				
1. See system exclusive MIDI data format section 9.				

## 11 Definition of MS6 Terms

Term	Description
<b>Bank</b>	Organisational unit for patches. 1 – 7 for tones, 8 for performances.
<b>Basic Receive Channel</b>	The MIDI channel (or OMNI) that applies to single sounds played in POLY mode
<b>Bottom limit</b>	The bottom note limit for an instrument in a performance patch
<b>Edit buffer</b>	Temporary storage for a patch allowing editing
<b>Instrument</b>	A timbral unit defined by a bank, a tone, a number of voices, a keyboard range, a MIDI channel and a volume.
<b>Patch</b>	A tone or performance that can be stored and retrieved
<b>Performance</b>	A multi-timbral patch usually of 2 or more instruments
<b>Play / Edit modes</b>	Swaps the user interface from changing banks and patches to selecting and adjusting parameters.
<b>Program</b>	MIDI program numbers 0 – 63, MS6 patches 11 - 88
<b>RAM banks</b>	Banks 6, 7 and 8 are read / write
<b>ROM banks</b>	Banks 1 – 5 are read only
<b>Sounds</b>	What you hear when patches (Tones) are played
<b>Tone</b>	Sound creation is by editing the tone's parameters
<b>Top limit</b>	The top note limit for an instrument in a performance patch
<b>Voice</b>	Allocating voices determines the degree of polyphony available for an instrument.

## 12 YouTube Demo

Cheetah MS6 Snow is Dancing Performance Editor Demo - MOZAIC script

<https://youtu.be/22TGRtnXsns>

Description for YouTube MS6 Snow is Dancing Demo video

This MIDI sequence of Debussy's 'Snow is Dancing' is playing on a single Cheetah MS6 6-voice poly, multi-timbral, mono output hardware synthesiser from 1988. Access to the MS6 performance mode parameters and the spatial panning MIDI effect are enabled through a custom script for the iOS MOZAIC Plugin Workshop AUv3 app.

While the multi-timbrality and ability to edit parameters from the front panel were the MS6's unique sales points at the time, the complexity of setting up the performance mode meant few users would exploit it effectively. The single mono audio output also did not encourage multi-timbral use. This MOZAIC script was developed to address these two limitations.

Note: the MIDI System Exclusive protocols used in the Performance Editor application are specific to the Kristofer Maad v1.3 upgrade firmware ROM (<http://www.maad.net/ms6/index.html>). The spatial realtime processing is not dependent on this ROM.

The performance patch used in the demo has 4 instruments, 3 are monophonic and the third has 3 voices. The MIDI sequence is played on Cubasis 3.3.

The MOZAIC app is hosted in the Kymatica AUM Audio Mixer which also handles the routing for the panner, the Klevgrand Brusfri noise reduction app and the FAC Alteza stereo reverb app.

The MOZAIC script and the User / Technical Manual are available as a free download at [PatchStorage.com](http://PatchStorage.com)

Timestamps

00:00 Title

00:07 A few of the Basic Functions

00:37 Hosting and Routing

01:21 Program Change Handling

01:54 Thanks for Watching

02:12 End Screens

Note: Debussy's piece is notated with very quiet dynamics. I have mastered around 11 LFUS so you should really turn it down to listen but I won't tell if you don't.