

Lintronics Advanced Memorymoog Manual



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INTRODUCTION

The **Lintronics Advanced MemoryMoog (LAMM)** is not just another MIDI upgrade for the Moog Memorymoog synthesizer, but rather a completely new further development of the legendary Memorymoog. These advancements do, of course, include a comprehensive MIDI upgrade, but also encompass numerous deep changes in the Memorymoog's soft- and hardware.

Our intensive study of the Memorymoog began in the middle of 1989. The Memorymoog's operating system was completely rewritten, and the hardware so thoroughly upgraded and "tweaked" that the **LAMM** has been fully freed of the glitches and problems that have plagued Memorymoog users on stage and in the studio.

Although the Memorymoog has been out of production since 1984, our upgrade is by no means antiquated or obsolete. For one, we are able to obtain most of the original replacement parts for the Memorymoog, and we have replaced the central processing unit of the Memorymoog with a more advanced CPU, which more than doubles the Memorymoog's performance. We have, however, resisted the temptation to attempt to "improve" the Memorymoog's synthesis in any fashion.

The purpose of the development of **LAMM** was not to simply endow the Memorymoog with MIDI and correct design errors, but rather to design a more clearly arranged and accessible user interface for the Memorymoog. With some pride we would say that not only does the **LAMM** possess many features not found in any other machine on the market, but also has a user interface that is so clear that an experienced user quickly finds the manual to be superfluous.

We of course often receive suggestions from users or discover new facts about the Memorymoog, and so will continually send out updates to the **LAMM**.

Users of MAC or WINDOWS computers should take note that Michael Heydn from **EMAGIC** has developed the SOUND DIVER Editor/Bankloader, which allows users to take full advantage of the **Lintronics Advanced Memorymoog**.

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QUICK REFERENCE GUIDE

If you hate reading manuals, please read at least this page! This is a condensed primer on how to...

...set the MIDI channels

Transmit channel: press "C"-**"5"**-ENTER, type in the transmit channel, **ENTER**.
Receive channel: press "C"-**"6"**-ENTER, type in the receive channel, **ENTER**.
Omni off: press "C"-**"9"**-ENTER-**"7"**-ENTER-**"0"**-ENTER.

...control the Moog's pitch and modulation wheels via MIDI *)

Enable reception: press "C"-**"9"**-ENTER-**"1"**-ENTER-**"1"**-ENTER.
Assignment: press "C"-**"9"**-ENTER-**"9"**-ENTER-**"1"**-ENTER, grab the pot named "Modulation Amount" and move it until a value of +1 is displayed, confirm with **ENTER**.

...use a velocity sensitive keyboard to control the Memorymoog *)

Assignment: press "C"-**"9"**-ENTER-**"9"**-ENTER-**"2"**-ENTER, move the pot to be affected by velocity until a value other than "OFF" is displayed, confirm with **ENTER**.

...use a pressure sensitive keyboard to control the Memorymoog *)

Enable reception: press "C"-**"9"**-ENTER-**"1"**-ENTER-**"5"**-ENTER.
Assignment: press "C"-**"9"**-ENTER-**"9"**-ENTER-**"3"**-ENTER, move the pot to be affected by Aftertouch until a value other than "OFF" is displayed, confirm with **ENTER**.

...change sounds via MIDI program change messages

Enable reception: press "C"-**"9"**-ENTER-**"4"**-ENTER-**"1"**-ENTER.

...transmit and receive sound dumps via MIDI, system exclusive

Enable SysEx: press "C"-**"9"**-ENTER-**"8"**-ENTER-**"1"**-ENTER.
Dump one sound: press "C"-**"7"**-ENTER.
Dump all sounds: press "C"-**"8"**-ENTER.

...transmit and receive all editing activity (pots, buttons and switches) via MIDI

Enable pot control: press "C"-**"9"**-ENTER-**"2"**-ENTER-**"1"**-ENTER.
Enable switching: press "C"-**"9"**-ENTER-**"3"**-ENTER-**"1"**-ENTER.
Application: This unique function allows realtime control of every pot movement or button actuation via MIDI! For example, you could record and play back all your editing performance with any MIDI sequencer. Since simple MIDI control changes are used instead of SysEx, operation is transparent, quick, reliable and memory-saving.

...synchronize the arpeggiator or the LFO to MIDI clock *)

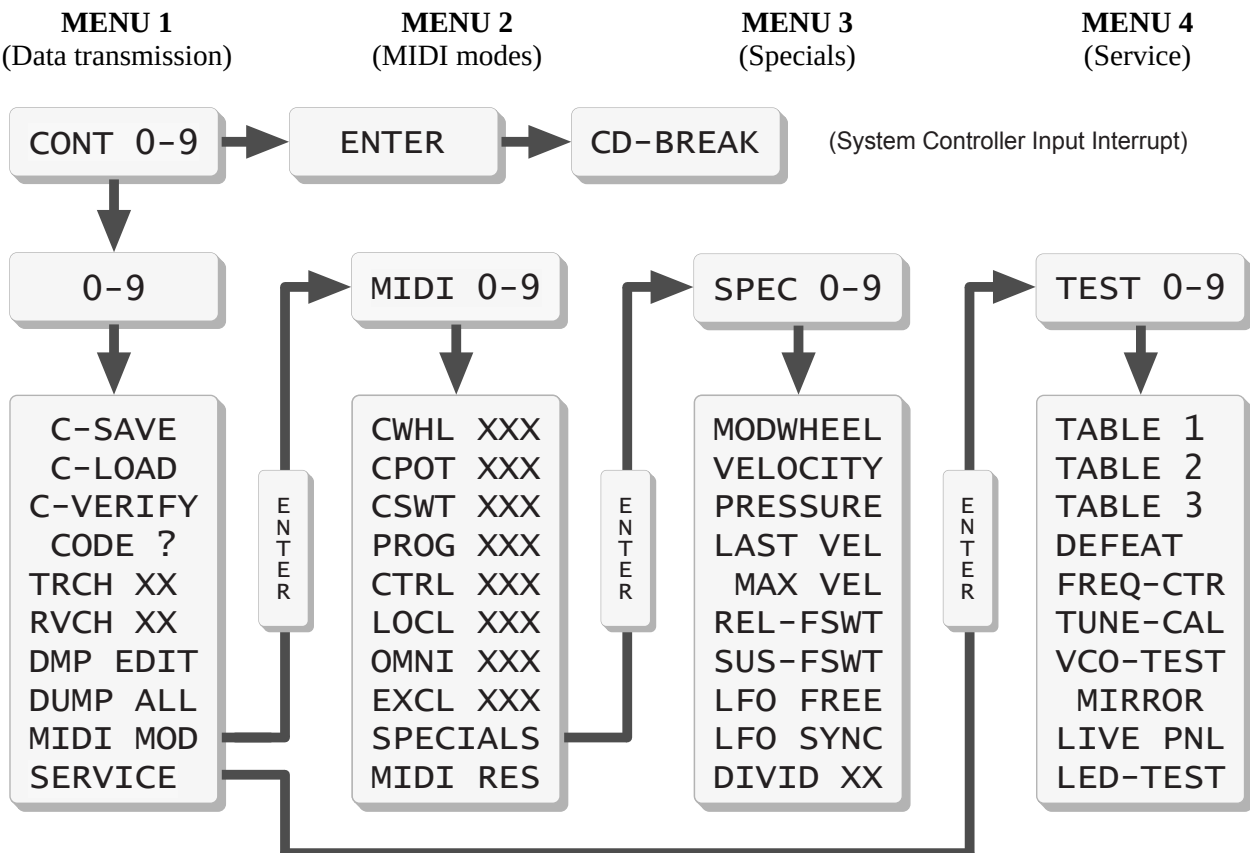
Gotcha! We suggest that you read the pages B-4 and B-9. (and what about the others?).

*) marked settings are storable per sound.

Keyboard / Arpeggiator Modes

Polyphonic Keyboard Modes		Monophonic Keyboard Modes		Arpeggiator Modes	
1	CYCLIC	1	VOICES 1	1	UP /1
2	MEM-CYC	2	VOICES 2	2	DWN /1
3	RESET	3	VOICES 3	3	UP/DWN/1
4	MEM-RES	4	VOICES 4	4	UP /*
5	POT-LOCK	5	VOICES 5	5	DWN /*
6	POT -ON-	6	VOICES 6	6	UP/DWN/*
7	HOLD KEY	7	LATEST X	7	UP/DWN/6
8	HOLD OFF	8	LOW X	8	AUTOTRIG
9	POT-->CV	9	HIGH X	9	CLK LFO
0	CV-->POT	0	3/4 XXXX	0	CLK MIDI

System Controller



1. Power on

Previously: sound program number "1" would appear in the display, and the last edited sound would be overwritten with program number "1" (that means: erased).

Now: the last selected program and the edit buffer are retained after power off and available again after the power is turned back on.

2. Octave buttons in the wheel panel

Previously: non-programmable

Now: programmable on a per sound basis



3. Potentiometer values

Previously: values from 0 to 100 were shown

Now: the resolution has been changed from 0 to 127, which allows finer control of the parameters, and is consistent with standard MIDI values.

4. HOLD function

(Users who don't possess the original Memorymoog manual should be aware that there are two methods to hold intervals or chords on the Memorymoog. One either plays a chord and then hits the HOLD button, or one first presses the HOLD button and then plays the individual notes of the chord. When using the second method, the notes must be played carefully, as pressing more than one key simultaneously causes the hold function to toggle off.)

Previously: as explained above, pressing two keys simultaneously in the HOLD function would cause the hold function to toggle off, although the HOLD LED would remain lit.

Now: the hold procedure is canceled and the HOLD LED is unlit if you press two or more notes simultaneously while depressing the HOLD button. In MONO mode, the hold function is not available any more. Pressing the HOLD button in MONO mode will cause the display to read "<-- MONO" and the HOLD LED will remain unlit. Hold is kept, even if you switch to another program, unless you switch to a program which was stored in MONO mode. Pressing the **MONO** button will cause the hold function to be canceled.

5. LFO wave forms

Previously: only one LFO wave form was selectable.

Now: it's possible to mix all LFO wave forms.

1. Keyboard Mode (Poly Mode)

Previously: to change the KB Mode it was necessary to press the KB Mode switch, enter a value from 1 to 4 with the numerical keypad and then verify this entry with the **ENTER** button. The display showed only "**EDIT**", which meant that it was impossible to see which mode was currently active.

Now: pressing the KB Mode switch causes the current KB Mode to be displayed immediately as text. Pressing any numeric button from 0 to 9 causes the Memorymoog to enter the corresponding KB Mode directly (i.e. without **ENTER**). Pressing any button other than 0 to 9 causes the LAMM to immediately leave the KB Mode menu (all edits in KB Mode are of course retained).

The buttons 0 through 9 correspond to the following functions:

- | | | |
|---|------------|---|
| 1 | CYCLIC | cyclic mode <i>see</i> page B-3 |
| 2 | MEM-CYC | memory cyclic mode <i>see</i> page B-3 |
| 3 | RESET | reset mode <i>see</i> page B-3 |
| 4 | MEM-RES | memory reset mode <i>see</i> page B-3 |
| 5 | POT-LOCK | lock pots <i>see</i> page B-3 |
| 6 | POT -ON- | release pots <i>see</i> page B-3 |
| 7 | HOLD KEY | hold up to 6 notes <i>see</i> page B-3 |
| 8 | HOLD OFF | cancels previous function |
| 9 | POT --> CV | pots reacts immediately |
| 0 | CV --> POT | pots reacts when the value agrees with the memory value |

2. Keyboard Mode (Mono Mode)

Previously: pressing the KB Mode switch would cause one of the three options "**LATEST**", "**LOW**" or "**HIGH**" to be displayed. These options corresponded to the key priority in Mono mode, i.e. whether the last, lowest, or highest key of a chord would sound. These options were selected by pressing either 1, 2 or 3 in the numeric key pad, and confirmed by pressing **ENTER**. The display would then show "**VOICES?**" whereupon one could press a numeric button from 1 to 6 to select the number of active voices, also confirmed by pressing **ENTER**.

Now: as before, pressing KB Mode causes "**LATEST**", "**HIGH**" or "**LOW**" to be displayed. In addition the last field in the display also shows the current number of active voices. The user interface has been simplified, as now pressing a button between 1 and 6 now selects the number of active voices, and pressing a button from 7 to 9 selects the note priority (see table below). Numeric button 0 calls the RAM check and shows the version and serial number.

Pressing one of the numerics now immediately changes the corresponding parameter without a confirmation via **ENTER**. Pressing any other button causes the Memorymoog to leave KB Mode. All edited parameters are retained.

The buttons 0 through 9 correspond to the following functions:

- | | | |
|---|----------|--|
| 1 | VOICES 1 | number of the active voices |
| 2 | VOICES 2 | number of the active voices |
| 3 | VOICES 3 | number of the active voices |
| 4 | VOICES 4 | number of the active voices |
| 5 | VOICES 5 | number of the active voices |
| 6 | VOICES 6 | number of the active voices |
| 7 | LATEST x | x = number of the active voices |
| 8 | LOW x | x = number of the active voices |
| 9 | HIGH x | x = number of the active voices |
| 0 | 3/1 xxxx | when the RAM check is successful, the display shows the version and serial number, otherwise ERROR Ux. |

Polyphonic Keyboard Modes

The individual keyboard modes primarily affect the glide effect and panorama (stereo outputs).

CYCLIC

This mode causes each keypress to be assigned to a different voice (the ordering is fixed: 1, 2, 3, 4, 5, 6, 1, 2, ...)

MEM-CYC

When you repeat the same notes (up to 6) over and over again, you should always hear the same voices.

RESET

This mode works in principle in the same fashion as the CYCLIC mode. The difference: playing single keys always causes voice 1 to be played. This characteristic allows monophonic type playing in poly mode. This effect is particularly useful in combination with the arpeggiator and the stereo outputs.

MEM-RES

The effect is almost like that of MEM-CYC, with the difference that voice 1 sounds if you play only one note.

POT-LOCK

This function is not stored per sound, but remains in effect if the Memorymoog is turned off and then later turned on again. The idea is to prevent an accidental "editing" of the Memorymoog's parameters during live work. In addition, activating POT-LOCK causes the Memorymoog's CPU to stop cyclically "polling" the pots to see if one has been moved (i.e. a parameter has been edited). This frees the CPU for other activities (for example, the arpeggiator can be used at higher rates).

POT-ON

This releases the potentiometer locking.

HOLD KEY

Notes from up to six voices are held until other notes are played (max. 10 keys!). If the same note key is pressed again, no trigger impulse is sent (i.e. the envelope isn't restarted). This function is programmable and storable per sound. Selecting the HOLD KEY also causes the RELEASE/SUSTAIN footswitch to be set to RELEASE.

HOLD OFF

Shuts off the previous function, also causes the RELEASE/SUSTAIN footswitch to be set to RELEASE.

POT --> CV

In this mode the pots reacts on the same way as a non-upgraded Memorymoog.

CV --> POT

Moving a pot has no affect when the value of the pot is not the same value of the memory. As long as the values are different the display shows the sign "<>" between the values (for smooth pot movements).

1. Arpeggiator

Although the arpeggiator may be seen by some to be a "gimmick" or "mere" playing aid, we decided to further develop the Memorymoog's arpeggiator so that a musician can use it in a true musical setting. Pressing the arpeggiator button allows the selection of ten different functions (numerical buttons 0 through 9):

1	UP/1	arpeggio upwards
2	DWN/1	arpeggio downwards
3	UP/DWN/1	arpeggio upwards/downwards
4	UP/*	sequence upwards with Split
5	DWN/*	sequence downwards with Split
6	UP/DWN/*	sequence upwards/downwards with Split
7	UP/DWN/6	octave up/ octave down (max. 6 voices)
8	AUTOTRIG	note repetition (max. 6 voices)
9	CLK LFO	LFO controls the arpeggiator
0	CLK MIDI	MIDI clock controls the arpeggiator, the divider is selectable in the SPECIALS page.

Previously: the arpeggiator function was entered by pressing the arpeggiator button, selecting the type of arpeggio with a numeric button from 1 to 9, and confirming this choice with **ENTER**. Only then was the arpeggio audible, and the display would only show the word "**EDIT**". Checking or editing one's choice was then only possible through exiting and then reentering the arpeggio function. Latched or held arpeggios (HOLD) were also handled by the arpeggio function.

Now: pressing a numeric button from 0 to 9 after pressing the arpeggio button causes the arpeggio to become immediately audible. Arpeggios of all types can be latched or held via the HOLD KEY function (*see* page B-3). In split mode (choices 4 through 6), one can play the lower two octaves of the keyboard (up to five voices) normally, while the upper three octaves are reserved for arpeggios. In split mode, the HOLD KEY only functions to latch the arpeggio in the upper three octaves. Held keys (*see* page B-1.4) can also be held in the arpeggiator.

Note: Please be aware of the distinction between the HOLD KEY function and the HOLD function! All arpeggios are also retained when the Memorymoog is turned off.

2. Program Sequencer

The program sequencer allows the user to create a customized series of program numbers. The program sequencer is entered by pressing the "**D**" button. If no editing is done, then this function may be exited by pressing **ENTER** (the display then shows "**CD-BREAK**").

Previously: calling up the program sequencer when it was empty (i.e. all presets erased) would cause the Memorymoog to "crash", i.e. to become fully inoperable. The only recourse was to turn off the Memorymoog and turn it back on.

Now: Entering the program sequencer while it is empty simply results in the Memorymoog displaying "**CLEARED**". The program sequencer is now exited by pressing the "**D**" button a second time, upon which the Memorymoog displays "**PSEQ OFF**".

CLK LFO

The Moog's internal LFO Clock is the source for the arpeggio speed.

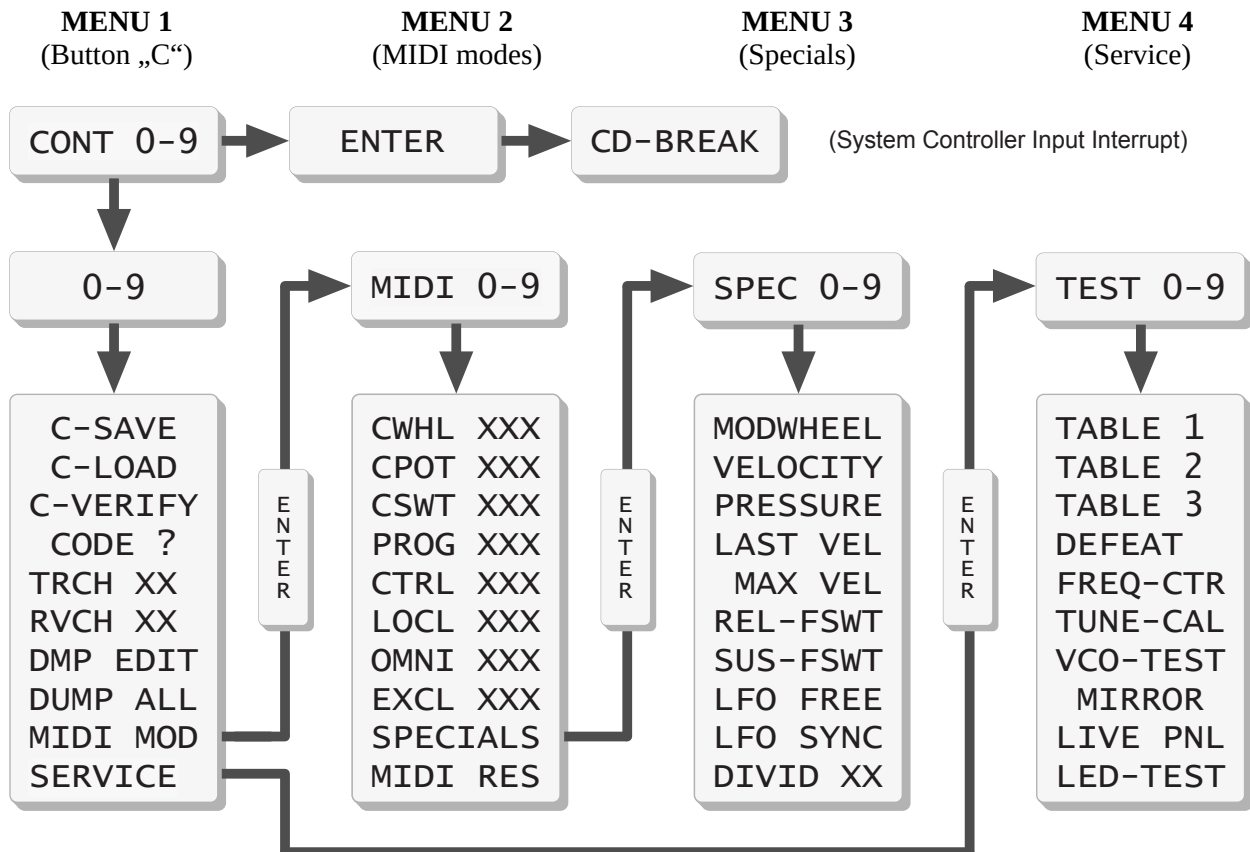
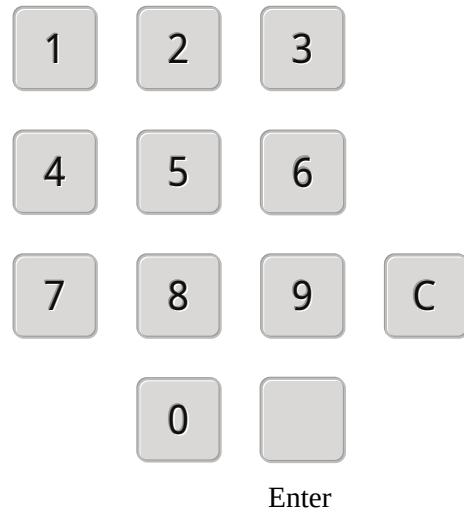
CLK MIDI

Incoming MIDI clock messages control the arpeggio speed (the arpeggio LED will blink until a MIDI start message is recognized).

SYSTEM CONTROLLER OVERVIEW

You can call the system controllers page with the "C" button. The display will read "CONT 0-9". To leave the system controller page without calling any system function, just press **ENTER** before pressing any numerical button (the display will read "CD-BREAK") or edit a current sound (e.g. by moving a programmable pot).

(numeric keypad layout)



System Controller Page ("C" button)

Pressing "C" enters the system controller main menu, which consists of eight menu points and two sub-menu points. The display in this function reads "**CONT 0-9**". The menus can be exited by either pressing **ENTER** before pressing any numerical button, or by activating an editing operation.

The menu layout is as follows:

1	C-SAVE	dump internal data to cassette recorder
2	C-LOAD	load internal data from cassette recorder
3	C-VERIFY	verify cassette data
4	CODE ?	input code
5	TRCH xx	display current MIDI transmit channel xx
6	RVCH xx	display current MIDI receive channel xx
7	DMP EDIT	dump current sound parameters via MIDI out
8	DUMP ALL	dump all sounds via MIDI out
9	MIDI-MOD	enter MIDI sub-menu <i>see</i> page B-7
0	SERVICE	enter SERVICE sub-menu <i>see</i> page B-10

The desired function is selected by pressing the corresponding numeric button from 0 to 9, which causes the function name to be displayed. The function will only be executed after the **ENTER** button is pressed. You can select another function before pressing the **ENTER** button.

The functions 1 through 3 are as they were in the original Memorymoog (*please refer to the Memorymoog manual for details*).

CODE ?

This has only been changed by the addition of a confirmation of a code change by the display "**STORED**".

TRCH xx

The MIDI output channel is displayed as a number between 1 and 16. Pressing **ENTER** replaces the number being displayed by "***". The desired MIDI output channel can then be selected via the numeric buttons. "Typos" can be simply overwritten by typing in a different number. The change takes effect only after the **ENTER** button is pressed.

RVCH xx

This is fully analogous to the TRCH function, with the difference that the MIDI receive channel is modified.

DMP EDIT

The currently edited (edit buffer) sound is transmitted via MIDI system exclusive after the **ENTER** button is pressed.

DUMP ALL

All sounds including the edit buffer are sent via system exclusive through the MIDI out port. The display shows "**ACTIVE**" for approximately four seconds, and the Memorymoog audio output is muted during the transfer.

System Controller MIDI-Mode sub-menu ("C" - "9" - Enter)

The numeric buttons 0 through 9 correspond to the following menu layout in the MIDI mode sub-menu:

1	CWHL xxx	wheels on/off (MIDI in)
2	CPOT xxx	potentiometers on/off (MIDI in/out)
3	CSWT xxx	switches on/off (MIDI in/out)
4	PROG xxx	program change on/off (MIDI in/out)
5	CTRL xxx	remaining controllers on/off (MIDI in/out)
6	LOCL xxx	local on/off (MIDI in/out)
7	OMNI xxx	omni mode on/off
8	EXCL xxx	system exclusive on/off (MIDI in/out)
9	SPECIALS	SPECIALS sub-menu
0	MIDI-RES	MIDI reset

The desired function is selected by pressing the corresponding numeric button, which causes the current state to be displayed ("xxx" is either "ON" or "OFF"). One can change the selection as often as desired; the function is executed only after **ENTER** is pressed. For the functions 1 through 8, the displayed state is replaced by "-?-" . The button 1 then selects the "ON" state for the function, any other numeric button means "OFF". The choice must be confirmed with **ENTER**.

CWHL xxx

Pitch and modulation wheel data at the MIDI IN port are either accepted or ignored.

CPOT xxx

Transfer of changes to the potentiometer values via MIDI in and out is either permitted or ignored according to this setting.

CSWT xxx

Transfer of button actuation via MIDI In or Out is permitted or ignored according to this setting.

PROG xxx

MIDI program changes (in/out) enabled or disabled.

CTRL xxx

Aftertouch and all remaining controller values are either transferred or not according to this setting. This includes, for example, footswitches, All notes off, etc. (*see* the MIDI Appendix).

LOCL xxx

The Memorymoog keyboard is activated or deactivated according to this setting (the Memorymoog powers on in LOCAL ON mode).

OMNI xxx

The MIDI omni mode is activated or deactivated by this setting. This does not alter the stored MIDI in channel (RVCH).

EXCL xxx

Allows or prevents the transmission and reception of MIDI SYSEX data.

MIDI-RES

The MIDI reset function sets all of the previous eight options to "ON", sets the MIDI receive and transmit channels to 01, deactivates external potentiometer control for the mod. wheel, velocity and pressure, sets the arpeggio clock to the LFO, and sets the divider to 1. These functions are executed after **ENTER** is pressed, and the display shows "**EDIT**".

System Controller Specials ("C" - "9" - Enter - "9" - Enter)

The numeric buttons in this sub-menu correspond to the following functions:

- | | | |
|---|----------|--|
| 1 | MODWHEEL | external mod. wheel controls a pot (MIDI in) |
| 2 | VELOCITY | external velocity controls a pot (MIDI in) |
| 3 | PRESSURE | external pressure controls a pot (MIDI in) |
| 4 | LAST VEL | last velocity value effective |
| 5 | MAX VEL | highest velocity value effective |
| 6 | REL-FSWT | footswitch controls release |
| 7 | SUS-FSWT | footswitch controls sustain |
| 8 | LFO FREE | the LFO is not synchronized |
| 9 | LFO SYNC | MIDI clock synchronizes the LFO |
| 0 | DIVID xx | MIDI clock divider (01-16) |

The items in the SPECIALS menu are intended to increase the expressiveness of the Memorymoog. External MIDI controllers can be freely assigned to potentiometers, and then used to control the values of these pots. Keying a numerical value and pressing **ENTER** brings the user to the desired function. Edits can be stored per program. Exiting this mode is accomplished by either selecting another edit function on the Memorymoog, or pressing the "C" button followed by the **ENTER** button (the display will show "**CD-BREAK**").

MODWHEEL

The display shows from left to right: "**M**" (for mod. wheel), the stored pot number (32 to 62), and the amount of control (-7 to +7). To assign the mod. wheel to a pot, just move this pot and choose the amount. The display readout will follow your tweaking. With amount values from +1 to +7, incoming mod. wheel messages will add to the pre-programmed pot position. With amount values from -1 to -7, incoming modwheel messages will be subtracted from the pre-programmed pot position. If the amount is set to OFF=0, incoming MIDI control change #1 messages will be ignored totally.

Note: If you want the modulation wheel of an external synth to work solely as a remote control of the MOOG's wheel, assign the modulation wheel to the "Modulation Amount" pot or to an unused pot (e.g. "Footpedal 2 Amount") with a value of -1 or +1.

VELOCITY

Same as MODWHEEL, but velocity is used to control the pots and the display shows "**V**" instead of "**M**".

PRESSURE

Same as MODWHEEL, but channel pressure is used to control the pots and the display shows "**P**" instead of "**M**".

LAST VEL

The last received velocity value determines the overall velocity, even for several keys or for keys that have already been held.

MAX VEL

If several keys are played simultaneously, the highest of their velocity values is valid for all of them.

REL-FSWT

A footswitch plugged into the footswitch jack in the rear of the Moog or an incoming MIDI controller #64 message will affect RELEASE.

SUS-FSWT

A footswitch or an incoming controller #64 message will affect the HOLD KEY function but with no canceling of old notes when playing new ones. As long as the footswitch is held down, a maximum of 10 notes can be played from which always the last 6 notes will sound.

Note: The on/off condition of the sustain pedal is stored with each sound. If you store a sound with the sustain pedal being pressed, this sound will have immediate sustain whenever you recall it - even if you don't touch the pedal.

LFO FREE

The LFO is not synchronized by MIDI clock.

LFO SYNC

Incoming MIDI clock messages synchronize the LFO. The speed rate is dependent on the divider.

DIVID xx

The time base of the incoming MIDI Clock can be divided by 1 to 16 to slow down the arpeggio. Just dial the value and press **ENTER**. (A setting of 1 will produce the highest, a setting of 16 the lowest possible LFO (or arpeggio) speed relating to MIDI Clock speed.)

System Controller Service ("C" - "0" - Enter)

The Memorymoog is, as are all high quality musical instruments, susceptible to environment changes such as humidity, temperature, dust or dirt. Thus like any sensitive musical instrument, the Memorymoog should be periodically adjusted and checked out by a qualified technician. To make servicing easier, a couple of new functions were implemented in the Advanced Memorymoog. As these functions are intended for technicians only, they are listed below but not explained in detail.

1	TABLE 1	load service table #1 of the service manual
2	TABLE 2	load service table #2 of the service manual
3	TABLE 3	load service table #3 of the service manual
4	DEFEAT ?	block voice cards <i>see</i> original service manual
5	FREQ-CTR	adjust center frequency of OSC2 and OSC3
6	TUNE-CAL	scale center Autotune values
7	VCO-TEST	calibrate the oscillators <i>see</i> org. service manual
8	MIRROR	VCO test with LED display upside down
9	LIVE PNL	load basic settings including current pot positions
0	LED-TEST	start test sequence for all LEDs

MIDI APPENDIX

Note: The **Lintronics Advanced Memorymoog** sends only one MIDI status byte between two active sensing messages or until any other status byte occurs. This method reduces data flow and saves time. All values are displayed in hexadecimal and, if appropriate, decimal.

Used short cuts:

short cuts	description
n	MIDI channel
tt	note number
vv	value (velocity, program number, switch number etc.)
dd	data
cc	controller number
ls/ms	least significant byte / most significant byte
Amt.	amount
Freq.	frequency
Mod.	modulation

Byte	function	range (vv)	notes
------	----------	------------	-------

Note Off

8n	n = MIDI channel	0-F (0-15)	
tt	note number	00-7F (0-127)	24 = note c ¹
vv	velocity	00-7F (0-127)	
	Transmit:	range tt: 24-60 (36-96)	vv = 7F (127)
	Receive:	range tt: 24-63 (36-99)	velocity is ignored

Note On

9n	n = MIDI channel	0-F (0-15)	
tt	note number	00-7F (0-127)	24 = note c ¹
vv	velocity	00-7F (0-127)	
	Transmit:	range tt: 24-60 (36-96)	vv = 64 (100)
	Receive:	range tt: 24-63 (36-99)	vv = 0 (note off)

Key Pressure

An	n = MIDI channel	0-F (0-15)	
tt	note number	00-7F (0-127)	24 = note c ¹
vv	pressure value	00-7F (0-127)	
	Transmit:	key pressure is not transmitted	
	Receive:	key pressure is ignored	

Byte	function	range (vv)	notes
Controller			
Bn	n = MIDI channel	0-F (0-15)	
cc	control change	00-7F (0-127)	
vv	value	00-7F (0-127)	

Byte	function	range (vv)	notes
01 (1)	Modulation Wheel	00-7F (0-127)	Receive only
02 (2)	Breath (Footp.1)	00-7F (0-127)	Receive only
04 (4)	Pedal (Footp.1)	00-7F (0-127)	Receive only
05 (5)	Glide Amt.	00-7F (0-127)	Receive only
07 (7)	Volume Amt.	00-7F (0-127)	Receive, routed to programmable volume
1E (30)	Switch On (button)	<i>see</i> chart #1	Transmit / Receive
1F (31)	Switch Off (button)	<i>see</i> chart #1	Transmit / Receive

Note: The following controller numbers are used to control the pots of the Memorymoog!

cc	function	range (vv)	notes
20 (32)	Glide Amt	00-7F (0-127)	Transmit / Receive
21 (33)	OSC 2 Freq. Low	00-1F (0-31)	Transmit / Receive
22 (34)	Pitch Bend Amt	00-7F (0-127)	Transmit / Receive
23 (35)	Modulation Amt.	00-7F (0-127)	Transmit / Receive
24 (36)	Foot Pedal 1 Amt.	00-7F (0-127)	Transmit / Receive
25 (37)	Foot Pedal 2 Amt.	00-7F (0-127)	Transmit / Receive
26 (38)	LFO Mod.-Rate	00-7F (0-127)	Transmit / Receive
27 (39)	OSC 3 Freq. Low	00-1F (0-31)	Transmit / Receive
28 (40)	V-Mod. OSC 3 Amt.	00-7F (0-127)	Transmit / Receive
29 (41)	V-Mod. Filter Env.	00-7F (0-127)	Transmit / Receive
2A (42)	OSC 1 Pulse Width	00-7F (0-127)	Transmit / Receive
2B (43)	OSC 2 Freq. High	00-7F (0-127)	Transmit / Receive
2C (44)	OSC 2 Pulse Width	00-7F (0-127)	Transmit / Receive
2D (45)	OSC 3 Freq. High	00-7F (0-127)	Transmit / Receive
2E (46)	OSC 3 Pulse Width	00-7F (0-127)	Transmit / Receive
2F (47)	OSC 1 Amt.	00-7F (0-127)	Transmit / Receive
30 (48)	OSC 2 Amt.	00-7F (0-127)	Transmit / Receive
31 (49)	OSC 3 Amt.	00-7F (0-127)	Transmit / Receive
32 (50)	Noise Amt.	00-7F (0-127)	Transmit / Receive
33 (51)	Cutoff	00-7F (0-127)	Transmit / Receive
34 (52)	Emphasis	00-7F (0-127)	Transmit / Receive
35 (53)	VCF Contour Amt.	00-7F (0-127)	Transmit / Receive
36 (54)	VCF Attack	00-7F (0-127)	Transmit / Receive
37 (55)	VCF Decay	00-7F (0-127)	Transmit / Receive
38 (56)	VCF Sustain	00-7F (0-127)	Transmit / Receive
39 (57)	VCF Release	00-7F (0-127)	Transmit / Receive
3A (58)	VCA Attack	00-7F (0-127)	Transmit / Receive
3B (59)	VCA Decay	00-7F (0-127)	Transmit / Receive
3C (60)	VCA Sustain	00-7F (0-127)	Transmit / Receive
3D (61)	VCA Release	00-7F (0-127)	Transmit / Receive

MIDI-Controller (continuation)

cc	function	range (vv)	notes
3E (62)	Programmable Volume	00-7F (0-127)	Transmit / Receive
40 (64)	Release / Sustain	00-3F=Off, 40-7F=On	Transmit / Receive
41 (65)	Glide Footswitch	00-3F=Off, 40-7F=On	Transmit / Receive
45 (69)	Hold Key	00-3F=Off, 40-7F=On	Receive only
7A (122)	Local On / Off	00=Off, 01-7F=On	Transmit / Receive
7B (123)	All Notes Off	ignored	Transmit (0) / Receive
7C (124)	Notes / Controller Off	ignored	Receive only
7D (125)	Notes / Controller Off	ignored	Receive only
7E (126)	Notes / Controller Off	ignored	Receive only
7F (127)	Notes / Controller Off	ignored	Receive only

Byte	function	range (vv)	notes
Program Change			
Cn	n = MIDI channel	0-F (0-15)	
vv	program number	00-63 (0-99)	64-7F is ignored or is not transmitted
	Transmit and Receive:		
	vv= 0 switches to program	1	
	vv=62 switches to program	99	
	vv=63 switches to program	0	

Channel Pressure (Aftertouch)

Dn	n = MIDI channel	0-F (0-15)	
vv	value	00-7F (0-127)	
	Transmit:	channel pressure is not transmitted	
	Receive:	<i>see</i> MIDI Specials	

Pitch Wheel

En	n = MIDI channel	0-F (0-15)	
ls	value (MSB)	00-7F (0-127)	
ms	value (LSB)	00-7F (0-127)	
	Receive (pitch wheel is not transmitted):		
	LSB/MSB = 00-00	lowest pitch wheel position	
	LSB/MSB = 00-40	default pitch wheel position	
	LSB/MSB = 7F-7F	highest pitch wheel position	

Note: Bit 0 and bit 1 of value (LSB) are ignored, i.e. the pitch bend resolution is 12 bits.

System Exclusive

Byte	function	notes
Sound Dump		
F0 (240)	system exclusive status (start)	
04 (4)	MOOG identification	
00 (0)	Lintronics Advanced Memorymoog identification	
vv	program number 00-64 (0-100),	64 (100) = sound buffer
dd	data (54 bytes)	
..		
..	<i>see</i> chart #2	
dd		
F7 (247)	End of Exclusive	

Transmit:

The "**DUMP ALL**" functions transmits all 101 Memorymoog sounds (100 programs and the sound buffer).

Receive:

To manage incoming data, 50ms pause between two sound dumps are necessary. During reception, the display shows "**PRG-EXCL**" if SysEx is enabled, otherwise you'd get a "**DISABLED**" message.

Byte	function	notes
System Errors		
F0 (240)	system exclusive status (start)	Transmit only
04 (4)	MOOG identification	
00 (0)	Lintronics Advanced Memorymoog identification	
vv	error number	
F7 (247)	end of exclusive (EOX)	

Transmit (System errors are not received):

vv=7B (123): Memorymoog is locked.

vv=7D (125): Memorymoog is busy.

vv=7E (126): counter error, more or less than 54 data bytes.

vv=7F (127): no error, last dump has been successfully received.

Byte	function	notes
Tune Request		
F6 (246)	activates Autotune	Receive only
Clock		
F8 (248)	synchronizes the LFO and the arpeggiator	Receive only
Start		
FA (250)	switches the arpeggiator LED from flash to a constant light when MIDI clock is active.	Receive only
Continue		
FB (251)	switches the arpeggiator LED from flash to a constant light when MIDI clock is active.	Receive only
Stop		
FC (252)	switches the arpeggiator LED from constant light to a flash when MIDI clock is active.	Receive only
Active Sensing		
FE (254)	is sent every 150ms.	Transmit only

CHART 1 (SWITCH REMOTE)

The **Lintronics Advanced Memorymoog** allows MIDI control of all its switches via MIDI controller numbers #30 and #31. Controller #30 is always used to set a switch to its ON position, controller #31 sets a switch to OFF. **Attention:** The controller value (!) determines which switch is affected. For example, if you want to turn GLIDE on, send a MIDI controller #30 message with a value of 27 to the Moog: Bn 1E 1B (n = MIDI channel).

Byte	function	notes
01 (1)	button "A"	Transmit / Receive
02 (2)	button "B"	Transmit / Receive
03 (3)	button "C"	Transmit / Receive
04 (4)	button "D"	Transmit / Receive
05 (5)	LFO OSC 2	Transmit / Receive
06 (6)	LFO Positive Sawtooth Wave	Transmit / Receive
07 (7)	button "3"	Transmit / Receive
08 (8)	button "6"	Transmit / Receive
09 (9)	button "9"	Transmit / Receive
0A (10)	Enter	Transmit / Receive
0B (11)	LFO OSC 1	Transmit / Receive
0C (12)	LFO Triangle Wave	Transmit / Receive
0D (13)	button "2"	Transmit / Receive
0E (14)	button "5"	Transmit / Receive
0F (15)	button "8"	Transmit / Receive
10 (16)	button "0"	Transmit / Receive
11 (17)	LFO OSC 3	Transmit / Receive
12 (18)	LFO Negative Sawtooth Wave	Transmit / Receive
13 (19)	button "1"	Transmit / Receive
14 (20)	button "4"	Transmit / Receive
15 (21)	button "7"	Transmit / Receive
16 (22)	Record / Interlock	Transmit / Receive
17 (23)	LFO Pulse Width 1	Transmit / Receive
18 (24)	LFO Square Wave	Transmit / Receive
19 (25)	Mono	Transmit / Receive
1A (26)	Hold	Transmit / Receive
1B (27)	Glide	Transmit / Receive
1C (28)	Foot Pedal 2 OSC 2	Transmit / Receive
1D (29)	LFO Pulse Width 3	Transmit / Receive
1E (30)	LFO Filter	Transmit / Receive
1F (31)	Multiple Trigger	Transmit / Receive
20 (32)	KB-Mode	Transmit / Receive
21 (33)	V-Mod. Pulse Width 1	Transmit / Receive
22 (34)	Foot Pedal 2 Modulation	Transmit / Receive
23 (35)	LFO Pulse Width 2	Transmit / Receive
24 (36)	LFO Sample & Hold	Transmit / Receive
25 (37)	Foot Pedal 1 Filter	Transmit / Receive
26 (38)	Arpeggiator	Transmit / Receive
27 (39)	V-Mod. Filter	Transmit / Receive
28 (40)	V-Mod. OSC 1 Frequency	Transmit / Receive
29 (41)	Foot Pedal 1 Volume	Transmit / Receive
2A (42)	Contour OSC 3 Amount	Transmit / Receive
2B (43)	KB-Out	Transmit / Receive
2C (44)	Auto Tune	Transmit / Receive

CHART 1 (SWITCH REMOTE)

Byte	function	notes
2D (45)	V-Mod. Pulse Width 2	Transmit / Receive
2E (46)	V-Mod. OSC 2 Frequency	Transmit / Receive
2F (47)	Foot Pedal 1 Pitch	Transmit / Receive
30 (48)	Invert	Transmit / Receive
31 (49)	Octave OSC 1 2'	Transmit / Receive
32 (50)	Octave OSC 1 4'	Transmit / Receive
33 (51)	Octave OSC 1 8'	Transmit / Receive
34 (52)	Octave OSC 1 16'	Transmit / Receive
35 (53)	Hold Key	Receive only
36 (54)	Arpeggiator MIDI Clock Sync.	Receive only
37 (55)	Octave OSC 2 2'	Transmit / Receive
38 (56)	Octave OSC 2 4'	Transmit / Receive
39 (57)	Octave OSC 2 8'	Transmit / Receive
3A (58)	Octave OSC 2 16'	Transmit / Receive
3B (59)	LFO MIDI Clock Sync.	Receive only
3C (60)	LFO Reset / Zero Start	Receive only
3D (61)	Octave OSC 3 2'	Transmit / Receive
3E (62)	Octave OSC 3 4'	Transmit / Receive
3F (63)	Octave OSC 3 8'	Transmit / Receive
40 (64)	Octave OSC 3 16'	Transmit / Receive
41 (65)	OSC 3 Low	Transmit / Receive
42 (66)	OSC 3 Keyboard Control	Transmit / Receive
43 (67)	OSC 1 Square Wave	Transmit / Receive
44 (68)	OSC 1 Sawtooth Wave	Transmit / Receive
45 (69)	OSC 1 Triangle Wave	Transmit / Receive
46 (70)	Sync. 2 to 1	Transmit / Receive
47 (71)	KB-Track 1/3	Transmit / Receive
48 (72)	KB-Track 2/3	Transmit / Receive
49 (73)	OSC 3 Square Wave	Transmit / Receive
4A (74)	OSC 3 Sawtooth Wave	Transmit / Receive
4B (75)	OSC 3 Triangle Wave	Transmit / Receive
4C (76)	Octave "-1"	Transmit / Receive
4D (77)	ADSR Release	Transmit / Receive
4E (78)	ADSR Keyboard Follow	Transmit / Receive
4F (79)	OSC 2 Square Wave	Transmit / Receive
50 (80)	OSC 2 Sawtooth Wave	Transmit / Receive
51 (81)	OSC 2 Triangle Wave	Transmit / Receive
52 (82)	Octave "0"	Transmit / Receive
53 (83)	ADSR Return to Zero	Transmit / Receive
54 (84)	ADSR Unconditional Contour	Transmit / Receive

Note: There must be an interval of at least 20ms between two switch remote messages. To edit sounds via MIDI it is sometimes more convenient to use system exclusive messages. One system exclusive sound dump takes about 192ms, that makes 5 dumps per second. If you want to edit a system exclusive dump, please refer to chart #2.

CHART 2 (SYSTEM EXCLUSIVE DATA FORMAT)

List of symbols:

symbol	meaning
↑	high active
↓	low active
↗	raising sawtooth
↘	falling sawtooth
▭	square
△	triangle
LSB	Least Significant Bit
MSB	Most Significant Bit

System Exclusive Data Format

Data	D7	D6	D5	D4	D3	D2	D1	D0
5	0	x	OSC 3 Octave 00 - 11		OSC 2 Octave 00 - 11		OSC 1 Octave 00 - 11	
6	0	Arpeggio ↑	Glide ↑	x	Mono-Voices 001=1 Voice 110=6 Voices			x
7	0	KB Modes 00 - 11		x	Mono Modes 00 - 11		Key Out ↓	Release ↑
8	0	Hold Key ↑	Arpeggio Modes 000 - 111			Mono ↓	Multi. Trig. ↑	Sustain ↑
9	0	KB Follow ↓	x	Octave -1 ↑	x	x	x	x
10	0	VM PW 1 ↓	Cont. OSC 3 ↓	x	x	Invert ↑	VM Filter ↓	x
11	0	↘ LFO ↓	x	x	1	VM Freq. 1 ↓	VM Freq. 2 ↓	VM PW 2 ↓
12	0	x	x	Filter LFO ↓	S&H LFO ↓	△ LFO ↓	▭ LFO ↓	↗ LFO ↓
13	0	x	OSC 2 LFO ↓	OSC 1 LFO ↓	OSC 3 LFO ↓	PW 1 LFO ↓	PW 3 LFO ↓	PW 2 LFO ↓
14	0	FP 1 Pitch ↓	FP 2 Mod. ↓	FP 1 Filter ↓	FP 2 OSC 2 ↓	FP 1 Vol. ↓	0	x
15	0	↗ OSC 2 ↑	△ OSC 2 ↑	▭ OSC 1 ↑	↗ OSC 1 ↑	△ OSC 1 ↑	x	x
16	0	KB Control ↑	▭ OSC 3 ↑	↗ OSC 3 ↑	△ OSC 3 ↑	x	x	▭ OSC 2 ↑
17	0	-- Divider (0-15) -----> LSB		Sync. 2 to 1 ↑	Mod. Wheel +/-	x	KB Track 2/3 ↑	KB Track 1/3 ↑
18	0	Unc. Contour ↑	LFO Reset ↑	Velocity +/-	MIDI Start ↑	ARP M-Sync. ↑	MSB <----Clock Divider (0-15)	
19	0	-----> LSB	Pressure +/-	MIDI Clock ↑	1	LFO M-Sync. ↑	Low ↑	Return to 0 ↑
20	0	MSB <----- Mod. Wheel Amt. (0-7) -----> LSB			MSB <----- Mod. Wheel Pot. No. (0-30) ----->			
21	0	--Velocity Amt. (0-7) ----> LSB		MSB <----- Velocity Pot. No. (0-30) -----> LSB				

CHART 2 (SYSTEM EXCLUSIVE DATA FORMAT)

Data	D7	D6	D5	D4	D3	D2	D1	D0
22	0	-----> LSB	MSB <----- Pressure Pot. No. (0-30) -----> LSB				MSB <-----	
23	0	----- Glide -----> LSB				MSB <----- Pressure Amt. (0-7)		
24	0	Bit 3 Lo Freq. 2	Bit 2 Lo Freq. 2	Bit 1 Lo Freq. 2	Bit 0 Lo Freq. 2	MSB <----- Glide -----		
25	0	----- Pitch Bend Amt. -----> LSB			x	x	x	x
26	0	----- Mod. Amt. -----> LSB		MSB <----- Pitch Bend Amt. -----				
27	0	-----> LSB	MSB <----- Modulation Amt. -----					
28	0	MSB <----- Foot Pedal 1 Amt. -----						
29	0	----- Foot Pedal 2 Amt. -----> LSB						
30	0	----- Modulation Rate -----> LSB						MSB <-----
31	0	x	Bit 3 Lo Freq. 3	Bit 2 Lo Freq. 3	Bit 1 Lo Freq. 3	Bit 0 Lo Freq. 3	MSB <----- Modulation Rate --	
32	0	----- Voice Mod. OSC 3 Amt. -----> LSB				x	x	x
33	0	----- Voice Mod. Filter Env. -----> LSB			MSB <----- Voice Mod. OSC 3 Amt. -----			
34	0	----- OSC 1 PW -----> LSB		MSB <----- Voice Mod. Filter Env. -----				
35	0	-----> LSB	MSB <----- OSC 1 Pulse Width -----					
36	0	MSB <----- OSC 2 Freq. High Byte -----						
37	0	----- OSC 2 Pulse Width -----> LSB						
38	0	----- OSC3 Freq. High Byte -----> LSB						MSB <-----
39	0	----- OSC 3 Pulse Width -----> LSB				MSB <--OSC 3 Freq. Hi Byte -		
40	0	----- OSC 1 Amt. -----> LSB			MSB <----- OSC 3 Pulse Width -----			
41	0	----- OSC 2 Amt. -----> LSB			MSB <----- OSC 1 Amt. -----			
42	0	----- OSC 3 Amt. -----> LSB		MSB <----- OSC 2 Amt. -----				
43	0	-----> LSB	MSB <----- OSC 3 Amt. -----					
44	0	MSB <----- Noise Amt. -----						
45	0	----- VCF Cutoff -----> LSB						
46	0	----- VCF Emphasis -----> LSB						MSB <-----
47	0	----- VCF Contour Amt. -----> LSB				MSB <----- VCF Emphasis ----		
48	0	----- VCF Attack -----> LSB				MSB <----- VCF Contour Amt. -----		
49	0	----- VCF Decay -----> LSB			MSB <----- VCF Attack -----			
50	0	----- VCF Sustain -----> LSB		MSB <----- VCF Decay -----				

CHART 2 (SYSTEM EXCLUSIVE DATA FORMAT)

Data	D7	D6	D5	D4	D3	D2	D1	D0
51	0	-----> LSB	MSB <----- VCF Sustain ----->					
52	0	MSB <----- VCF Release ----->						
53	0	----- VCF Attack -----> LSB						
54	0	----- VCA Decay ----->						MSB <-----
55	0	----- VCA Sustain ----->	MSB <----- VCA Decay -----					LSB
56	0	----- VCA Release -----> LSB				MSB <----- VCA Sustain -----		
57	0	----- Programmable Volume -----> LSB			MSB <----- VCA Release -----			
58	0	x	x	MSB <----- Programmable Volume -----				

1.1 Stereo Outputs

There is an expansion slot for the original Moog MIDI interface on the rear panel. The **Lintronics Advanced Memorymoog** system uses this slot for the MIDI in jack, the MIDI out jack, two output jacks and one input jack. You can plug a high impedance stereo headphone into the stereo output. The second port is used to split the stereo signal of the stereo output into two mono outputs. The volume of the stereo output can be controlled with the programmable volume pot. It is also possible to store the volume per program.

Panorama is fixed to the following values:

	Output A	Output B
Voice 1	60 %	40 %
Voice 2	40 %	60 %
Voice 3	75 %	25 %
Voice 4	25 %	75 %
Voice 5	100 %	0 %
Voice 6	0 %	100 %

1.2 MIDI connectors IN/OUT

The MIDI in port receives data from an external MIDI device which is to control the **Lintronics Advanced Memorymoog**. The MIDI out jack transmits data corresponding to all Memorymoog operations (for example playing on the keyboard or editing any program).

1.3 Power supply

During the upgrade procedure, the power supply is checked for cold soldered joints. This increases its reliability and road-worthiness.

1.4 Voice Cards

All six voice cards are removed, tested, repaired if necessary and modified for the new **Lintronics** autotune algorithm. This algorithm makes the autotune procedure more precise and guarantees long-time stability of the oscillators.

1.5 Demux Board

The Demux Board is removed, tested for cold soldered joints, repaired if necessary and modified for pitch bend, modulation wheel, foot pedal 1 and the octave switch.

1.6 Common Analog Board

This board is also removed, tested for cold soldered joints etc., repaired if necessary and prepared for pitch bend, modulation wheel, transpose, foot pedal 1, stereo outputs and the octave switch. **Lintronics** also modifies the octave switch function to increase the sound quality, especially when playing sounds with extremely high filter emphasis setting.

1.7 Octave Board

The octave board is modified to store the octave setting with each program.

2.1 Digital Board

The digital board is removed and modified. (Since the reset circuit of the original Memorymoog was not very reliable, it crashed and lost its sounds often when problems occurred in the power supply.)

2.2 Filter Input

External audio signals can be fed through the Moog's VCF and VCA circuitry (including envelopes and LFO) with an optional filter input board which is located on the Memorymoog's expansion slot (1/4" standard phone jack, mono).

[Note:](#) The best signal-to-noise ratio can be achieved at a signal input level of +6dB.

2.3 CV-OUT jack modification

The normal Memorymoog transmits only keyboard and glide voltages through the CV-OUT jack. With the optional CV-OUT modification, the **Advanced Memorymoog** adds pitch bend, octave, tune and modulation voltages.

(This is particularly useful when driving a Minimoog from the CV-OUT. The Minimoog's 3rd oscillator must no longer be reserved for modulation and can be used as a sound source.)

2.4 Control Panel

All pots and the two front panel boards are removed, the pots are tested, cleaned and, if necessary, replaced. Missing knobs and switches are replaced with original Moog spare parts.

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Autotune	B-10, C-5, C-6, D-1
Breath (Footp.1)	C-2
C (button)	B-5, B-6, C-6
C-Load	A-3, B-5, B-6
C-Save	A-3, B-5, B-6
C-Verify	A-3, B-5, B-6
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CSwt	A-3, B-5, B-7
Ctrl	A-3, B-5, B-7
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Front panel board	D-2.4
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MIDI Implementation Chart

Lintronics Advanced Memorymoog

Date: January 21, 2025

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1-16 1-16	1-16 1-16	memorized
Mode	Default Messages Altered	3 x *****	1, 3 x x	memorized
Note Number	True Voice	36-96 *****	o v = 127 o	
Velocity	Note On Note Off	o 9nH, v = 100 o 8nH, v = 127	o v = 1-127 o	
After Touch	Key's Ch's	x x	x o	
Pitch Bender		x	o	12 bit resolution
Control Change	1	x	o	Modulation Wheel
	2	x	o	Breath Control
	4	x	o	Pedal
	5	x	o	Glide Amount
	7	x	o	Volume
	30	o	o	Switch On *1
	31	o	o	Switch Off *1
	32-63	o	o	Pots *2
	64	o	o	Sustain
	65	o	o	Glide On/Off
69	x	o	Hold Key	
122-123	o	o	Local/All Notes Off	
124-127	o	o	Notes/Controller Off	
Program Change	True #	o 0-99	o 0-99 1-99, 0	
System Exclusive		o	o	*3
System Common	Song Pos. Song Sel. Tune	x x x	x x o	
System Clock		x	o	*4
Real Time Commands		x	o	*4
Auxiliary Messages	Local On/Off All Notes Off Active Sense Reset	o o o x	o o x x	
Notes:	*1 see chart on page C-6/C-7		Mode 1: Omni On, Poly	
	*2 see chart on page C-2/C-3		Mode 2: Omni On, Mono	o: yes
	*3 see chart on page C-8/C-9/C-10		Mode 3: Omni Off, Poly	x: no
	*4 affects the LFO/Arpeggiator		Mode 4: Omni Off, Mono	