



How To...Guide

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1 Introduction

The **MOTAS-6** synthesizer is a very powerful and complex instrument and so it takes time to fully appreciate and understand all the capabilities and possibilities. It is hoped that this guide, in conjunction with the User Guide, makes this process a little faster and easier, as well as perhaps revealing some capabilities or techniques that you weren't aware of.

This How to... guide is intended to suppliment the **NOTRS -6** User Guide available from motas-synth.uk/downloads.html. Whereas the User Guide works through each of the features in order, this guide often takes an alternative approach where it is explained how to setup or use the features/settings to achieve a goal. This guide also expands on some more advanced topics that are not covered in detail in the User Guide.

We suggest that you also read the appropriate section(s) in the User Guide. If further guidance is needed please email support@motas-synth.uk

For the latest news, firmware and document updates please visit www.motas-synth.uk.

Whilst every effort has been made to ensure that this guide is as accurate as possible Motas Electronics Limited will not be liable for any erroneous information. This manual may be updated at any time without prior notice. Please check the website for updates.

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2 Configure and control

2.1 Change the active parameter page without adjusting the offset values

Engage the 'value lock' feature (VALUE LOCK to prevent the offset parameter from changing and then turn the O rotary knob corresponding to the new parameter page you want to access.

Another approach is to turn the \bigcirc rotary knob to access the new page and then turn the \bigcirc rotary knob back to restore the setting, however it can be hard to set the value exactly back as original which may be important e.g. when accessing the oscillator pitch control pages.

2.2 Adjust page offset values without changing the active parameter page

Engage the 'page lock' feature PAGE LOCK to prevent the active page from changing. This can be useful when you are busy setting the modulation settings on a page but you find that other pages need their offsets tweaking (such as filter cutoff, or signal levels) but you don't want to leave the current page. Another use case is when wanting to study the oscilloscope or spectrum analyser whilst adjusting settings.

2.3 Set the knob control mode

Since the rotary knobs ① are real potentiometers (and not continuous encoders) the current knob value will typically not match the offset setting when a new patch is loaded.

There are 5 options to set how turning a knob affects the patch offset value: (excluding the pitch controls which always use relative mode):

RELATIVE	relative change
JUMP	value jumps to knob position once
	knob is moved a small amount
SNAP	no changes until knob position
	matches current value
SCALED	scaled changes giving maximum
	immediate control

You may find that the **SCALED** mode is the best choice as this mode gives maximum control of the offset by compressing/expanding changes depending on the position of the knob relative to the current offset value.

2.4 Set the 5 fast-access patches loaded at power-on

Pressing $\frac{1}{2}$ **1**, $\frac{1}{2}$ **2**, $\frac{1}{2}$ **3**, $\frac{1}{2}$ **4** or $\frac{1}{2}$ **5** normally switches between 5 fast-access patches. To set these patches first load in the desired patches into each of the slots and/or edit the patch settings in each slot. Then press $\frac{1}{2}$ **SAVE** and choose the **SAVE STARTUP** option. This will save the current 5 patches in the fast-access slots to be restored at next power-on.

S	AVE PATCH	
	BANK 1	
	IJMH STRINGS	
4	- SAVE STARTUP	

2.5 Save a set of 5 fast-access patches

You may want this set of 5 patches for a live performance to be able to quickly switch between patches, or as a set for use with the vector morphing feature, or as a set for use with the arpeggiator set to cycle through patches.

First load in the desired patches into each of the 5 fastaccess slots and/or edit the patch settings in each slot. Then press in SEQUENCE and then press in SAVE to save into one of the 16 slots (2 banks of 8 sequences). Saving as a 'sequence' allows saving of the set of 5 patches together, even if the sequence data is empty or not used.

2.6 Initialise patch settings

When on a patch parameter page press to enter the copy/reset/randomise page.

Press $\textcircled{h} \uparrow / \textcircled{h} \downarrow$ to select the **RESET PATCH** option and then press $\textcircled{h} \rightarrow$ to reset the parameter settings to default values on *every* parameter page.

The patch parameter mappings and other settings (under the setup pages) are also reset to default values.

To reset the patch parameters only on the current page select the **FESET FAGE** option and then press $\textcircled{b} \rightarrow$ to reset all parameters to default values on the current parameter page.

COPY	SELECT CO)PY
	DESTINAT:	ION
RESET	PAGE	
RESET	PATCH	+
RANDON	1ISE PAGE	
RANDON	1ISE PATCH	-
	DEF	≥тн 🚹

2.7 Copy patch settings

When on a patch parameter page press to enter the copy/reset/randomise page.

COPY	SELECT CO	
	DESTINATI	ON
RESET		
RESET	PATCH	+
BANDON	1ISE PAGE	
	1ISE PATCH	
	DEP	тн 🛛

Copy entire patch

Press the new patch preset destination $\frac{1}{2}$ **1** $-\frac{1}{2}$ **5** to copy the patch settings over to the new fast-access preset destination.

Copy modulation settings to all pages

To copy the MIDI/CV modulations setting for that modulation source from the current page to *all* parameter pages press (NOTE , (VELOCITY (M1 (M2 (M3

or the copy operation replicates the amount, secondary amount, secondary destination and unipolar mode to all pages.

A fast way to zero a modulation on all pages is to set the values to zero and then do a copy-to-all pages operation

Copy global LFO settings to all pages

To copy the chosen global LFOx and the LFOx modulation amount to *all* pages from the current page press to react the for LFOx.

Copy local LFO settings to all pages

Press in or in FREQUENCY for the local LFO to copy the corresponding values to *all* pages from the current page. To copy the local LFO modulation amount and other LFO settings (e.g. single-shot mode, pitch track etc.) to *all* pages from the current page press in C for LFO.

Copy EG settings to all pages

2.8 Control using a PC

Free software MotasEdit for controlling **MOTRS-6** is available from www.motas-synth.uk/downloads.html. This software is available as a standalone executable and as a plug-in version for use with 3rd party DAW software.

For best results always use a USB connection as the data transfer is faster than using MIDI DIN connectors.

The MotasEdit software allows you to apply firmware updates (see 2.9), control **MOTRS – 6** patch settings, archive (load and save) patch, pattern and sequence settings, live screenshots and more.

To send (i.e. control) **MOTRS-6** patch settings from the computer MIDI NRPN messages are used. For firmware updating, archiving of data, live screenshots and other functions SysEx data is used. Normally you would set **NRPN+SYSEX** for both **USB IN** and **USB OUT** to allow full bi-directional functionality on **SETUP PAGE**

15. If you are using MIDI DIN connections then you would need to set the **MIDI IN** and **MIDI OUT** settings appropriately.

NRPN / S	YSEX / THRU
MIDI IN	
MIDI OUT	OFF
USB IN	NRPN+SYSEX
USB OUT	NRPN+SYSEX
	SETUP PAGE 15

Set the MIDI **CHANNEL** to match that set in the MotasEdit (or set to **ANY** where data will be sent on channel 1 and received on any channel).

MIDI SETT	INGS
MODE Channel Low Note High Note	GLOBAL Any Any C-2 C-2 GB GB
	SETUP PAGE 6

2.9 Update the firmware

Updated firmware for **NOTAS – 6** may be released from time to time to make improvements and add new features. These are available from www.motas-synth.uk/downloads.html.

The update file (MotasFirmware_vXXXXXXX.mbin) contains the new binary firmware for **MOTAS-6**.

Use the MotasEdit software (see 2.8 for details) to apply the update to **MOTAS – 6**. The firmware update is sent using MIDI system exclusive (SysEx). Ideally you should connect **MOTAS – 6** to your PC using USB. MIDI DIN connectors can be used but this interface is much slower.

You must ensure that your **MOTAS-6** is set so that **ALLOW UPDATES** is set to **YES** to allow the firmware updating process, on **SETUP PAGE 17**.

DISPLA	Y CO	NTRA:	5 T	63
SCREEN	SAVE	B		0 F F .
EXT. P	AGE	CHAN	3E 1	YES.
ALLOW	UPDA	TES		YES.
MENUS	RESE	Т		NO.
	51	ET U P	PAGE	1.7

It is possible to apply an older firmware version but this is not recommended especially since newer serial number **MOTAS-6** units may not function correctly with older firmware. It is recommended to always update to the latest firmware available.

2.10 Make an LFO sync to clock

All of the LFOs can be synced to MIDI clock. First ensure that the LFO **FREO MODE** is set to **CLK SYNC**



then edit the frequency of the LFO to set the sync-timing. When set to synchronise to the clock the display will show a metronome indicator and the LFO period value (down to as fast as 32 triplet). The icon displayed is **S** in this mode.

TEMPO SETTINGS

CLK	SOURCE	INTE	RNAL
INT	TEMPO	122	BPM
CLK	ОШТ		OFF
SEQ	TEMPO DIV	J	OFF
	SET	UP PA	GE 3.

Now set the CLK SOURCE to EXT MIDI,

EXT CLK or **INTERNAL** to choose external MIDI clock, external CV/gate or internal clock.

PATCH SETT	<mark>ings 2</mark> Atch global
LFO SYNC	OFF OFF
	TO EDIT LFO Etup page 2

2.11 Reset LFO on MIDI start

Set **LFO SYNC SEO** to **ON** so that the LFOs are synchronised (reset) when the sequence or pattern is rewound to the start, play started or a MIDI START real-time message is received. This feature is useful when controlling **MOTAS-6** from an external sequencer and you want the LFOs to be synchronised with the track.

PATO	H		TINGS	
				GLOBAL
LFO	SY	NC		<u>ON</u>
PRES	ss	+/-	ED IT Setup	LFO Page 2

2.12 Setup the source of modulators M1-M4

To setup the sources of the 4 global modulations M1–M4 that can be applied to each parameter page access **SETUP PAGE**. You can freely choose from many MIDI CC controllers, MIDI aftertouch, MIDI pitchbend, CV/-gate signals, MIDI note value, MIDI velocity and even the output from the global LFOs and EGs.

MODULATO	RS		
MODE		GLOBAL	
M1		001	
M2		002	
MЭ		007	
M4		AFT	
CC MOD W	IHEEL		
	SETUP	PAGE 7	

You could setup 5 independent LFOs to modulate a single parameter page by assigning global LFO2, LFO3 and LFO4 to global modulators M1, M2 and M3. These, together with the page global LFO set to LFO1 and the page-local LFO gives a total of 5 simultaneous independent LFO signals! A similar trick can allow 5 independent EGs to modulate a single parameter page.

2.13 Control playing style for note-off events

On the SETUP PAGE 1 you can set the

TRACK NOTE-OFF modes. Sometimes you may want the oscillators to update pitch after note-off events when multiple notes are held, depending on your playing style. If you hold a note down and play another note on and off then with **TRACK NOTE-OFF** set to **FITCH** then the pitch will jump to match the note helddown (which note depends also on the individual oscillator note-tracking options), otherwise it won't respond to the note-off event.

PORTA MODE OFF Porta Time/Rate Time Porta Value off
TRACK NOTE-OFF P+EG PITCHWHEEL SENS. 12 Setup Page 1

In mode **P+EG**, additionally the EGs can re-trigger on the note-off event, although this also depends on the EG **GATE/TRIG** setting too (set to **EVERY** to ensure always re-triggers, for example).

2.14 Play multiple units together polyphonically

Multiple **MOTAS** – **G** units can be operated so that they play together as a polyphonic synthesizer. Up to 16 units can be operated together in this way. In this mode called 'polychain' each new note is played by the next unit in the chain (and if the end of the chain is reached then starting again from the beginning of the chain). This is sometimes called 'round-robin' voice assignment and allows true polyphonic playing (unlike the simpler note-stealing method).

Each unit should be assigned a unique number in the chain and every unit in the chain needs to be set with the total number of units in the chain for this to work in the normal way. Of course, if you want things to behavely differently you do not have to adhere to this rule!

POLYCHA	IN	O N
DEVICE	1 OF 15	
	POLY SETUP Current pa Setup pag	

The 'polychain' algorithm runs independently on each of the separate **MOTRS-6** units and so in fact it is not required that the units are daisy-chained to each other. However, this is the easiest way to set things up and allows editing of patch parameters on the first unit in the chain to be transfered automatically to the other units along the chain to maintain the 'polysynth' operation.

The normal setup of 'polychain' would have the first unit in the chain connected to an external MIDI controller (or computer) via USB or MIDI DIN to receive the played notes. This first unit needs to forward the MIDI controller data to the second unit and so its **MIDI OUTT** should be set to **THRU+FILL** so that the MIDI controller data (note on/off etc) will be merged with the internal controller data (to allow patch editing) and sent to the next in the chain.

All the units need to operating on the same MIDI channel and so the easiest way is to set **CHANNEL** to **ANY** for all of the units.

MIDI SETT	INGS
MODE Channel Low Note High Note	GLOBAL Any Any C-2 C-2 G5 G5
	SETUP PAGE 6

The remaining units in the chain need be connected to the previous unit in the chain with a MIDI DIN cable and to have **MIDI TIN** set to **NREN** or **NREN+SYSEX** (to allow patch editing data from the first unit) and **MIDI OUT** set to **THRU** to simply forward the data from the first unit only. The last unit in the chain, of course, does not have to **MIDI OUT** set at all.

NRPN	1.3	SYSEX	/	THRU
MIDI	IN			
MIDI	011	ſ		OFF
USB	IN	N	RP.	N+SYSEX
USB (ОЦТ	N	RP.	N+SYSEX
		SETL	IP	PAGE 15

Finally, of course, all of the audio outputs from each **NOTRS-6** need to be mixed together using an external audio mixer.

2.15 Using external CV/gate

Normally **MOTAS – 6** is played and controlled using MIDI but external analogue CV (control voltage) signals can be used too. There are 4 external CV/gate inputs and each input can be assigned to a number of roles. The offset and gain can be independently adjusted for each input for compatibility with a wide range of external equipment.

Set the mode to **CUPTICH** to allow the CV signal to control the basic pitch of **MOTAS-6**. This will override the MIDI note control of pitch, and will bypass any tuning setup (see section 2.19 for tunings).

To trigger the EGs using CV/gate inputs set the mode to **GATE+** or **GATE-** to trigger on rising or falling voltage, respectively. The trigger point threshold is adjusted by setting the offset for that CV input.

CV/gate can also control the tempo when set to CLOCK+ or CLOCK-, in this case the CLK SOURCE should be set to EXT CLK on SETUP PAGE 3.

The **CV SMOOTHING** parameter applies a low-pass filter to the CV/gate signals which smoothes out and delays the response to input CV (except when used for gate or clock signals). This can be useful to filter out noise or to add a delayed effect. When set to **OO** there is no smoothing.

CN/GF	ATE MODES	
IN1	CV PITCH	
IN2	CLOCK+	
IND	OFF	
IN4	OFF	
$\mathbb{C} V \neq \mathbb{M}$	IDI OFF	
ON SN	10 O T H I N G 👘	00
	SETUP	PAGE 10

To set the offset and gain for each input access **SETUP PAGE 11**

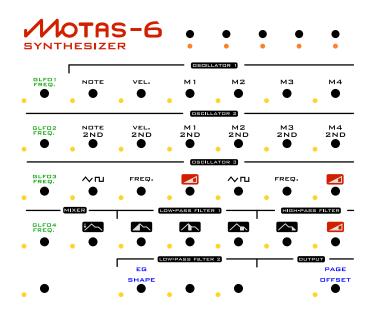
The raw input CV/gate signal for each of the 4 inputs is shown on the display as a dimmed horizontal bar. Underneath this bar is a brighter bar showing the current resolved CV/gate signal, after the offset and scaling adjustment. For gate signals this will be zero or full width corresponding to gate off or on respectively. This feature allows easier setup of the offset and scaling required for each input.

o v∕ e	ATE AC	JUSTI	MENT	
IN1	0.000	2.00		
IN2	0.000	1.00	5	
IN3	0.000	1.00)	
IN4	0.000	1.00)	
0	FFSET	SCALE	Ξ	
		FILE	PAGE 1	1

2.16 Edit page parameters such as EG attack using rotary knobs

Whilst on a parameter page engage in PAGE LOCK and VALUE LOCK. Now the rotary knobs O allow realtime editing for many of the parameters for that page.

The table below which shows what is controlled from each rotary knob and the figure below shows the same information, overlaid onto the **MOTRS-6** panel. For example, turning **C LPF-1** will now control the EG attack.



This feature is useful for live editing of the page patch parameters, and for faster more immediate editing of the patch parameters using the $\frac{1}{2}$ rotary knobs.

Rotary knob	Control function
✓ 050-1	Note mod amount
() рітен 050-1	Velocity mod amount
	M1 amount
✓ OSC-1	M2 amount
	M3 amount
6 🗖 OSC-1	M4 amount
Ó 🗖 050-2	Note secondary amount
EITCH OSC-2	Velocity secondary amount
🔨 🔽 0SC-2	M1 secondary amount
√○ 0SC-2	M2 secondary amount
🚫 🔲 OSC-2	M3 secondary amount
🚫 SUB 0SC-2	M4 secondary amount
🔨 🗾 ОЅС-Э	LFOx waveform
🌔 епсн ОSC-Э	LFOx frequency/tempo
🚫 💽 ОSС-Э	LFOx amount
🚫 🗖 0SC-3	local LFO waveform
	local LFO frequency
🔨 🔲 05С-Э	local LFO amount
🔨 🗾 MIXER	EG delay
C LPF-1	EG attack
LPF-1	EG decay
√∑ LPF-1	EG sustain
HPF	EG release
K HPF	EG level
C LPF-2	EG shape
	Page offset
MASTER PITCH	global LFO1 frequency
PHASE MOD 050-2	global LFO2 frequency
PHASE MOD 050-3	global LFO3 frequency
MIXER MIXER	global LFO4 frequency

2.17 Paraphonic playing

MOTRS-6 is a paraphonic synthesizer. The 3 VCOs can separately be configured to track pitch independently, and EGs can be applied to control the mixing of the VCOs, but ultimately their outputs are all mixed together and pass through the filters and final output together. This is in contrast to a true polyphonic synthesizer where each

'voice' is fully independent all the way through to the final output.

There are many 'flavours' of paraphonic operation. The simplest and often most effective is to set each of the 3 VCOs to track incoming notes in modes **HIGHEST**, **MIDDLE** or **LOBEST** respectively. With this setup when one note is played all VCOs play the pitch of that note. When 2 notes are held 2 of the VCOs play the highest note and the 3rd plays the lowest. When 3 notes are held each VCO is set to a separate pitch. This allows easy playing of 3-note chords with the benefit of a rich sound on 1-note playing (as all 3 VCOs then combine).

050-1	PITCH	
	TRACK Sync	HIGHEST OFF

For true polyphonic operations multiple **MOTRS-6** units can be operation together, see section 2.14.

2.18 Use the arpeggiator without an external keyboard

The arpeggiator has a mode that can play without triggering from an external source. Set **HODE** to **HODE** to **HODE** which means 'hold-internal' then the notes played can be edited on page 3 of the arpeggiator setup.

ARPEGGIA	ITOR	
SOURCE		GLOBAL
MODE		H-MIDI
DIRN		ЦP
PATTERN		16
LEAP		OFF
RANGE		2
	ARPEG.	PAGE 1

Either fixed chord formations can be chosen (12 types such as MAJOR, MINOR, AUG ...) or custom-defined notes can be set. Up to 8 notes can be specified.

ARPEGGI	ATOR	INT		
CHORD		MAJOR		
NOTES		8		
1		5		
2		6		
Э		7		
4		8		
	ARP	EG. PI	AGE	Э

2.19 Setup custom tunings

A 'tuning' is the mapping between the played note and the resulting pitch (frequency). The tuning will be correct when no modulations are applied to the master pitch page and the individual VCO pitch pages and the offsets are set to zero semitones. If note modulation is applied then deviations will occur which can be useful way to detune according to note played. Note that the tunings are only used for MIDI playing of **NOTRS -6** – when using CV to control pitch there is no such mapping in operation (the pitch is directly controlled by the CV voltage).

You can choose from 32 built-in preset tunings and from a further 32 user-defined tunings that you import (via MIDI tuning commands). Make the selection from **SETUP PAGE 12**.



2.20 Live tweaking: modify any patch parameter using MIDI CCs or rotary knobs

All of the **MOTAS** – **G** parameters can be controlled using NRPN MIDI controller data but this can be fiddly to setup and use with some external hardware. The MotasEdit software does use NRPNs to control and read the parameters to allow full, bidirectional high-resolution control of all parameters.

A simpler method can be employed using standard MIDI CCs (continuous controllers) from CC #1 (modulation wheel) to CC #24 using a pameter mapping system. This mapping is necessary because there are far too many parameters in each MOTAS – 6 patch to allow full control from the limited number of CC controllers. The mapping system allows you to choose which patch parameters is assigned to which CC controller. This is accessed from

SETUP PAGE 5.

PARAMET	ER MAP	0 N
MODE	GLO	BAL
SLOT		2
PAGE	GLOBAL PAR	AMS.
DEST	LF02 WAVEF	0 RM
	SETUP PAG	8 5

When the parameter map is **IN** CC control is active. You can set the parameter map to be **GLOBAL** meaning the same mapping is used for all patches or **FATCH** which is specific to each patch and saved within each patch. The table below show the mapping options. They are 2 settings needed for each mapping (the 'page' and the 'dest') allowing control of all patch settings (more than 1600 parameters!).

DFF LFOT WAVEFORM OFFSEI PORT INUE[RATE CLOBAL PARAMS LFOT FREQUENCY PAGE OPTION 1 PORT VALUE MASTER PITCH LFOT SINGLE-SHOT NOTE OPTION 2 PORT VALUE OSC-1:PITCH LFOT SINGLE-SHOT NOTE OPTION 2 PORT VALUE OSC-1:PITCH LFOT SINGLE-SHOT NOTE OPTION 2 PORT VALUE OSC-1:PITCH LFOT SINGLE-SHOT NOTE 2ND DEFTH LFO SINGLE-SHOT OSC-1:PULSE MOD. LFO2 TEMPO* VEL. 2ND DEST OSC-2:EVEL OSC-2:PHASE LEVEL LFO2 TEMPO* VEL. 2ND DEST OSC-2:EVEL OSC-2:RUE LFO3 TEMPO* M1 2ND DEST OSC-2:SUB-OSC OSC-2:SUB-OSC LFO3 STRUCRESET M2 2ND DEST OSC-2:SUB-OSC OSC-3:SUARSMOD LFO3 TEMPO* M1 2ND DEST OSC-3:RUASE OSC-3:RUASE LFO4 TREQ WODE M2 DEPTH OSC-3:RUASE OSC-3:RUASE LFO3 TEMPO* M2 RESPONSE OSC-3:RUASE OSC-3:RUASE LFO3 SYNC/RESET M2 2ND DEST OSC-3:RUASE OSC-3:RUASE LEVEL LFO4 SINGLE-SHOT M3 2ND	Global/Page/Patch	Global Destination	Page Destination	Patch Dest.
MASTER PITCH LFO1 TENIÃO:* PAGE OPTION 2 PORT VALÚE OSC-1:LEVEL LFO1 SINGLE-SHOT NOTE 2ND DEST NOTE OFF TRACK OSC-1:RIANGLE LFO1 FREQ MODE NOTE 2ND DEST PW SENS. OSC-1:RUNTOTH LFO2 FREQUENCY VELOCITY DEPTH LFO SYNC. OSC-2:RUSE MOD. LFO2 FREQUENCY VEL.2ND DEST OSC-2:RUSE OSC-2:RUSE LFO2 SINGLE-SHOT VEL.2ND DEST OSC-2:RUSE OSC-2:RUSE LFO2 SINGLE-SHOT VEL.2ND DEPTH OSC-2:RUSE OSC-2:RUAR LFO3 TEMPO* M1 END DEPTH OSC-2:SUB-OSC OSC-2:SUB-OSC LFO3 TEMPO* M1 ENSPONSE OSC-2:SUB-OSC OSC-3:SHTCH LFO3 TEMPO* M1 ENSPONSE OSC-3:SUB-OSC OSC-3:SHTCH LFO3 TREQUENCY M1 ZND DEPTH OSC-3:SINTCH OSC-3:SHTCH LFO3 TREQUENCY M2 ZND DEST OSC-3:SINTCH OSC-3:SHTCH LFO4 TREQUENCY M3 ZND DEST OSC-3:SINTCH OSC-3:SINTCH LFO4 TREQUENCY M3 ZND DEST OSC-3:SINTCH OSC-3:SINTCH LFO4 TREQUENCY M3 ZN	OFF	LFO1 WAVEFORM	OFFSET	PORT MODE
OSC-1:LEVEL LFO1 SINGLE-SHOT NOTE DEPTH NOTE OFF TRACK OSC-1:RINAGLE LFO1 SYNC/RESET NOTE 2ND DEPTH LFO SYNC. OSC-1:RINAGLE LFO1 FRQ MODE NOTE RESPONSE OSC-1:SAWTOOTH LFO2 REQUENCY VELCITY DEPTH OSC-1:PULSE LEVEL LFO2 TEMPO* VEL. 2ND DEST OSC-2:SURAES OSC-2:SURAES VEL. 2ND DEPTH OSC-2:PHASE MOD LFO2 SYNC/RESET VEL. RESPONSE OSC-2:SURAE LFO3 SWAVEFORM M1 2ND DEPTH OSC-2:SQUARE LFO3 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LFO3 SINGLE-SHOT M2 DEPTH OSC-2:SQUARE LFO3 SINGLE-SHOT M2 2ND DEPTH OSC-2:SQUARE OSC-3:SIEVEL LFO3 SINGLE-SHOT M2 DEPTH OSC-3:SUARE LFO3 SINGLE-SHOT M2 ZND DEPTH OSC-3:SIEVEL LFO4 SINGLE-SHOT M3 ZND DEPTH OSC-3:SULSE MOD LFO4 FREQUENCY M3 ZND DEPTH OSC-3:SWATOOTH LFO4 FREQUENCY M3 ZND DEPTH OSC-3:SULSE MOD LFO4 FREQUENCY M3 ZND DEPTH OSC-3:SULSE MOD MA ZND DEPTH OSC-3:PULSE LEVEL LFO4 FREQUENCY M4 ZND DEPTH <t< td=""><td></td><td></td><td></td><td></td></t<>				
OSC-1:PITCH LFO1 SPRC/RESET NOTE 2ND DEST PW SENS. OSC-1:SRUATOOTH LFO1 FREQ MODE NOTE 2ND DEPTH LFO SYNC. OSC-1:SRUATOOTH LFO2 TREQUENCY VELOCITY DEPTH UFO SYNC. OSC-1:SRUE LEVEL LFO2 TEMPO* VEL. 2ND DEST OSC-2:PHASE MOD LFO2 SINGLE-SHOT VEL. 2ND DEST OSC-2:PHASE MOD LFO2 SINGLE-SHOT VEL. 2ND DEST OSC-2:RUADE LFO2 SINGLE-SHOT VEL. 2ND DEST OSC-2:RUAR LFO3 TEMPO* M1 2ND DEPTH OSC-2:SQUARE LFO3 TEMPO* M1 RESPONSE OSC-2:SQUARE LFO3 TEMPO* M1 2ND DEPTH OSC-2:SQUARE LFO3 TEMPO* M1 RESPONSE OSC-2:SQUARE LFO3 TEMPO* M1 RESPONSE OSC-2:SQUARE LFO3 STRUESET M2 RESPONSE OSC-3:RUASLE LFO3 TEMPO* M2 RESPONSE OSC-3:RUASLE LFO3 SYNC/RESET M2 RD DEST OSC-3:RUASLE LFO4 FREQ UENCY M3 DEPTH OSC-3:RUASLE DEOTH OSC-3:RUASLE LFO4 SINGLE-SHOT M3 RESPONSE M2 RESPONSE DSC-3:SAWTOOTH LFO4 SINGLE-SHOT M3 RESPONSE				
OSC-1:TRIANGLE LF01 FREQ MODE NOTE 2ND DEPTH LF0 SYNC. OSC-1:SAWTOOTH LF02 WAVEFORM NOTE RESPONSE OSC-000000000000000000000000000000000000				
OSC-1:SAWTOOTH LF02 WAVEFORM NOTE RESPONSE OSC-1:PULSE MOD. LF02 FREQUENCY VEL.ORT DEPTH OSC-1:PULSE LEVEL LF02 TENPO* VEL. 2ND DEST OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEST OSC-2:IEVEL LF02 SINGLE-SHOT VEL. RESPONSE OSC-2:IEVEL LF03 TEMPO* MI 2ND DEST OSC-2:SQUARE LF03 SINGLE-SHOT MI 2ND DEST OSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LF04 FREQUENCY M3 2ND DEPTH OSC-3:PITCH LF04 FREQUENCY M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 FREQUENCY M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SINC/RESET M3 RESPONSE MIXER:FB/EXT EG1 DELAY M4 DEPTH MIXER:FB/EXT EG1 SUSTAIN LF0X CHOICE LP1:RESONANCE EG1 SUSTAIN LF0X CHOICE LP1:REXPENANCE				
OSC-1:PULSE MOD. IF02 FREQUENCY VELOCITY DEPTH OSC-2:PHASE MOD IF02 TEMPO* VEL. 2ND DEST OSC-2:PHASE MOD IF02 SINC/RESET VEL. RESPONSE OSC-2:PITCH IF02 SINC/RESET VEL. RESPONSE OSC-2:RIANGLE IF03 TEMPO* MI 2ND DEST OSC-2:RIANGLE IF03 TEMPO* MI 12ND DEST OSC-2:SAWTOOTH IF03 TEMPO* MI RESPONSE OSC-2:SUB-OSC IF03 SINGLE-SHOT M2 DEPTH OSC-3:PUCH IF03 TEMPO* MI RESPONSE OSC-3:PITCH IF03 TEMPO* MI RESPONSE OSC-3:PITCH IF04 SINCLE-SHOT M2 ND DEST OSC-3:PITCH IF04 FREQUENCY M3 2ND DEST OSC-3:PITCH IF04 SINCLE-SHOT M3 2ND DEST MIXER:NOISE IF04 SINCLE-SHOT M4 DEPTH MIXER:NOISE IF04 SIN				LFO SYNC.
OSC-1:PULSE LEVEL LF02 SINCLE-SHOT VEL. 2ND DEST OSC-2:EVEL LF02 SINCLE-SHOT VEL. 2ND DEPTH OSC-2:EVEL LF02 SINC/RESET VEL. RESPONSE OSC-2:EVEL LF03 WAVEFORM M1 DEPTH OSC-2:SQUARE LF03 TRRQUENCY M1 IND DEST OSC-2:SQUARE LF03 SINCLE-SHOT M2 RESPONSE OSC-3:SWTOOTH LF03 SINCLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINCLE-SHOT M2 ZND DEST OSC-3:SUEVEL LF04 WAVEFORM M2 RESPONSE OSC-3:SUEVEL LF04 FREQUENCY M3 DEPTH OSC-3:SWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:SUEVEL LF04 FREQUENCY M3 DEPTH OSC-3:SWTOOTH LF04 SINC/RESET M3 DEPTH OSC-3:PULSE LEVEL LF04 SINC/RESET M3 RESPONSE OSC-3:PULSE LEVEL LF04 SINC/RESET M3 RESPONSE MIXER:LEVEL EG1 DELAY M4 ZND DEST MIXER:LEVEL EG1 DECAY M4 ZND DEST MIXER:LEVEL EG1 SUSTAIN LF0X CHOICE LP1:NESONANCE EG1 SUSTAIN <td></td> <td></td> <td></td> <td></td>				
OSC-2:PHASE MOD LFO2 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PICH LFO2 FREQ MODE MI DEPTH OSC-2:PICH LFO2 FREQ MODE MI 2ND DEST OSC-2:SAWTOOTH LFO3 TRAPO* MI 2ND DEPTH OSC-2:SURAURE LFO3 TRAPO* MI RESPONSE OSC-2:SURAURE LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PICH LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PICH LFO4 SINGLE-SHOT M2 DEPTH OSC-3:PICH LFO4 SINGLE-SHOT M2 RESPONSE OSC-3:PICH LFO4 FREQUENCY M3 DEPTH OSC-3:PIUSE MODD LFO4 TREQUENCY M3 2ND DEST OSC-3:PULSE MODL LFO4 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MODL LFO4 SINC/RESET M3 2ND DEST MIXER:NOISE LFO4 SINC/RESET M3 PEPTH LP1:rikeQUENCY EG1 NESET				
OSC-2:LEVEL LFO2 SYNC/RESET VEL. RESPONSE OSC-2:RINGLE LFO2 FREQ MODE M1 DEPTH OSC-2:RINGLE LFO3 WAVEFORM M1 2ND DEST OSC-2:SQUARE LFO3 TEMPO* M1 2ND DEST OSC-2:SQUARE LFO3 SINCLE-SHOT M2 DEPTH OSC-3:SPHASE MOD LFO3 SINC/RESET M2 2ND DEST OSC-3:IEVEL LFO3 FREQUENCY M3 DEPTH OSC-3:RINACLE LFO4 WAVEFORM M2 RESPONSE OSC-3:RINACLE LFO4 WAVEFORM M3 DEPTH OSC-3:RUSE MOD. LFO4 SINC/RESET M3 2ND DEST OSC-3:PULSE LOVEL LFO4 FREQUENCY M3 DEPTH MIXER:NOISE LFO4 FREQ MODE M4 2ND DEST LPF1:rREQUENCY EG1 DELAY M4 2ND DEST				
OSC-2:PITCH LFO2 FREQ MODE M1 DEPTH OSC-2:RIANGLE LFO3 REQUENCY M1 2ND DEST OSC-2:SQUARE LFO3 TREQUENCY M1 2ND DEPTH OSC-2:SQUARE LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LFO4 SINGLE-SHOT M3 DEPTH OSC-3:PITCH LFO4 SINGLE-SHOT M3 DEPTH OSC-3:PITCH LFO4 FREQUENCY M3 DEPTH OSC-3:PITCH LFO4 FREQUENCY M3 DEPTH OSC-3:PITCH LFO4 FREQUENCY M3 DEPTH OSC-3:PITCH LFO4 FREQ MODE M4 DEPTH MIXER:FB(FX) EG1 DECAY M4 RESPONSE MIXER:FB(FX) EG1 DECAY M4 RESPONSE LPF1:REQUENCY EG1 RELASE LFOX DEPTH LPF1:REQUENCY EG1 RELASE LFOX DEPTH	OSC-2:PHASE MOD	LFO2 SINGLE-SHOT	VEL. 2ND DEPTH	
OSC-2:TRIANGLE LF03 WAVEFORM M1 2ND DEST OSC-2:SAWTOOTH LF03 TREQUENCY M1 2ND DEPTH OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LF03 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LF03 SINGLE-SHOT M2 ND DEST OSC-3:PITCH LF04 REQUENCY M3 2ND DEPTH OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MOD. LF04 FREQ MODE M4 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:ROISE LF04 FREQ MODE M4 DEPTH MIXER:ROISE LF04 FREQ MODE M4 2ND DEST LP1:RESONANCE EG1 DELAY M4 PENDEPTH LP1:RESONANCE EG1 DECAY M4 RESPONSE LP1:RESONANCE EG1 SUSTAIN LF0X CMOLE LP1:RESONANCE EG1 SUSTAIN LF0X CMOLE LP1:RESONANCE EG1 RESPTLOP LF0 FREQUENCY LP1:RESONANCE EG1 RES	OSC-2:LEVEL	LFO2 SYNC/RESET	VEL. RESPONSE	
OSC-2:SAWTOOTH LF03 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LF03 SINCLESHOT M7 RESPONSE OSC-3:DEVEL LF03 SINCLESHOT M2 DEPTH OSC-3:LEVEL LF03 SINCLESHOT M2 DEPTH OSC-3:LEVEL LF04 SYNC/RESET M2 ND DEPTH OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:SULSE MOD. LF04 SYNC/RESET M3 RESPONSE OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:ROISE LF04 SYNC/RESET M3 RESPONSE MIXER:ROISE LF04 SYNC/RESET M3 RESPONSE ILP04 SINCHARE EGT DELAY M4 ZND DEST MIXER:REVEL EGT BELAY M4 ZND DEST MIXER:REVEL EGT BELAY M4 RENDONSE LPF1:REQUENCY EGT RELASE LF0X DEPTH LPF1:REQUENCY EGT RELASE LF0X DEPTH LPF2:RESONANCE EGT RELASE LF0X DEPTH LPF2:RESONANCE EGT RELASE LF0X DEPTH LPF2:REQUENCY EGT RELEASE LF0X DEPTH LPF2:RESONANCE EGT RESONSE LF0X DEP	OSC-2:PITCH	LFO2 FREQ MODE	M1 DEPTH	
OSC-2:SQUARE LFO3 TEMPO* M1 RESPONSE OSC-2:SUB-OSC LFO3 SINCLE-SHOT M2 DEPTH OSC-3:HASE MOD LFO3 SINC/RESET M2 2ND DEST OSC-3:LEVEL LFO3 SINC/RESET M2 2ND DEFTH OSC-3:LEVEL LFO3 FREQ MODE M2 2ND DEFTH OSC-3:RITCH LFO4 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LFO4 FREQUENCY M3 DEPTH OSC-3:SPULSE MOD. LFO4 SINCLE-SHOT M3 DEPTH OSC-3:PULSE MOD. LFO4 SINCLE-SHOT M3 RESPONSE MIXER:NOISE LFO4 SINCLE-SHOT M3 RESPONSE MIXER:NOISE LFO4 SINCLE-SHOT M3 RESPONSE MIXER:REVEL EG1 DELAY M4 DEPTH MIXER:REVEL EG1 DELAY M4 RESPONSE LPF1:REQUENCY EG1 BEST/LOOP LFOX CHOICE LPF1:REQUENCY EG1 RESET/LOOP LFOX CHOICE LPF2:REQUENCY EG1 RESET/LOOP LFO OUTPUT HPF:REQUENCY EG1 RESPONSE LFO OUTPUT LPF2:REQUENCY EG1 RESPONSE LFO OUTPUT LPF2:REQUENCY EG1 RESET/LOOP	OSC-2:TRIANGLE	LFO3 WAVEFORM	M1 2ND DEST	
OSC-2:SUB-OSC LFO3 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LFO3 SYNC/RESET M2 2ND DEFTH OSC-3:PITCH LFO3 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LFO4 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LFO4 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LFO4 SYNC/RESET M3 RESPONSE MIXER:NOISE LFO4 SYNC/RESET M3 RESPONSE MIXER:NOISE LFO4 FREQ MODE M4 DEPTH MIXER:REVEL EG1 DELAY M4 NESPONSE LPF1:REQUENCY EG1 TACK M4 2ND DEPTH LPF1:REQUENCY EG1 RELAY M4 NESPONSE LPF1:RESONANCE EG1 SUSTAIN LFOX CHOICE LPF1:REQUENCY EG1 RELASE LFOX DEPTH LPF2:REQUENCY EG1 RESET/LOOP LFO FREQUENCY LPF2:OUTPUT EG1 RESET/LOOP LFO FREQUENCY LPF2:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:REQUENCY EG1 RESET/LOOP LFO SINGLE-SHOT OUTPUT EG2 RESET/LOOP LFO SINGLE-SHOT OUTPUT EG2 RESET/LOOP LFO SINGLE-SHOT OUTPUT EG2 RESET/LOOP <	OSC-2:SAWTOOTH	LFO3 FREQUENCY	M1 2ND DEPTH	
OSC-3:PHASE MOD LFO3 SYNC/RESET M2 2ND DEST OSC-3:IEVEL LFO3 REQ MODE M2 2ND DEPTH OSC-3:TRIANGLE LFO4 WAVEFORM M2 RESPONSE OSC-3:SAWTOOTH LFO4 TEMPO* M3 DEPTH OSC-3:PULSE MOD. LFO4 SINGLE-SHOT M3 ND DEPTH OSC-3:PULSE LEVEL LFO4 SINGLE-SHOT M3 RESPONSE MIXER:ROISE LFO4 SYNC/RESET M3 RESPONSE MIXER:REVEL EG1 DELAY M4 2ND DEST MIXER:REVEL EG1 DELAY M4 2ND DEFTH LPF1:REQUENCY EG1 DECAY M4 NESPONSE LPF1:REQUENCY EG1 RESET/LOOP LFO XDAVEFORM LPF1:REQUENCY EG1 RESET/LOOP LFO XDAVEFORM LPF2:REQUENCY EG1 RESET/LOOP LFO XDAVEFORM LPF2:OUTPUT EG1 RESET/LOOP LFO XDAVEFORM LPF2:OUTPUT EG1 RESET/LOOP LFO XDAVEFORM LPF2:QUENCY EG1 RESET/LOOP LFO XDAVEFORM LPF2:QUENCY EG1 RESET/LOOP LFO XDAVEFORM LPF2:QUENCY EG1 RESET/LOOP LFO SNICLE-SHOT OUTPUT EG2 D	OSC-2:SQUARE	LFO3 TEMPO*	M1 RESPONSE	
OSC-3:LEVEL LFO3 FREQ MODE M2 2ND DEPTH OSC-3:PITCH LFO4 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LFO4 FREQUENCY M3 2ND DEST OSC-3:SPULSE MODL LFO4 SINGLE-SHOT M3 2ND DEPTH OSC-3:SPULSE MODL LFO4 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE MODL LFO4 SINGLE-SHOT M3 RESPONSE MIXER:NOISE LFO4 FREQ MODE M4 DEPTH MIXER:NOISE LFO4 FREQ MODE M4 DEPTH MIXER:NOISE LFO4 TATACK M4 2ND DEST MIXER:NOISE LEG1 TATACK M4 2ND DEPTH LPF1:REQUENCY EG1 RELEASE LFOX DEPTH LPF1:REQUENCY EG1 RESTAIN LFOX CHOICE LPF1:REQUENCY EG1 REST/LOOP LFO REQUENCY LPF2:RESONANCE EG1 REST/LOOP LFO SINGLE-SHOT DUTPUT EG2 ATTACK LFO OUTPUT MODE HPF:OUTPUT EG2 DECAY LFO FREQ MODE OUTPUT EG2 REST/LOOP LFO FREQ MODE EG2 RELEASE LFO FMOD LFOX EG2 RELEASE LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK EG2 RESET/LOOP EGA	OSC-2:SUB-OSC	LFO3 SINGLE-SHOT	M2 DEPTH	
OSC-3:LEVEL LFO3 FREQ MODE M2 2ND DEPTH OSC-3:PITCH LFO4 REQUENCY M3 DEPTH OSC-3:SAWTOOTH LFO4 FREQUENCY M3 2ND DEST OSC-3:SAWTOOTH LFO4 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE MOD. LFO4 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LFO4 SYNC/RESET M3 RESPONSE MIXER:NOISE LFO4 SYNC/RESET M3 RESPONSE MIXER:OSE EG1 DELAY M4 DEPTH MIXER:DEVEL EG1 DELAY M4 DEPTH MIXER:DEVEL EG1 TATIACK M4 2ND DEST MIXER:DEVEL EG1 TATIACK M4 2ND DEPTH LPF1:REQUENCY EG1 RELEASE LFOX DEPTH LPF1:REQUENCY EG1 RESTAIN LFOX CHOICE LPF1:REQUENCY EG1 REST/LOOP LFO NAVEFORM LPF2:REQUENCY EG1 REST/LOOP LFO OUTPUT MODE HPF:OUTPUT EG2 ATTACK LFO OUTPUT MODE HPF:OUTPUT EG2 REAY LFO FMEQ UENCY LPF2:REQUENCY EG1 REST/LOOP LFO FMEQ UENCY LPF2:SOUTPUT EG2 REAY LFO SINCLE-SHOT OUTPUT EG2 REAY LFO FMEQ UE	OSC-3:PHASE MOD	LFO3 SYNC/RESET	M2 2ND DEST	
OSC-3:PITCH LF04 WAVEFORM M2 RESPONSE OSC-3:RIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:AWATOOTH LF04 TEMPO* M3 2ND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:ROUSE LF04 FREQ MODE M4 DEPTH MIXER:ROUSE LE01 DELAY M4 2ND DEST MIXER:ROUSE EG1 DELAY M4 2ND DEPTH LPF1:RESONANCE EG1 SUSTAIN LF0X CHOICE LPF1:RESONANCE EG1 RELEASE LF0X MODE LPF2:REQUENCY EG1 RESET/LOOP LF0 REQUENCY LPF2:REQUENCY EG1 RESET/LOOP LF0 SINGLE-SHOT OUTPUT EG2 DELAY LF0 SINGLE-SHOT OUTPUT EG2 DELAY LF0 FMOD LF0X PATCH SETTINGS EG2 DECAY LF0 FMOD LF0X EG2 RESET/LOOP EG ATTACK LF0 FMOD LF0X EG2 RESET/LOOP EG ATTACK EG3 DELAY EG2 RESET/LOOP EG ATTACK EG3 DECAY				
OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LF04 FREQUENCY M3 2ND DEST OSC-3:PULSE MOD. LF04 SINC/RESET M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:RNOISE LF04 FREQ MODE M4 DEPTH MIXER:REVEL EG1 DELAY M4 2ND DEST MIXER:RB/EXT EG1 ATTACK M4 2ND DEPTH LPF1:REQUENCY EG1 SUSTAIN LF0X CHOICE LPF1:RESONANCE EG1 RELEASE LF0X CHOICE LPF2:REQUENCY EG1 RESET/LOOP LF0 REPTH LPF2:REQUENCY EG1 RESET/LOOP LF0 OEPTH LPF2:REQUENCY EG1 RESET/LOOP LF0 OEPTH HPF:FREQUENCY EG1 RESET/LOOP LF0 SYNC/RESET PATCH SETTINGS EG2 DELAY LF0 SYNC/RESET PATCH SETTINGS EG2 RECAY LF0 FMOD LF0X EG2 RECAY LF0 FMOD LF0X EG2 RESET/LOOP EG2 RESET/LOOP EG ATTACK EC DECAY EG2 RESET/LOOP EG ATTACK EG DECAY EG3 DELAY EG CHOICE EG3				
OSC-3:SAWTOOTH LF04 TEMPO* M3 2ND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SINGLE-SHOT M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE EG1 DELAY M4 2ND DEST MIXER:RUEVEL EG1 DELAY M4 2ND DEPTH LPF1:REQUENCY EG1 BECAY M4 RESPONSE LPF1:REQUENCY EG1 RELEASE LFOX DEPTH LPF2:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:REQUENCY EG1 RESPONSE LFO OUTPUT MODE HPF:OUTPUT EG2 SUSTAIN LFO SINGLE-SHOT OUTPUT EG2 DECAY LFO FREQ MODE PATCH SETTINGS EG2 DECAY LFO FROD LFOX EG2 RELASE LFO FMOD LFOX EG2 RELASE LFO FMOD EG EG2 RELEASE LFO FMOD EG EG2 RESET/LOOP EG ATTACK EG2 RESET/LOOP EG ATTACK EG3 DELAY EG CECAY EG3 DELAY EG CECAY				
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EG4 RESET/LOOP EG4 SHAPE				
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		EG4 RESET/LOOP		
EG4 RESPONSE		EG4 SHAPE		
		EG4 RESPONSE		

*since firmware 0602010C LFOx TEMPO is not used (use LFOx FREQUENCY instead).

When in patch summary display mode and both PAGE LOOK and () VALUE LOOK are enabled then 24 of the rotary knobs () also control the mapping (in parallel with external CC controllers). The table below shows the knob functions.

Rotary knob	Control function
Ó 🗖 05C-1	slot #1
PITCH OSC-1	slot #2
✓ OSC-1	slot #3
Ó ∠ 0SC-1	slot #4
	slot #5
<u>∽</u> ∎ 0sc−1	slot #6
Ó 🗖 OSC-2	slot #7
C PITCH 0SC-2	slot #8
Ó ∕ 0SC-2	slot #9
Ó 🖊 050-2	slot #10
Ó 🔲 050-2	slot #11
🚫 SUB 050-2	slot #12
🏷 🗾 0SC-3	slot #13
PITCH OSC-3	slot #14
Ô 🐼 0SC-3	slot #15
🏷 🗾 0SC-3	slot #16
	slot #17
🖒 🔲 ОБС-Э	slot #18
🔨 🗾 MIXER	slot #19
√ ■ LPF-1	slot #20
LPF-1	slot #21
€ LPF-1	slot #22
	slot #23
	slot #24
MASTER PITCH	global LFO1 frequency
PHASE MOD 050-2	global LFO2 frequency
PHASE MOD 050-3	global LFO3 frequency
K MIXER	global LFO4 frequency

Use this feature to tweak patch parameters in a live situation. Set the parameter mapping to **FATCH** so the tweakable parameters are custom to each patch and then load the patch and enter patch summary display mode with both **PAGE LOCK** and **VALUE LOCK** enabled. Turn the rotary knobs **O** to tweak away!

3 Advanced modulation

The modulation architecture of **MOTAS-6** typically allows the user to 'see' the modulation being applied to each parameter shown on the individual parameter pages and to dial-in modulation amounts from local LFOs and EGs (local to that parameter page) as well as amounts from global (patch-wide) modulators such as velocity, M1 ... M4 and global LFOs and EGs.

The advanced modulation feature, covered in this chapter, opens the door to some really extreme and complex modulation configurations. The downside is that this feature can lead to modulation routings that are difficult to see how they are configured, but does allow the ultimate in power and flexibility.

With the advanced modulation feature enabled you can, for example, modulate the parameters of *local* EGs and LFOs across different parameter pages. You can mathematically process the outputs of multiple modulation sources and apply the output to almost *any* **MOTRS-6** parameter as well as chain together these modulations for some extreme setups.

A complex example (using 4 of the 16 available advanced modulation slots): you could have the output from the local LFO on the VCO-3 triangle-wave parameter page multiplied by CV/gate input 2, added to the global EG4 output then slewed by global modulator M1 output and the minimum of this and the global LFO2 output routed to modify the EG shape of the local EG on the LPF2 resonance parameter page and simultaneously modulate the master pitch local LFO frequency ...!

> ADVANCED MOD ON # 1 S1 PAGE OSC-2:SAW S2 OFF OFF FUNCTION OFF 7.57 S BIPOLAR PAGE OSC-1:PITCH DEST OFFSET SET UP PAGE 4

On the **ADJANCED MOD** setup page the advanced modulation feature can be turned on and configured. There are 16 slots of advanced modulation. This powerful feature allows complex chains of modulation from many sources to be applied to a vast choice of destinations. The settings are stored within the patch (including whether this feature is enabled). For each slot there are 2 source settings and a 'function' that operates on the source values. The output from the chosen function can be routed as a source input for other advanced modulation slots.

Finally, the output from the chosen function has a modulation amount setting and this result modulates the slot destination. The modulation amount can be adjusted over a wide range from positive to negative and can be set as bipolar or unipolar response.

3.1 Source options

There are 2 sources for each advanced modulation slot labelled **S1** and **S2**. Each source has 2 parameters, the first parameter sets the source type. The second parameter source selection depends on the source type, the options are shown in the following table.

Source type				
SLOT	GLOBAL	PAGE/KNOB/LFO/EG	MISC	
#1	VELOCITY	OSC-1:LEVEL	TEMPO CLK	
#2	NOTE	OSC-1:PITCH	NOTES DOWN	
#3	M1	OSC-1:TRI	LAST NOTE	
#4	M2	OSC-1:SAW	1ST NOTE	
#5	M3	OSC-1:PL MOD	2ND NOTE	
#6	M4	OSC-1:PL LEV	3RD NOTE	
#7	CV1	OSC-2:PH MOD	HIGHEST NOTE	
#8	CV1	OSC-2:LEVEL	MIDDLE NOTE	
#9	CV2	OSC-2:PITCH	LOWEST NOTE	
#10	CV3	OSC-2:TRI	CONST 1	
#11	CV4	OSC-2:SAW	CONST 2	
#12	LFO1	OSC-2:SQUARE	CONST 3	
#13	LFO2	OSC-2:SUBOSC	CONST 4	
#14	LFO3	OSC-3:PH MOD	CONST 5	
#15	LFO4	OSC-3:LEVEL	CONST 6	
#16	EG1	OSC-3:PITCH	CONST 7	
	EG2	OSC-3:TRI	CONST 8	
	EG3	OSC-3:SAW	CONST 9	
	EG4	OSC-3:PL MOD	CONST 10	
		OSC-3:PL LEV	CONST 11	
		MIXER:NOISE	CONST 12	
		MIXER:LEVEL	CONST 13	
		LPF1:FREQ	CONST 14	
		LPF1:RES	CONST 15	
		LPF1:OUT	CONST 16	
		HPF:FREQ	CONST 32	
		HPF:OUT	CONST 64	
		MIX:FB/EXT	CONST 128	
		LPF2:FREQ		
		LPF2:RES		
		LPF2:OUT		
		OUTPUT		

Source type **SLOT**

When source type is set to **SLOT** the source value is routed from another advanced modulation slot output. The source selection can be chosen from **#1** to **#16** corresponding to the advanced modulation outputs slots 1...16.

Source type GLOBAL

When source type is set to **GLOBAL** the source selection is set to that of the corresponding global modulator, for example **EGE** sets the source to the output of global EG2.

Source type PAGE / KNOB / LFO / EG

When source type is set to **PAGE**, **KNOB**, **LFO** or **EG** the source selection is set to the parameter on the chosen parameter page.

Using **FHGE** the source is the final value of the parameter page (i.e. the resultant value for that page, after the effects of any other modulations that are present for that page).

Using **KNOB** the source is the value of the knob position for that page (regardless of the page or value lock settings).

Using **LFO** the source is the output of the local LFO for that page.

Using **EG** the source is the output of the local EG for that page. For example, with source type set to **EG** and 2nd parameter set to **OSC:TRI** the source is value of the local EG from the **OSC:TRI** page.

3.2 Function

You can choose the function that is applied to the **S1** and **S2** sources. The output from the chosen function can be routed as a source input for other advanced modulation slots (using the **SLOT** source option). The choice of functions is:

FUNCTION	Description
OFF	fixed zero value
S1 ONLY	S1 value (S2 ignored)
-S1 ONLY	negative S1 value (S2 ignored)
S2 ONLY	S2 value (S1 ignored)
ADD	S1 + S2
AVERAGE	(S1 + S2) / 2
SUBTRACT	S1 - S2
DIFF	positive difference S1 - S2
MIN	minimum of S1, S2
MAX	maximum of S1, S2
MULTIPLY	S1 x S2
DIVIDE	S1 / S2
QUANTISE	S1 quantised by S2
SLEW	S1 slewed by S2
S/HOLD	S1 sample/hold by S2
F-DIVIDE	S1 frequency-divide by S2
LESS	binary: S1 less or equal S2
GREATER	binary: S1 greater or equal S2
AND	binary: S1 AND S2
OR	binary: S1 OR S2
XOR	binary: S1 XOR S2

Note that in all cases if the result of the function is out-ofrange the result is clipped.

The **MULTIPLY** and **DIVIDE** functions rescale the result so it is more likely to be in range.

The **SLER** function low-pass filters the **S1** value with a filter coefficient depending on the **S2** value.

The **S**/**HOLD** function samples the **S1** value when the **S2** value rises above the mid-point value.

The **FDIVIDE** function first converts **S1** into a square wave signal toggling when the **S1** value crosses through the mid-point value. This square wave is then frequency divided by the **S2** value, to generate an output square wave of lower frequency.

The 'binary' functions (LESS, GREATER, AND, OR and XOR) output only 2 possible values (zero or maximum) depending on the S1 and S2 values.

LESS outputs maximum if **S1** is less than or equal to **S2**.

GREATER outputs maximum if **S1** is greater than or equal to **S2**.

AND outputs maximum only if both **S1** and **S2** are greater than midpoint values.

OR outputs maximum if either **S1** or **S2** are greater than midpoint values.

XOR outputs maximum if either **S1** or **S2** are greater than midpoint values but zero if both **S1** and **S2** are greater than midpoint values.

The **MISC: CONST** X constant source values can be useful in conjunction with the **SLER** function to provide a fixed slew setting or the **F-DIVIDE** function to provide a frequency-divided signal with a fixed ratio.

For on/off accent control use function **GREATER** with **S1** set to **UELOCITY** and **S2** set to **MISC: CONST 64**. The output will then depend on whether velocity is below or above the mid-point value 64. Route the output to e.g. filter cutoff to allow on/off 'accent' control from the velocity.

3.3 Modulation amount

The amount of modulation sent to the destination can be adjusted over a wide range (both positive and negative). Depending on the destination setting the modulation amount may be shown in different units e.g. percent, cents, semitones etc.

Press botoggle **UNIFOLAR** or **BIFOLAR** modulation.

3.4 Destination

The destination is set using the **PAGE** and **DEST** settings as shown in the table below.

GLOBAL PARAMS LF01 FREQUENCY PAGE OPTION 1 PM MASTER PITCH LF01 TEMPO* PAGE OPTION 2 PM OSC-1:LEVEL LF01 SINCLE-SHOT NOTE DEPTH N OSC-1:PITCH LF01 SINC/RESET NOTE ZND DEST PM	EST (patch)	
MASTER PITCHLF01 TEMPO*PAGE OPTION 2PAGEOSC-1:LEVELLF01 SINGLE-SHOTNOTE DEPTHNOSC-1:RIANGLELF01 SINGLESHOTNOTE ZND DEPTHILOSC-1:RIANGLELF01 FRQ MODENOTE ZND DEPTHILOSC-1:SAWTOOTHLF02 FREQUENCYVELOCITY DEPTHILOSC-1:PULSE LEVELLF02 TRUPO*VEL. ZND DEPTHIDOSC-2:PHASE MODLF02 SINGLE-SHOTVEL. ZND DEPTHIDOSC-2:PHASE MODLF02 SINGLE-SHOTVEL. ZND DEPTHIDOSC-2:PHASE MODLF02 SINGLE-SHOTVEL. ZND DEPTHIDOSC-2:EVELLF03 SINGLE-SHOTW1 ZND DEPTHIDOSC-2:SQUARELF03 SINGLE-SHOTM1 ZND DEPTHIDOSC-2:SQUARELF03 SINGLE-SHOTM2 DEPTHIDOSC-3:PHASE MODLF03 SYNC/RESETM2 ZND DEPTHIDOSC-3:RIANGLELF03 FREQ WODEM2 ZND DEPTHIDOSC-3:RIANGLELF04 FREQUENCYM3 DEPTHIDOSC-3:RINAGLELF04 FREQUENCYM3 DEPTHIDOSC-3:RINAGLELF04 SYNC/RESETM3 RESPONSEIDOSC-3:RULSE MODLF04 SYNC/RESETM3 RESPONSEIDMIXER:NOISELF04 FREQ MODEM4 DEPTHIDOSC-3:PULSE MODLF04 SYNC/RESETM3 RESPONSEIDMIXER:NOISELF04 FREQ MODEM4 DEPTHIDOSC-3:PULSE MODLF04 SYNC/RESETM3 RESPONSEIDIMXER:ROUSELF04 SYNC/RESETM3 RESPONSEIDIMXER:ROUSELF04 SYNC/RESET	ORT MODE	
OSC-1:LEVEL LF01 SINGLE-SHOT NOTE DEPTH N OSC-1:PITCH LF01 SYNC/RESET NOTE 2ND DEST PI OSC-1:PITCH LF01 FRQ MODE NOTE 2ND DEPTH LI OSC-1:PULSE MOD. LF02 FREQUENCY VELOCITY DEPTH OSC-1:PULSE MOD. LF02 SYNC/RESET VEL. 2ND DEST OSC-2:PULSE LEVEL LF02 SYNC/RESET VEL. 2ND DEPTH OSC-2:PIASE MOD LF02 SYNC/RESET VEL. 2ND DEPTH OSC-2:PITCH LF03 SYNC/RESET VEL. 2ND DEST OSC-2:SQUARE LF03 SYNC/RESET WEL 2ND DEST OSC-2:SQUARE LF03 SYNC/RESET M1 DEPTH OSC-2:SQUARE LF03 SYNC/RESET M2 2ND DEST OSC-3:SWTOOTH LF03 SYNC/RESET M2 2ND DEST OSC-3:SWTOOTH OSC-3:SWTO DEPTH OSC-3:SWTO DEPTH	ORT TIME/RATE	
OSC-1:PITCH LF01 SYNC/RESET NOTE 2ND DEST PI OSC-1:SRIANGLE LF01 FREQ MODE NOTE 2ND DEST LI OSC-1:SRUSE MOD. LF02 FREQUENCY VEL.021Y DEPTH LI OSC-1:SULSE MOD. LF02 FREQUENCY VEL.01Y DEPTH DEST OSC-2:PIUSE LEVEL LF02 SINGLE-SHOT VEL.2ND DEST DSC-2:PITCH LF02 SINGLE-SHOT VEL.2ND DEPTH OSC-2:PITCH LF02 SINGLE-SHOT VEL.2ND DEPTH DSC-2:SUNGVENCY M1 DEPTH OSC-2:SQUARE LF03 STEQUENCY M1 DEPTH DSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-2:SUMOOTH LF03 SINGLE-SHOT M2 2ND DEPTH DSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-3:SPHASE MOD LF03 SINGLE-SHOT M2 2ND DEPTH DSC-3:SPHASE DSC-3:SINGLE-SHOT M2 DEPTH OSC-3:SPHASE MOD LF04 KRQUENCY M3 DEPTH DSC-3:SPHASE DSC-3:SINGLE-SHOT M2 ND DEPTH OSC-3:SPHASE MOD LF04 SINGLE-SHOT M3 2ND DEPTH DSC-3:SPUSE DSC-3:SPUSE DSC-3:SPUSE DSC-3:SINGLE-SHOT M3 2ND DEPTH DSC-3:SPUSE DSC-3:	PORT VALUE	
OSC-1:TRIANGLE LF01 FREQ MODE NOTE 2ND DEPTH LI OSC-1:SAWTOOTH LF02 WAVEFORM NOTE RESPONSE OSC-1:PULSE MOD. LF02 FREQUENCY VELO.ITD VET OSC-1:PULSE LEVEL LF02 FREQUENCY VEL. 2ND DEST OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PITCH LF02 SINGLE-SHOT VEL. RESPONSE OSC-2:PITCH LF03 TREQUENCY M1 DEPTH OSC-2:SAWTOOTH LF03 TREQUENCY M1 ZND DEST OSC-2:SUARE LF03 SINGLE-SHOT M2 DEPTH OSC-2:SUARE OSC-2:SUARE OSC-3:PITCH LF03 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LF03 SYNC/RESET M2 ZND DEFTH OSC-3:PITCH LF04 SYNC/RESET M2 ZND DEPTH OSC-3:PITCH LF04 SYNC/RESET M3 ZND DEPTH OSC-3:PITCH LF04 SYNC/RESET M3 ZND DEPTH OSC-3:PITCH LF04 SYNC/RESET M3 ZND DEPTH OSC-3:PIUSE MODL LF04 SYNC/RESET M3 ZND DEPTH OSC-3:PIUSE LEVEL LF04 SYNC/RESET M3 ZND DEPTH OSC-3:PIUSE LEVEL LF04 SYNC/RESET M3 ZND DEPTH	NOTE OFF TRACK	
OSC-1:SAWTOOTH LF02 WAVEFORM NOTE RESPONSE OSC-1:PULSE MOD. LF02 FREQUENCY VELOCITY DEPTH OSC-2:PULSE LEVEL LF02 SINGLE-SHOT VEL. 2ND DEST OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PHASE MOD LF02 SYNC/RESET VEL. 2ND DEPTH OSC-2:PHASE MOD LF03 SYNC/RESET VEL. 2ND DEPTH OSC-2:SQUARE LF03 SYNC/RESET M1 DEPTH OSC-2:SQUARE LF03 SYNC/RESET M2 2ND DEPTH OSC-2:SQUARE LF03 SYNC/RESET M2 2ND DEPTH OSC-3:SWTOOTH LF03 SYNC/RESET M2 2ND DEPTH OSC-3:SUARE LF03 SYNC/RESET M2 2ND DEPTH OSC-3:SUARE LF04 SYNC/RESET M2 2ND DEPTH OSC-3:SWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:SWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:SWTOOTH LF04 SINGLE-SHOT M3 2ND DEST OSC-3:SWTOOTH LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:SWTOOTH LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:SWTOOTH LF04 SINGLE-SHOT M3 2ND DEPTH <	W SENS.	
OSC-1:PULSE MOD. LF02 FREQUENCY VELOCITY DEPTH OSC-1:PULSE LEVEL LF02 TEMPO* VEL. 2ND DEST OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PITCH LF02 SINGLE-SHOT VEL. RESPONSE OSC-2:PITCH LF03 SINGLE-SHOT WEL RESPONSE OSC-2:PITCH LF03 FREQ MODE M1 DEPTH OSC-2:SQUARE LF03 TEMPO* M1 RESPONSE OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LF04 TEMPO* M2 ND DEST OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MODL LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MODL LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE	FO SYNC.	
OSC-1:PULSE MOD. LF02 FREQUENCY VELOCITY DEPTH OSC-1:PULSE LEVEL LF02 TEMPO* VEL. 2ND DEST OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PITCH LF02 SINGLE-SHOT VEL. RESPONSE OSC-2:PITCH LF03 SINGLE-SHOT WEL RESPONSE OSC-2:PITCH LF03 FREQ MODE M1 DEPTH OSC-2:SQUARE LF03 TEMPO* M1 RESPONSE OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LF04 TEMPO* M2 ND DEST OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MODL LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MODL LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE	-	
OSC-1:PULSE LEVEL LFO2 TEMPO* VEL. 2ND DEST OSC-2:PHASE MOD LFO2 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PITCH LFO2 SINGLE-SHOT VEL. REPONSE OSC-2:PITCH LFO2 FREQ MODE M1 DEPTH OSC-2:PITCH LFO3 TRAVCRESET VEL. RESPONSE OSC-2:PITCH LFO3 TRAVEFORM M1 2ND DEST OSC-2:SUB-OSC LFO3 SINGLE-SHOT M2 DEPTH OSC-2:SUB-OSC LFO3 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LFO3 SINGLE-SHOT M2 DEPTH OSC-3:SHASE MOD LFO3 SYNC/RESET M2 DDEPTH OSC-3:SHONOTH LFO4 REQUENCY M3 DEPTH OSC-3:SULSE MOD LFO4 FREQUENCY M3 DEPTH OSC-3:PULSE MOD LFO4 SYNC/RESET M3 2ND DEST OSC-3:PULSE MOD LFO4 SYNC/RESET M3 2ND DEST OSC-3:PULSE MOD LFO4 SYNC/RESET M3 END DEST MIXER:NOISE		
OSC-2:PHASE MOD LF02 SINGLE-SHOT VEL. 2ND DEPTH OSC-2:PTCH LF02 SYNC/RESET VEL. RESPONSE OSC-2:TRIANGLE LF03 WAVEFORM M1 DEPTH OSC-2:SWTOOTH LF03 FREQUENCY M1 2ND DEST OSC-2:SQUARE LF03 TEMPO* M1 2ND DEPTH OSC-2:SQUARE LF03 STMC/RESET M2 DEPTH OSC-2:SQUARE LF03 SYNC/RESET M2 DEPTH OSC-3:PHASE MOD LF03 SYNC/RESET M2 ND DEST OSC-3:PHASE MOD LF03 SYNC/RESET M2 DEPTH OSC-3:IEVEL LF04 FREQUENCY M3 DEPTH OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LF04 SYNC/RESET M3 RESPONSE OSC-3:PULSE MOD LF04 SYNC/RESET M3 RESPONSE OSC-3:PULSE MOD LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 DEPTH OSC-3:PULSE MOD LF04 SYNC/RESET M3 RESPONSE IMIXER:NOISE LF04 FREQ MODE M4 2ND DEST MIXER:REVEL EG1 DELAY M4 2ND DEST MIXER:REVEX EG1 RELE		
OSC-2:LEVEL LF02 SYNC/RESET VEL. RESPONSE OSC-2:PITCH LF02 FREQ MODE M1 DEPTH OSC-2:RIANGLE LF03 WAVEFORM M1 2ND DEST OSC-2:SQUARE LF03 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LF03 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PITCH LF03 STREQUENCY M3 DEPTH OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 ZND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 DEPTH OSC-3:PULSE LEVEL LF04 SINGLE-SHOT M3 DEPTH MIXER:NOISE LF04 SINGLE-SHOT M3 DEPTH MIXER:NOISE LF04 SINGLE-SHOT M4 DEPTH MIXER:NOISE LF04 SINGLE-SHOT M4 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH LPF1:FREQUENCY EG1 REEASE LF0X MAYENDRM LPF1:REQUENCY EG1 REEASE		
OSC-2:PITCH LF02 FREQ MODE M1 DEPTH OSC-2:RINANGLE LF03 WAVEFORM M1 2ND DEST OSC-2:SAWTOOTH LF03 FREQUENCY M1 2ND DEPTH OSC-2:SAWTOOTH LF03 SINGLE-SHOT M2 DEPTH OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SHASE MOD LF03 SINGLE-SHOT M2 DEPTH OSC-3:SHASE MOD LF03 SINGLE-SHOT M2 DEPTH OSC-3:SPHASE MOD LF04 REQUENCY M3 DEPTH OSC-3:STRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SPUISE MOD. LF04 FREQUENCY M3 DEPTH OSC-3:SPUISE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PUISE MOD. LF04 SYNC/RESET M3 2ND DEST OSC-3:PUISE LEVEL LF04 SYNC/RESET M3 2ND DEST MIXER:IEVEL EG1 DECAY M4 DEPTH MIXER:EVEL EG1 DECAY M4 2ND DEST MIXER:EVEL EG1 SUSTAIN LF0X DEPTH LPF1:RESONANCE EG1 RESET/LOOP LF0 FREQUENCY LPF1:RESONANCE EG1 RESET/LOOP LF0 FREQUENCY LPF2:REQUENCY E		
OSC-2:TRIANGLE LF03 WAVEFORM M1 2ND DEST OSC-2:SAWTOOTH LF03 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LF03 TREMPO* M1 RESPONSE OSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LF03 SYNC/RESET M2 2ND DEST OSC-3:PILEVEL LF04 REQUENCY M3 DEPTH OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LF04 SYNC/RESET M3 ZND DEST OSC-3:PULSE MOD. LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 ZND DEPTH OSC-3:PULSE MOD. LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 2ND DEST MIXER:PKEVL EG1 DELAY M4 2ND DEST MIXER:PKEVL EG1 DECAY M4 2ND DEST MIXER:PKEVL EG1 BECAY M4 2ND DEPTH LPF1:REQUENCY EG1 REST/LOOP LFO REQUENCY LPF1:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:REQUENCY EG1 RESPONSE<		
OSC-2:SAWTOOTH LF03 FREQUENCY M1 2ND DEPTH OSC-2:SQUARE LF03 TEMPO* M1 RESPONSE OSC-2:SQUARE LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SHASE MOD LF03 SINGLE-SHOT M2 DEPTH OSC-3:LEVEL LF03 FREQ MODE M2 2ND DEST OSC-3:LEVEL LF04 FREQ MODE M2 2ND DEPTH OSC-3:RINAGLE LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL EG1 DELAY M4 DEPTH MIXER:NOISE LF04 SINGLE-SHOT M3 ZND DEST MIXER:B/EXT EG1 DELAY M4 2ND DEPTH MIXER:B/EXT EG1 DELAY M4 ZND DEPTH LPF1:REQUENCY EG1 SUSTAIN LF0X CHOICE LPF1:REQUENCY EG1 RESET/LOOP LF0 REQUENCY LPF2:SONANCE EG1 RESET/LOOP LF0 REQUENCY LPF2:OUTPUT EG2 DE		
OSC-2:SQUARE LF03 TEMPO* M1 RESPONSE OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LF03 SYNC/RESET M2 2ND DEST OSC-3:PHASE MOD LF03 FRQ MODE M2 2ND DEPTH OSC-3:PHASE MOD LF04 FREQ WODE M2 2ND DEPTH OSC-3:PHOLS LF04 FREQUENCY M3 DEPTH OSC-3:SPULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 2ND DEPTH MIXER:NOISE LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 SYNC/RESET M3 DEPTH MIXER:NOISE LF04 SYNC/RESET M3 DEPTH MIXER:NOISE LF04 SYNC/RESET M3 DEPTH LPF1:REQUENCY EG1 DECAY M4 PESPONSE LPF1:REQUENCY EG1 RELEASE LF0X DEPTH LPF1:REQUENCY EG1 RELEASE LF0X DEPTH LPF2:RESONANCE EG1 RESET/LOOP LF0 FREQUENCY LPF2:REQUENCY EG1 RESET/LOOP LF0 FREQUENCY LPF2:REQUENCY EG2 DE		
OSC-2:SUB-OSC LF03 SINGLE-SHOT M2 DEPTH OSC-3:PHASE MOD LF03 SYNC/RESET M2 2ND DEST OSC-3:PHASE MOD LF03 FRQ MODE M2 2ND DEPTH OSC-3:PITCH LF04 WAVEFORM M2 RESPONSE OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:RINAGLE LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LF04 SYNC/RESET M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH DIF1:RESONANCE EG1 DELAY M4 2ND DEST MIXER:FB/EXT EG1 DECAY M4 RESPONSE LPF1:RESONANCE EG1 SUSTAIN LF0X CHOICE LPF1:REQUENCY EG1 KEYTRACK LF0 MAVEFORM LPF2:REQUENCY EG1 RESET/LOOP LF0 FREQUENCY LPF1:RESONANCE EG1 SUSTAIN LF0 OUTPUT LPF2:OUTPUT EG1 SEST/LOOP LF0 REQUENCY LPF2:REQUENCY EG1 RESET/LOOP LF0 SINGL-SHOT UDTPUT EG2 RESET/LOOP		
OSC-3:PHASE MOD LF03 SYNC/RESET M2 2ND DEST OSC-3:PTCH LF03 FREQ MODE M2 2ND DEPTH OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:SPULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:SULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:FE/EXT EG1 DELAY M4 2ND DEST MIXER:FE/EXT EG1 DECAY M4 RESPONSE LPF1:RESONANCE EG1 NETACK LF0X CHOICE LPF2:REQUENCY EG1 RESET/LOOP LF0 NAVEFORM LPF2:REQUENCY EG1 RESET/LOOP LF0 NAVEFORM LPF2:GUENCY EG1 RESET/LOOP LF0 SINGLE-SHOT UPF2:OUTPUT EG2 DELAY LF0 SINGLE-SHOT UPTCH EG2 DELAY LF0 SINGLE-SHOT UDTPUT EG2 DELAY LF0 FREQ MODE EG2 RESET/LOOP EG ATTACK LF0 SINGLE-SHOT OUTPUT EG2 DELAY LF0 FREQ MODE EG2 RESET/LOOP EG ATTACK EG DECAY EG2 RESET/LOOP EG ATTACK EG RELEASE <td>-</td>	-	
OSC-3:LEVEL LF03 FREQ MODE M2 2ND DEPTH OSC-3:PITCH LF04 FREQUENCY M3 DEPTH OSC-3:RIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:RUSS LF04 FREQUENCY M3 DEPTH OSC-3:SPULSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:SPULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:SPULSE LEVEL LF04 SINGLE-SHOT M3 2ND DEPTH MIXER:NOISE LF04 SINGLE-SHOT M3 DEPTH MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE EG1 DELAY M4 DEPTH LP1:FREQUENCY EG1 DECAY M4 RESPONSE LP1:FREQUENCY EG1 RELEASE LF0X CHOICE LP1:FREQUENCY EG1 RESET/LOOP LF0 REQUENCY LPF2:REQUENCY EG1 RESPONSE LF0 OUTPUT LP5:OUTPUT EG2 DELAY LF0 SINGLE-SHOT UPF:OUTPUT EG2 DECAY LF0 FREQ MODE PATCH SETTINGS EG2 DECAY LF0 FREQ MODE EG2 RESET/LOOP LF0 FREQ MODE EG2 RESET/LOOP EG2 RESET/LOOP EG4 TATACK		
OSC-3:PITCH LF04 WAVEFORM M2 RESPONSE OSC-3:STRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:STRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:STRUSE MOD. LF04 SINGLE-SHOT M3 2ND DEST OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 2ND DEST MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:NOISE EG1 DELAY M4 2ND DEST MIXER:FB/EXT EG1 ATTACK M4 2ND DEST IPF1:RESONANCE EG1 SUSTAIN LF0X CHOICE LPF1:RESONANCE EG1 RELEASE LF0X DEPTH LPF2:REQUENCY EG1 RESET/LOOP LF0 FREQUENCY LPF2:REQUENCY EG1 RESPONSE LF0 OUTPUT LPF2:OUTPUT EG1 RESPONSE LF0 OUTPUT LPF2:OUTPUT EG2 DELAY LF0 SINGLE-SHOT OUTPUT EG2 DECAY LF0 FREQ MODE EG2 RESET/LOOP LF0 FREQ MODE EG2 RESET/LOOP EG2 RESET/LOOP EG ATTACK LF0 FMOD LF0X EG2 RESET/LOOP EG ATTACK		
OSC-3:TRIANGLE LF04 FREQUENCY M3 DEPTH OSC-3:SAWTOOTH LF04 FREQUENCY M3 DEPTH OSC-3:PULSE MOD. LF04 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:NOISE LF04 FREQ MODE M4 DEPTH MIXER:REVEL EG1 DELAY M4 2ND DEPTH IMIXER:REVEL EG1 DECAY M4 2ND DEPTH LPF1:REQUENCY EG1 DECAY M4 2ND DEPTH LPF1:RESONANCE EG1 SUSTAIN LFOX CHOICE LPF1:REQUENCY EG1 RESET/LOOP LFO REPTH LPF2:REQUENCY EG1 RESET/LOOP LFO NAVEFORM LPF2:REQUENCY EG1 RESET/LOOP LFO ODEPTH LPF2:GUENCY EG1 RESET/LOOP LFO SINGLE-SHOT OUTPUT EG2 DELAY LFO SINGLE-SHOT OUTPUT EG2 DELAY LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DELAY		
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OSC-3:PULSE MOD. LFO4 SINGLE-SHOT M3 2ND DEPTH OSC-3:PULSE LEVEL LFO4 SYNC/RESET M3 2RSPONSE MIXER:NOISE LFO4 FREQ MODE M4 DEPTH MIXER:NOISE LFO4 FREQ MODE M4 DEPTH MIXER:INOISE LFO4 FREQ MODE M4 DEPTH MIXER:LEVEL EG1 DELAY M4 2ND DEST MIXER:EVEL EG1 DECAY M4 RESPONSE LPF1:REQUENCY EG1 BECAY M4 RESPONSE LPF1:REQUENCY EG1 RELEASE LFOX DEPTH LPF1:RESONANCE EG1 RESET/LOOP LFO REVENCY LPF2:RESONANCE EG1 RESPONSE LFO OUTPUT LPF2:REQUENCY EG1 RESPONSE LFO OUTPUT LPF2:REQUENCY EG1 RESPONSE LFO SINGLE-SHOT UTPUT EG2 DELAY LFO FREQ MODE HPF:OUTPUT EG2 DECAY LFO FREQ MODE EG2 RESET/LOOP LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DECAY EG2 RESET/LOOP EG ATTACK EG DECAY EG3 RESET/		
OSC-3:PULSE LEVEL LF04 SYNC/RESET M3 RESPONSE MIXER:LEVEL EG1 PELAY M4 2ND DEST MIXER:LEVEL EG1 PELAY M4 2ND DEST MIXER:LEVEL EG1 PELAY M4 2ND DEST MIXER:LEVEL EG1 DELAY M4 2ND DEST MIXER:LEVEL EG1 DELAY M4 2ND DEST MIXER:LEVEL EG1 DECAY M4 2ND DEPTH LPF1:REQUENCY EG1 SUSTAIN LFOX CHOICE LPF1:REQUENCY EG1 RELEASE LFOX DEPTH LPF2:REQUENCY EG1 RESET/LOOP LFO FREQUENCY LPF2:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:OUTPUT EG1 RESET/LOOP LFO OUTPUT MODE HPF:OUTPUT EG2 DELAY LFO SINCLE-SHOT OUTPUT EG2 DECAY LFO FMOD LFOX EG2 REST/LOOP EG ATTACK LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DECAY EG2 RESET/LOOP EG ATTACK EG DECAY EG2 RESET/LOOP EG ATTACK EG DECAY EG3 DELAY EG RELEASE EG DECAY EG3 DELAY EG ANDA EG RESET/LOOP EG3 DELAY EG ANTACK EG DETH EG3 DELAY EG ANTACK EG DECAY<		
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MIXER:FB/EXT EG1 ATTACK M4 2ND DEPTH LPF1:FREQUENCY EG1 DECAY M4 RESPONSE LPF1:RESONANCE EG1 SUSTAIN LFOX CHOICE LPF1:RESONANCE EG1 RELEASE LFOX DEPTH LPF2:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:REQUENCY EG1 RESET/LOOP LFO REQUENCY LPF2:OUTPUT EG1 RESPONSE LFO OUTPUT MODE HPF:REQUENCY EG1 RESPONSE LFO SINGLE-SHOT OUTPUT EG2 DELAY LFO FREQ MODE PATCH SETTINGS EG2 DECAY LFO FMOD LFOX EG2 RELEASE LFO FMOD LFOX EG2 RESET/LOOP EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DECAY EG3 RELEASE LFO FMOD LFOX EG2 RESET/LOOP EG3 RELEASE EG DECAY EG3 DELAY EG3 DELAY EG RESET/LOOP EG RELEASE EG3 DELAY EG CHOICE EG3 SUSTAIN EG3 DELAY EG CHOICE EG3 SUSTAIN EG3 RELEASE EG RESET/LOOP EG3 RESET/LOOP EG3 RELEASE EG RESET/LOOP EG3 RESET/LOOP EG3 RESET/LOOP		
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LPF1:OUTPUT EG1 RELEASE LFOX DEPTH LPF2:REQUENCY EG1 REST/LOOP LFO KEQUENCY LPF2:REQUENCY EG1 RESET/LOOP LFO FREQUENCY LPF2:OUTPUT EG1 RESPONSE LFO OUTPUT MODE HPF:OUTPUT EG2 DELAY LFO SINGLE-SHOT OUTPUT EG2 DECAY LFO FREQ MODE PATCH SETTINGS EG2 DECAY LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK LFO FMOD LFOX EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DELAY EG2 RESET/LOOP EG ATTACK EG DECAY EG2 RESET/LOOP EG ATTACK EG DECAY EG3 DELAY EG DECAY EG DECAY EG3 DELAY EG RELEASE EG SUSTAIN EG3 DELAY EG CACAY EG DECAY EG3 DELAY EG CACY EG DECAY EG3 DELAY EG CHOICE EG3 SUSTAIN EG3 SUSTAIN EG KEYTRACK EG RESET/LOOP EG3 RELEASE EG RESET/LOOP EG RESET/LOOP EG3 RESET/LOOP		
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EG3 KEYTRACK EG SHAPE EG3 RESET/LOOP EG RESPONSE		
EG3 RESET/LOOP EG RESPONSE		
EG3 SHAPE		
200 0.0.02		
EG3 RESPONSE		
EG4 DELAY		
EG4 ATTACK		
EG4 DECAY		
EG4 SUSTAIN		
EG4 RELEASE		
EG4 KEYTRACK		
EG4 RESET/LOOP	-	
EG4 SHAPE		
EG4 RESPONSE		

*since firmware 0602010C LFOx TEMPO is not used (use LFOx FREQUENCY instead).

Note that the available options are exactly the same as for the parameter mapping feature (see 2.20).

3.5 Copy/Reset Mod

Pressing (GOPY) from the **ADVANCED** MOD setup page allows options to copy or reset the advanced modulation settings. The current slot is shown in the upper right of the display.

COPY/RESET MOD	#	1
COPY FROM 2 Copy to 2 Reset this slot Reset all slots		+

Press $\textcircled{h} \rightarrow$ when the **COPY FROM** line is selected to copy from a modulation slot (selected using the rotary encoder O) to the current modulation slot.

Press 0 \longrightarrow when the **COPY TO** line is selected to copy the current modulation slot settings to another slot (selected using the rotary encoder O).

Press h when the **RESET THIS SLOT** line is selected to reset all the settings for the current slot.

Press $\textcircled{h} \rightarrow$ when the **RESET ALL SLOTS** line is selected to reset all of the advanced modulation settings for this patch, and turn off (disable) the advanced modulation.

3.6 Control of settings over MIDI

When the advanced modulation settings are adjusted the new settings can be sent over MIDI using NRPN messages. Similarly **MOTRS-6** recognises these NRPN messages to adjust the settings. The MotasEdit has an interface to allow changing of the advanced modulation settings, see also section 2.8.

4 Sound design

4.1 Set bipolar or unipolar modulation

The modulation sources EG, note, velocity and global modulators M1 ... M4 can all be set to modulate in either unipolar or bipolar mode (independent settings for each source on each parameter page). Bipolar means that when the modulation source is at its mid-value the modulation effect will be zero whilst in unipolar mode the effect is zero when the source is also at its zero value. Typically (on traditional synths) EGs are always unipolar but with MOTAS – 6 this does not have to be the case.

HPF	01	UTPI	ЦТ						
ENV	ΕL	OPE	GE	NE	ΒA	ТΟ	B 👘		
EG	СΗ	OIC	E	GL	0 B	AL.	1		
GAT	EΖ	TRI	G	NO	ΤE				
RES	ΕT			0 F	F				
MOD	E			GA	ΤE	D			
SHA	ΡE			LO				Э	2
RES	ΡO	NSE		LΝ	IP	0L	AR		

The LFOs (global and local) are always bipolar.

4.2 Make an oscillator have fixed pitch

The VCOs normally track MIDI note-on values automatically. To hold the VCO so that its pitch is the same regardless of the incoming MIDI note simply apply a note modulation of -12 semitones (to cancel out the +12 semitones that is built-in).



4.3 Create a drone patch

To create a drone patch i.e. one where the audio is heard continuously, simply reduce the EG modulation level on the final output page to zero and offset the page value to 100% to give full output level. Also, you would need to set non-zero offset levels on other pages such as oscillator individual waveform pages, oscillator overall level page, mixer level page and filter output page (such as for low-pass filter 1) in order to hear something.



4.4 Create a band-pass filter

NOTAS – 6 has 3 independent filters: two low-pass and one high-pass. To make a bandpass filter a low-pass filter needs to be placed in series with the high-pass filter.

Let's use low-pass filter 1 with the high-pass filter. Set the input of the low-pass filter 1 to the mixer **MIX** and set the cut-off frequency to **2.00KHZ**.

LPF-1:FREQ	MIX +
MODULATIONS Not active	
1	⇒

Next, set the direct output level of low-pass filter 1 to zero (we don't want any of the direct output to be audible).

LPF-1:0UTPUT	POLE-2
MODULATIONS Not active	
1	→ ⊠%

Next set the input of the high-pass filter to the 2nd pole of the low-pass filter 1 output **POLE = 2** and set the cutoff frequency to **1**.00KHZ.

HPF:FREQ	POLE-2+
MODULATIONS Not active	
1	→ 1.00KHZ



With this setup the audio from the mixer passes through a band-pass filter with fixed width and a centre frequency around 1.5kHz. Of course the frequencies of the low and high pass filters can be modulated (independently) to make the sound more interesting.

The high-pass filter can be set to receive its signal from a different pole of the low-pass filter 1 (the higher the pole the steeper the cut-off frequency), the low-pass filter 1 resonance could be adjusted and the signal level can be adjusted (to alter the gain-staging and so distortion effects)...all of these changes will alter the sonic effect.

4.5 Use phase modulation to create complex waveforms

NOTRS-6 is rather unique for an analogue synthesizer in having phase-modulation capabilities. Phase modulation (PM) is when the waveform of an oscillator (the carrier) is shifted in phase a controllable amount from another oscillator waveform (the modulator).

Phase-modulation gives rise to sounds similar to frequency modulation (FM) but does not have the frequency shift problems that can plague true FM. This is because with FM the frequency of the output signal is affected by *the value* of the modulating signal whereas with PM the frequency shift is from the *rate-of-change* of the modulator signal. Using FM it is very hard to generate modulator wavefoms that do not cause the side-effect of uncontrolled frequency changes, especially with analogue VCOs and strong modulation amounts.

The 'FM' digital synths of the 1980s actually used phase-modulation (PM) but it was marketed as FM...

The VCO2 core sawtooth waveform can be phase-modulated

from the VCO1 triangle wave. The modulated result is the sawtooth output from VCO2. Internally the triangle waveform from VCO2 is generated from this new sawtooth and so is affected by the PM. The square and sub waveforms are generated from the original core sawtooth and so are not affected by the PM on VCO2.

The VCO3 core sawtooth waveform can be phase-modulated from either the VCO1 or VCO2 triangle wave. The modulated result is the sawtooth output from VCO3. Internally the triangle and pulse waveforms from VCO2 are generated from this new sawtooth and so both are affected by the PM.

In the screenshot below (captured from the built-in oscilloscope feature) we have VCO3 sawtooth output with phase modulation from VCO2. Both VCOs have been set to the same frequency (with VCO2 set to hard-sync to VCO3 to ensure constant lock). As you can see the waveform is significantly altered from a pure sawtooth.



In the screenshot below we have the same setup as above but additionally add phase modulation of VCO2 from VCO1 creating a more complex waveshape.



4.6 Create wave-folding sounds

It is possible to create wave-folding type effects using a special setup of the phase-modulation.

To achieve this we set the carrier frequency out-of-range of hearing (either **INFRASONIC** or **ULTRASONIC**). Then, with phase modulation the triangle wave output shape will, with some combination of settings, effectively be wavefolded onto itself.



In the screenshot below (captured from the built-in oscilloscope feature) you can see that the triangle wave output of VCO3 has 'folded' back onto itself at the tops of the cycle giving a characteristic tone. In this example the filters have been bypassed.



4.7 Set LFOs to track pitch for AM- and FM-type sounds

Normally the LFOs frequency is free-running but setting the **FREQ MODE** setting to **NOTE TRACK** or **FITCH TRACK** causes the LFO frequency to track with the played note. In this case the LFO frequency is not displayed in Hz but in semitones or cents offset from the played note. In **NOTE TRACK** mode the LFO will track the last played note including pitch bend and global tuning and offset, whilst in **FITCH TRACK** mode additionally the tracking will be from the result of the **MASTER PITCH** page.

MIXER	
LOCAL LFO	
OUTPUT MODE N	ORMAL
SINGLE-SHOT	OFF
SYNC/RESET	OFF
FREQ MODE PITCH	TRACK
FREQ MOD LFOX	0.0
FREQ MOD EG	0.0

Use pitch-tracking to apply a range of AM and FM effects (depending where the LFO is appled). Offset the pitch-tracking frequency to give characteristic noisy/complex tones. Since the LFOs cannot run at high audio rates (due to hardware limitations) digital aliasing artifacts will be heard when at higher frequencies, especially if the LFO waveform is not a sine wave.

4.8 Control gain-staging and distortion

There are several audio gain controlling stages in the audio signal path. There is the mix of the individual oscillator waveforms, the overall oscillator levels, the mixer level (including boost option) and the individual filter output levels. Also the resonance control on the low-pass filters is relevant (since resonance is a local feedback path), as well as the possibility to use the external input/feedback path. Finally there are the clipping options on the final output stage.



MOTAS – 6 has been designed so that at higher levels the audio signals will overdrive/compress/limit/clip within the analogue circuitry producing new harmonics from nonlinear circuit operation in many places. The effect will be different depending on where the higher levels are present within the circuitry. This intentional design allows a greater range of possible sounds which vary with the various signal levels in the signal path. Use of filter resonance and feedback also plays a part by modifying the signal levels. Use lower-levels for a clean sound, high levels for a grungy aggresive sound and intermediate levels for effects inbetween. The filters will distort differently due to the different designs of the circuits.

Using multiple oscillators at almost the same frequency, with appropriate level settings, can give an interesting change of tone as the oscillators drift in- and out-of phase. At some times the oscillators add together (when in-phase) and then distortion is strongest. At other times, when not in-phase, the overall signal is weaker and so the distortion is reduced or absent.

The subtle (or not subtle) effects of distortion are one of the key sonic attractions of analogue synthesizers such as **MOTAS-6**.

4.9 Change the EG response shape

Each EG (Envelope Generator) has an output signal that varies over time during the attack, decay and release phases. The way this signal varies with time can be varied over a wide range using the shape parameter from -64 to +64. With positive shape values (LOG) the signal changes more quickly at the start and then more slowly, conversely with negative shape values (EXF) the signal changes more slowly at the start and then more quickly. Adjusting this parameter is particularly useful to get exactly the 'right' response for percussive sounds where small changes in the shape can make a big difference to the sound effect.

MIXER:FB/EX	TERNAL	
ENVELOPE G	ENERATOR	
EG CHOICE	LOCAL	
GATE/TRIG	NOTE	
RESET	OFF	
MODE	GATED	
SHAPE	LOG	24
RESPONSE	BIPOLAR	

4.10 Use oscillator sync to create complex waveforms

MOTRS – 6 has hard oscillator syncronisation features on oscillators 1 and 2. This means that the oscillator core can be reset by another oscillator (or oscillators). The synced oscillator re-starts its waveform cycle at the point in time when the other oscillator re-starts. The audio effect depends on the relationship between the frequencies of the oscillators.

The waveform below shows the triangle wave output of oscillator 1 which is synced to oscillator 2. The frequency of oscillator 2 is set to 7 semitones lower than oscillator 1. As you can see the triangle waveform is distorted as the oscillator signal resets partway through the cycle.



In a more complex example the waveform below shows the triangle wave output of oscillator 1 which is synced to oscillators 2 and 3. The frequency of oscillator 2 is set to 7 semitones lower than oscillator 1 whilst the frequency of oscillator 3 is set to 9 semitones lower. The triangle waveform is distorted with 2 resets during its cycle.



4.11 'Play' a resonant filter

The 2 low-pass filters can both be 'played' like oscillators using high resonance settings. Set the filter cut-off frequency to track note with 1.00 octave. Set the resonance above 70%.



Note that the self-oscillation dies off at lower frequencies especially for low-pass filter 2. With low-pass filter 1 set the resonance feedback setting to **FOLE-4** or **FOLE-5**. The pitch will be lower in the **FOLE-5** setting and will extend to lower frequency operation. Note also that the pitch stability of the filters is not as accurate as that for the oscillators.

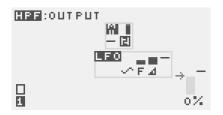
4.12 Modulate a local LFO frequency with a global LFO or EG

Set the **FREQ MOD LFOX** parameter to allow the frequency of a local LFO to be modulated by the global

LFO used on that page and/or set the **FREQ MOD EG** parameter to allow the frequency to be modulated by the EG used on that page. Note that the global lfo or EG modulation amount settings for the page are irrelevant here and could be zero.

HPF:OUTPUT	
LOCAL LFO	
OUTPUT MODE	NORMAL
SINGLE-SHOT	OFF
SYNC/RESET	OFF
PITCH TRACK	OFF
FREQ MOD LFOX	45%
FREQ MOD EG	0%

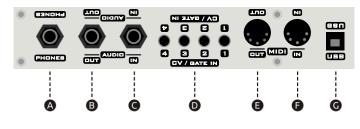
Another way to achieve this is (or in parallel to the above!) is to assign a global LFO or global EG to one of the global modulators M1 ...M4 and then set a secondary modulation amount to modulate the local LFO frequency.



Adjust the local LFO frequency as normal to set the 'offset' of the local LFO about which the modulation takes place.

4.13 Feedback audio / process external audio

To process the output of **NOTAS** – **G** in a feedback loop ensure that nothing is plugged into the external audio input **G**. When nothing is connected an internal loopback connection is made from the main output (before the final volume control). Alternatively, to process external audio plug in a line-level audio signal into **G**.



Adjust the level on the 🌾 ዙ

MIXER FB/EXTERNAL parameter page. The feedback or external audio signal enters the mixer along with the VCOs and the noise source. Since this is a feedback loop if the gain around the loop becomes greater than 1 and is inphase the output will potentially scream/howl so use with caution, or to good effect!

MIXER:FB/EXTERNAL	
MODULATIONS Not active	÷
3	65%

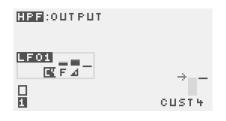
Of course modulation can be applied to this page (just like all the other pages) so you could create an effect where the external sound is only processed for a certain time on each key press by modulating with an EG, for example.

4.14 Design and use custom LFO waveforms

Each patch has 4 custom LFO waveforms which can be edited. Access SETUP PAGE 2 and then press 🖑 🔂 or



Any LFO (parameter-page local, or global) can use the 4 custom LFO waveforms just like the preset waveforms.



Set an LFO into **SINGLE-SHOT** mode using a custom LFO waveform with a complex profile to use the LFO more like an 'EG' on a percussive patch with exact and complex control of the shape over time. Use the LFO frequency to control how 'fast' the waveform changes over time.

A Real-time patch changes using MIDI NRPNs

When a patch parameter is changed using the rotary knobs **()**, rotary encoder **(O** or buttons **(B** a series of 4 MIDI controller messages are sent:

- NRPN MSB #99 (0x63 in hex)
- NRPN LSB #98 (0x62)
- data entry MSB #6 (0x06)
- data entry LSB #38 (0x26)

Parameter Page	NRPN MSB data
N/A (global parameter)	0
Master pitch	1
Oscillator 1 Level	2
Oscillator 1 Pitch	3
Oscillator 1 Triangle Level	4
Oscillator 1 Sawtooth Level	5
Oscillator 1 Pulse Mod	6
Oscillator 1 Pulse Level	7
Oscillator 2 Phase Mod.	8
Oscillator 2 Level	9
Oscillator 2 Pitch	10
Oscillator 2 Triangle Level	11
Oscillator 2 Sawtooth Level	12
Oscillator 2 Square	13
Oscillator 2 Sub Level	14
Oscillator 3 Phase Mod.	15
Oscillator 3 Level	16
Oscillator 3 Pitch	17
Oscillator 3 Triangle Level	18
Oscillator 3 Sawtooth Level	19
Oscillator 3 Pulse Mod	20
Oscillator 3 Pulse Level	21
Noise Level	22
Mix Level	23
Low-pass Filter 1 cut-off	24
Low-pass Filter 1 resonance	25
Low-pass Filter 1 level	26
High-pass Filter cut-off	27
High-pass Filter level	28
Feedback/Ext in Level	29
Low-pass Filter 2 cut-off	31
Low-pass Filter 2 resonance	32
Low-pass Filter 2 Level	33
Output Level	35
Advanced modulation	64
	see section A.1

The same format of messages, if received via USB or MIDI,
cause the current patch to change accordingly.

The NRPN messages indicate exactly which parameter is being changed whilst the data entry messages contain the new parameter value. The first message (controller 99) is sent with the data value from the table above, denoting the parameter page being changed. If the data is for a global source (such as a shared EG or LFO) then the data value is zero.

In the case of a page-related parameter changing (i.e. NRPN MSB value not 0 or 64) then the second message sent (controller 98) has the data value from the following table, denoting the parameter from that page being changed.

Page data	NRPN LSB data
Offset	1
EG mod depth	5
EG delay	10
EG attack	11
EG decay	12
EG sustain	13
EG release	14
LFOx mod depth	20
LFO frequency	25
LFO mod depth	26
M1 level	30
M1 alternate dest. level	31
M1 unipolar	32
M2 level	35
M2 alternate dest. level	36
M2 unipolar	37
M3 level	40
M3 alternate dest. level	41
M3 unipolar	42
M4 level	45
M4 alternate dest. level	46
M4 unipolar	47
Velocity level	50
Velocity alternate dest. level	51
Velocity unipolar	52
Note level	55
Note alternate dest. level	56
Note unipolar	57
Page option 1	64
Page option 2	65
EG source	70
EG retrig	70
EG restart	72
EG shape	75
EG shape multi	76
EG unipolar	78
LFO source	80
LFO waveform	85
LFO trigger	86
LFO trigger LFO single shot	80
LFO output mode	88
LFO freq mode	89
M1 destination	90
LFO freq mod LFOx	90
	92
LFO freq mod EG M2 destination	93
M3 destination	100
M4 destination	105
velocity destination	110
note destination	115

In the case of a global parameter changing (i.e. NRPN MSB value was 0) then the second message sent (controller 98) has the data value from the following table, denoting the global parameter.

Global data	NRPN LSB data
LFOx 1 frequency	4
LFOx 2 frequency	5
LFOx 3 frequency	6
LFOx 4 frequency	7
EGx 1 delay EGx 2 delav	12 13
EGX 2 delay EGX 3 delay	13
EGX 3 delay EGX 4 delay	14
EGx 1 attack	20
EGx 2 attack	21
EGx 3 attack	22
EGx 4 attack	23
EGx 1 decay	28
EGx 2 decay	29
EGx 3 decay	30
EGx 4 decay	31
EGx 1 sustain	36
EGx 2 sustain	37
EGx 3 sustain	38
EGx 4 sustain	39
EGx 1 release	44
EGx 2 release	45
EGx 3 release	46
EGx 4 release	47
portmento mode	52
portmento value	53
portmento time or rate	54
lfo sync	55
track note-off	56 57
pitchwheel sensitivity	
M1 source M2 source	64 65
M2 source	66
M3 source	67
LFOx 1 trigger	72
LFOx 2 trigger	73
LFOx 3 trigger	74
LFOx 4 trigger	75
LFOx 1 single-shot	76
LFOx 2 single-shot	77
LFOx 3 single-shot	78
LFOx 4 single-shot	79
LFOx 1 waveform	80
LFOx 2 waveform	81
LFOx 3 waveform	82
LFOx 4 waveform	83
LFOx 1 freq mode	84
LFOx 2 freq mode	85
LFOx 3 freq mode	86
LFOx 4 freq mode	87
EGx 1 trigger	88
EGx 2 trigger	89
EGx 3 trigger	90
EGx 4 trigger	91
EGx 1 restart	96
EGx 2 restart	97
EGx 3 restart	98
EGx 4 restart	99
EGx 1 shape	104
EGx 2 shape EGx 3 shape	105 106
EGx 3 shape EGx 4 shape	106
EGX 4 shape EGX 1 unipolar	110
EGX 1 unipolar EGX 2 unipolar	110
EGX 2 unipolar EGX 3 unipolar	111
EGX 3 Unipolar EGX 4 unipolar	112
EGX 4 unipolai EGX 1 shape multi	113
EGX 1 shape multi	114
EGX 2 shape multi	115
EGx 4 shape multi	117
Lov + shape match	117

A.1 NRPN control of advanced modulation

The configuration of the advanced modulation (see chapter 3) can be sent and received using NRPNs too.

In this case the NRPN MSB is 64. The NRPN LSB data upper 4 bits indicate the advanced modulation slot number whilst the lower 3 bits encode the following:

Parameter	NRPN LSB data (lowest 3 bits only)
Source S1	0
Source S2	1
Destination	2
Function	3
Gain	4
Unipolar	5
Mode (on/off)	7

B MIDI Implementation Chart

MIDI Implementation Chart v. 2.0 (Page 1 of 3)

Manufacturer: Motas Electronics Limited. Model: Motas 6	Date: July 202 Transmit/Export	Recognise/Import	Remarks
1. Basic Information	fransmit/Export	Recognise/import	Remarks
MIDI channels	1 – 16	1–16	
Note numbers	No	0 - 127	
Program change	No		change active patch / load patch from ban
Bank Select response? (Yes/No)		Yes	Bank CC 0 to select fast-access patch 1–5
If yes, list banks utilized in remarks column			Bank CC 1–10 to select banks 1–10
Modes supported : Mode 1: Omni-On, Poly (Yes/No)		No	Can be set
Mode 2: Omni-On, Mono (Yes/No)		No	to receive
Mode 3: Omni-Off, Poly (Yes/No)		No	on any channel
Mode 4: Omni-Off, Mono (Yes/No)		No	
Multi Mode (Yes/No)		No	
Note-On Velocity (Yes/No)		Yes	
Note-Off Velocity (Yes/No)	No	No	
Channel Aftertouch (Yes/No)		Yes	
Poly (Key) Aftertouch (Yes/No)		No	
Pitch Bend (Yes/No)		Yes	
Active Sensing (Yes/No)		Yes	
System Reset (Yes/No)	No	No	
Tune Request (Yes/No)	No	No	
Universal System Exclusive: Sample Dump Standard (Yes/No)	No	No	
Device Inquiry (Yes/No)	No	No	
File Dump (Yes/No)	No	No	
MIDI Tuning (Yes/No)	No	Yes	3-byte bulk tuning dump
Master Volume (Yes/No)	No	No	
Master Balance (Yes/No)	No	No	
Notation Information (Yes/No)	No	No	
Turn GM1 System On (Yes/No)	No	No	
Turn GM2 System On (Yes/No)	No	No	
Turn GM System Off (Yes/No)	No	No	
DLS-1 (Yes/No)	No	No	
File Reference (Yes/No)	No	No	
Controller Destination (Yes/No)	No	No	
Key-based Instrument Ctrl (Yes/No)	No	No	
Master Fine/Coarse Tune (Yes/No)	No	No	
Other Universal System Exclusive	No	No	
Manufacturer or Non-Commercial System Exclusive	Yes	Yes	Motas Electronics Ltd ID# : 00H 21H 2FH
NRPNs (Yes/No)	Yes	Yes	see A
RPN 00 (Pitch Bend Sensitivity) (Yes/No)	No	No	JCCA
RPN 01 (Channel Fine Tune) (Yes/No)	No	No	
RPN 02 (Channel Coarse Tune) (Yes/No)	No	No	
RPN 03 (Tuning Program Select) (Yes/No)	No	No	
RPN 04 (Tuning Bank Select) (Yes/No)	No	No	
RPN 04 (Turning Bank Selecc) (Tes/No) RPN 05 (Modulation Depth Range) (Yes/No)	No	No	
2. MIDI Timing and Synchronization	NO	NO	
MIDI Clock (Yes/No)	Yes	Yes	
Song Position Pointer (Yes/No)	No	No	
Song Select (Yes/No)	No	No	
Start (Yes/No)	No	Yes	
Continue (Yes/No)	No	Yes	
Stop (Yes/No)	No	Yes	
MIDI Time Code (Yes/No)	No	No	
MIDI Machine Control (Yes/No)	No	No	
MIDI Show Control (Yes/No)	No	No	
f yes, MSC Level supported	No	No	
3. Extensions Compatibility			
General MIDI compatible? (Level(s)/No)	No	No	
s GM default power-up mode? (Level/No)			
DLS compatible? (Levels(s)/No)	No	No	
(DLS File Type(s)/No)	No	No	
Standard MIDI Files (Type(s)/No)	No	No	
XMF Files (Type(s)/No)	No	No	
SP-MIDI compatible? (Yes/No)	No	No	

	or: Motor Electronical india d	lol: Motor C	100/02020	
Manufactur C ontrol #	er: Motas Electronics Limited. Moc Function	el: Motas 6. Date Transmitted (Y/N)	: July 2020. Recognised (Y/N)	Democke
0	MIDI Bank Select (MSB)	Y	Y	Remarks
1	Modulation Wheel (MSB)	Ŷ	Ŷ	
2	Breath Controller (MSB)	Ŷ	Y	
3		Y	Y	
4	Foot Controller (MSB)	Y	Y	
5	Portamento Time (MSB)	Y	Y	
6	Data Entry (MSB)	Y	Y	see A
7	Channel Volume (MSB)	Y	Y	
8	Balance (MSB)	Y	Y	
9		Y Y	Y Y	
10	Pan (MSB) Expression (MSB)	Y Y	Y Y	
11 12	Effect Control 1 (MSB)	Y Y	Y Y	
13	Effect Control 2 (MSB)	Y	Y	
14		Y	Y	
15		Ŷ	Y	
16	General Purpose Controller 1 (MSB)	Ŷ	Y	
17	General Purpose Controller 2 (MSB)	Y	Y	
18	General Purpose Controller 3 (MSB)	Y	Y	
19	General Purpose Controller 4 (MSB)	Y	Y	
20	• • • •	Y	Y	
21		Y	Y	
22		Y	Y	
23		Y	Y	
24		Y	Y	
25		Y	Y	
26		Y	Y	
27		Y	Y	
28		Y	Y	
29 30		Y Y	Y Y	
30		Y	Y	
32	Bank Select (LSB	N	N	
33	Modulation Wheel (LSB)	Y	Y	
34	Breath Controller (LSB)	Ŷ	Y	
35		Y	Y	
36	Foot Controller (LSB)	Ŷ	Ŷ	
37	Portamento Time (LSB)	Y	Y	
38	Data Entry (LSB)	Y	Y	see A
39	Channel Volume (LSB)	Y	Y	
40	Balance (LSB)	Y	Y	
41		Y	Y	
42	Pan (LSB)	Y	Y	
43	Expression (LSB)	Y	Y	
44	Effect Control 1 (LSB)	Y	Y	
45	Effect Control 2 (LSB)	Y	Y	
46		Y	Y	
47		Y	Y	
48	General Purpose Controller 1 (LSB) General Purpose Controller 2 (LSB)	Y Y	Y Y	
49 50	General Purpose Controller 2 (LSB) General Purpose Controller 3 (LSB)	Y Y	Y Y	
50	General Purpose Controller 3 (LSB) General Purpose Controller 4 (LSB)	Y Y	Y Y	
52	General r di pose conti oller 4 (LSB)	Y Y	Y	
53		Y	Y	
54		Y	Y	
55		Y	Y	
56		Y	Y	
57		N	N	
58		N	N	
59		Ν	Ν	
60		Ν	N	
61		Ν	Ν	
62		N	N	
63		N	N	

Manufacture	er: Motas Electronics Limited. Model: Motas 6. D	ate: July 2020.		
Control #	Function	Transmitted (Y/N)	Recognised (Y/N)	Remarks
64	Sustain Pedal	Y	Υ	Kellidika
65	Portamento On/Off	Y	Y	
66	Sostenuto	Y	Y	
67	Soft Pedal	Y	Y	
68	Legato Footswitch	Y	Y	
69	Hold 2	Y	Y	
70	Sound Controller 1 (default: Sound Variation)	Y	Y	
71	Sound Controller 2 (default: Timbre / Harmonic Quality)	Y	Y	
72	Sound Controller 3 (default: Release Time)	Y	Y	
73	Sound Controller 4 (default: Attack Time)	Y	Y	
74	Sound Controller 5 (default: Brightness)	Y	Y	
75	Sound Controller 6 (GM2 default: Decay Time)	Y	Y	
76	Sound Controller 7 (GM2 default: Vibrato Rate)	Y	Y	
77	Sound Controller 8 (GM2 default: Vibrato Depth)	Y	Y	
78	Sound Controller 9 (GM2 default: Vibrato Delay)	Y	Y	
79	Sound Controller 10 (GM2 default: Undefined)	Y	Y	
80	General Purpose Controller 5	Y	Y	
81	General Purpose Controller 6	Y	Y	
82	General Purpose Controller 7	Y	Y	
83	General Purpose Controller 8	Y	Y	
84	Portamento Control	Y	Y	
85		Y	Y	
86		Y	Y	
87		Y	Y	
88		Y	Y	
89		Y	Y	
90		Y	Y	
91	Effects 1 Depth (default: Reverb Send)	Y	Y	
92	Effects 2 Depth (default: Tremolo Depth)	Y	Y	
93	Effects 3 Depth (default: Chorus Send)	Y	Y	
94	Effects 4 Depth (default: Celeste [Detune] Depth)	Y	Y	
95 96	Effects 5 Depth (default: Phaser Depth) Data Increment	Y Y	Y Y	
96	Data Increment	Y	Y Y	
98	Non-Registered Parameter Number (LSB)	Y	r Y	see A
99	Non-Registered Parameter Number (LSB)	Y	Y	see A
100	Registered Parameter Number (LSB)	Y	Y	see A
100	Registered Parameter Number (LSD)	Y	Y	see A
101		Y	Y	
102		Y	Y	
103		Y	Y	
105		Y	Y	
106		Y	Y	
100		Y	Y	
108		Y	Y	
109		Y	Y	
110		Y	Y	
111		Y	Y	
112		Y	Y	
113		Y	Y	
114		Y	Y	
115		Y	Y	
116		Y	Y	
117		Y	Y	
118		Y	Y	
119		Y	Y	
120	All Sound Off	N	Y	
121	Reset All Controllers	N	Y	
122	Local Control On/Off	N	N	
123	All Notes Off	N	Y	
124	Omni Mode Off	N	N	
125	Omni Mode On	N	N	
126	Poly Mode Off	N	N	
127	Poly Mode On	N	N	

C MIDI SysEx messages

This appendix is for reference purposes mainly for those wishing to develop software to communicate with MOTAS-6. MIDI system exclusive (SysEx) messages allow transfer of bulk data such as patch data, screenshot images and firmware updates. Further details are available on request.

The following table shows the message format that can be used by a connected MIDI device to request data from MOTAS-6

MIDI SysEx request message format		
SysEx byte	Description	
0xF0	start	
0x00	Motas Electronics identifier	
0x21	Motas Electronics identifier	
0x2F	Motas Electronics identifier	
0x06	product id (6 = motas-6)	
Х	MIDI channel byte 'X'	
0x00	reserved	
CB	SysEx command byte 'CB'	
Р	SysEx parameter byte'P'	
0xF7	end	

The following table shows the message format for bulk data messages that can be sent or received. In the case of larger data transfers they are split up and sent in multiple smaller packets using the start/continue/end byte indicator.

MIDI SysEx bulk data transfer message format			
SysEx byte	Description		
0xF0	start		
0x00	Motas Electronics identifier		
0x21	Motas Electronics identifier		
0x2F	Motas Electronics identifier		
0x06	product id (6 = motas-6)		
X	MIDI channel 'X'		
0x00	reserved		
CB	SysEx command byte 'CB'		
SCE	SysEx start/continue/end byte 'SCE'		
	0x47 = start, 0x48 = continue, 0x49 = end		
A	SysEx parameter 'A'		
В	SysEx parameter 'B'		
C	SysEx parameter 'C'		
DD*	multiple data bytes 'DD'		
	encoded from original data bytes 'XX'		
	to limit each byte value <= 0x7F		
	required by MIDI protocol		
CRC [†]	† only present if this is an 'end' packet		
	– 4-byte CRC of the original data bytes 'XX'		
0xF7	end		

MIDI SysEx Command Listing

MIDI Sysex Command Listing			
Command description	'CB'	Parameter(s)	
Request commands			
Request screenshot bitmap	0x0A	-	
Request oscilloscope trace	0x0B	-	
Request bulk data	0x0C	-	
Request info	0x0E	-	
Request global data	0x0F	-	
Request screenshot bitmap			
compressed	0x10	-	
Request status	0x11	P = 0bxxxxxx1 : auto	
		page change on	
		P = 0bxxxxx1x:	
		show monitor page	
Request patch	0x14	-	
Request patch bank	0x15	P = bank number	
Request pattern	0x19	-	
Request pattern bank	0x1A	P = bank number	
Request sequence	0x1E	-	
Request sequence bank	0x1F	P = bank number	
Request abort process	0x4B	-	
Data transfer			
Screenshot	0x28	-	
Oscilloscope data	0x29	-	
Info	0x2A	-	
Screenshot compressed‡	0x2B	-	
Global data	0x2D	_	
Patch	0x32	A = 0x7E	
		B = current preset#	
Patch bank	0x33	A = bank#	
		B = index#	
Pattern	0x37	A = 0x7E	
Debbe en la el	020	B = current pattern#	
Pattern bank	0x38	A = bank# B = index#	
Sand coquence	0x3C	B = Index# A = 0x7E	
Send sequence	UX3C	A = 0X/E B = 0	
Sond coquence back	0x3D	в = 0 A = bank#	
Send sequence bank	UXSD	A = bank# B = index#	
Send status	0x3E		
Send bulk data	0x3E 0x0C		
Receive-only commands	UXUC	-	
Receive bulk data	0x0D		
Receive firmware	0x0D 0x46		
	0,40		

* To decode the bytes values to the original data a sequence of 8 bytes can be processed using the following c-code algorithm:

2

3

4

5

6

8

```
1 for (i = 0; i < 8; i++) {
    if (i == 0) {
        msbByte = byte[i];
        msbCount = 1;
      } else {
        decodedByte = byte[i] | ((msbByte << msbCount) &</pre>
        0x80):
        msbCount++;
      }
9 }
```

† The CRC algorithm is 32 bit, uses the initial value 0xFFFFFFF, polynomial value 0x04C11DB7 and final XOR value of 0x0000000

‡ Compression algorithm details available on request, email support@motas-synth.uk