motor mix

Developers Guide

Version 1.2

CM Labs®

http://www.cmlabs.net

Notices

Please return your warranty card to CM Labs immediately. Your name will be placed on our mailing list (unless you requested it not to be) and we will inform you of all product updates as well as new products developments. Some of these updates will be free so please send it in.

CM Labs reserves the right to make improvements or changes to the products described in this manual at any time.

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CM Labs warrants that our hardware conforms substantially to the specifications contained in this manual when used in accordance with these specifications for a period of one (1) year from the date of original purchase from CM Labs or it's authorized resellers. In case of a valid warranty claim, your sole and exclusive remedy and CM Labs entire liability under any theory of liability will be, at its option to repair or replace the product without charge or, if not possible, to refund the purchase price to you. The warranty is not transferable, it applies only to the original purchaser of the product. For warranty service, please call CM Labs at (360) 794-1196 to obtain a return authorization (RA) number. After you obtain the RA number, ship the defective product to CM Labs 13221 191st Ave. S.E. Monroe, WA 98272. Write the RA number in large letters on the outside of the shipping box. Enclose your name, address, telephone number, copy of original sales invoice and a detailed description of the problem. CM Labs will not accept responsibility for loss or damage in transit.

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Greetings

To: Perspective MotorMix™ / MotorMan™ Development Partners

From: Carl Malone (President and Engineering Director, CM Labs)

Hello, and thank you for your interest in supporting the MotorMix™ or MotorMan™ worksurfaces.

We here at CM are very excited about the prospect that you will become a CM Labs Development Partner. This partnership will benefit your company, your customers, and the rapidly expanding field of computer based audio products.

We expect to see an increase in our Development Partners hardware and software sales as a result of this collaboration. When your end users have quick access to mixing and controlling more tracks of audio via our worksurface, they will purchase more A/D, D/A, and audio recording hardware products from you. When PLUG-INS can be controlled quickly by real time controls like pots and switches, your customers will purchase more PLUG-INS, and therefore you will sell more DSP hardware.

If a prospective customer sees that your products are controllable by MotorMix/MotorMan they will be more likely to make the initial purchase. There is great comfort in their knowledge that they can use a REAL motorized control surface to run things. In our print advertising and product brochures, we will include your company logo and the names of your products.

We have planned a number of ancillary products to connect with the Accessory port on our worksurfaces for controlling the transporting and editing of audio files. We are designing additional products to add edit, surround and monitor control. As these products materialize, they should enhance our partnership and bear similar fruits to those mentioned above.

This developer package is intended to help in every way possible with your adoption of MotorMix™ / MotorMan™. The Suggested Practices document should help clear up how to do some of the less obvious things that it was intended to do. The MIDI implementation document includes all the specific details.

We will provide at your request a MotorMix™ / MotorMan™ unit for your development use. This unit is priced at our developers discount of $700.

I will make myself available via E-mail and phone to answer and help out any way I can. Please feel free to ask me anything that will help insure our mutual success in this adventure.

Carl Malone cmfluteguy@earthlink.net

Connections

Connect the MotorMix or MotorMan MIDI out jack to the MIDI input on your computer MIDI interface. Connect your computer MIDI out jack to the MIDI input jack on MotorMix or MotorMan.

Check out the Self-Demo

If you would like see the worksurface in action to get a quick tour, run the built-in self-demonstration. Simply turn on the "POWER" switch (rear panel) power with the "SHIFT" switch down. Watch the self-demo to see what it can do.

Troubleshooting

If MotorMix / MotorMan does not respond properly, you can run the built in self-test. Simply connect the MIDI output directly into the MIDI input and apply power. The LCD should show "Performing Customer self test". Then it will perform:

1.) Memory (SRAM) test. It should report "SRAM IS O.K". Press the "SHIFT" and "UNDO" switches to end the test.

2.) MIDI ports test. It should report "MIDI IS O.K. Press the "SHIFT" and "UNDO" switches to end the test.

3.) Pots and Encoder test. Rotate the pots slowly, and the faders should move up and down. Rotate the encoder, and all the faders should move up and down. Push all the switches, and all the LED's should light. Push the encoder, and all the faders should move repeatedly from bottom to top. Press the "SHIFT" and "UNDO" switches to end the test.

4.) Fader test. Move the faders, and you should see their position reading on the LCD go from 000 to 255. Press the "SHIFT" and "UNDO" switches to end the test.

Remove the MIDI "jumper" cable and re-patch the MIDI cables. Connect the MIDI out jack on MotorMix / MotorMan to the MIDI input on your computer MIDI interface. Connect your computer MIDI out jack on your computer MIDI interface to the MIDI input jack on MotorMix / MotorMan.

If the unit passes these tests then you can look for problems elsewhere.

MotorMix / MotorMan Hidden Switch Functions

During Power Up:

1.) SHIFT performs self-demo.

2.) SHIFT * UNDO performs factory full test from menus.

3.) AUTO ENBL * SUSPEND performs factory full test from start to end.

4.) ESCAPE * ENTER performs factory final test.

5.) SELECT1 * SELECT `

1` `1 `1 `1 `1 `2 reloads all Factory default parameters to NVRAM.

6.) PLAY * ESCAPE toggles Pro Tools mode on and off.

During Normal Operations.

1.) Hold down SHIFT to delay touch release until SHIFT is released.

Switch and Control Use

Faders

The motorized fadersfaders output both position and 'touch' messages. Moving a fader sends out a 'touch' message and turn off motor drive to the fader. Then the fader position messages are sent as the fader is moved. The position is sent out with 9 bits of accuracy. The 2 least significant bits can be ignored for 7-bit accuracy. When the user stops moving the fader, a 'touch off' message is sent out. If the 'SHIFT' switch is down before the touch off condition occurs, the 'touch off' messages will not be sent until the "SHIFT" switch is released. This is useful to allow a static fader to continue to update the channel automation.

The fader touch on and touch off messages should be used to gate fader automation updates.

LCD usage

The top row of the LCD should be used to do text display of Mixer channel labels, Automation Group labels, Plug In names, or parameter labels.

Each channel is 5 LCD characters wide. The Channel Labels should be 4 characters plus a space, or 5 characters with a capital letter at the start of each label. If the user has entered channel labels longer than this they must be truncated before sending them to the LCD.

The LCD text messages require ASCII character strings and an LCD address.

The bottom row of the LCD should be used to graphically display Pan, Send Levels, level meters, or Plug In parameter values. It is also useful for text display of Aux pre / post, channel routing, numeric fader or pan settings.

Graphic display is handled by MotorMix / MotorMan. Simply send the desired value 0 - 7F (hexadecimal) to the desired channel 0-7 in the Graphic display message.

View Controls Section

The VIEW controls are used to specify which mixer channels (or VIEW) will be operated by the worksurface. The channel view can be switched by single channels, or banks of 8 channels. The application could also create a favorite view list, and these controls could navigate through that list.

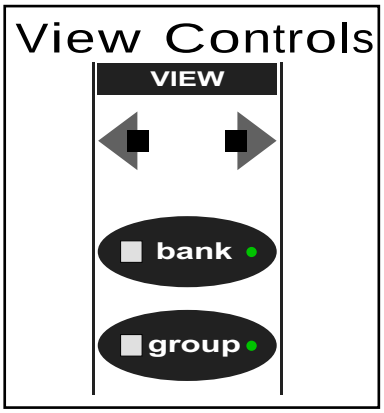
Left Arrow Switch: With the Bank LED off, the Left Arrow switch moves the current 8 channel view left by one. Example: if mixer channels 4 through 11 are displayed on Motor Mix, pressing the Left Arrow Button should cause channels 3-10 to be displayed on Motor Mix.

Right Arrow Switch: With the Bank LED off, the Right Arrow switch moves the current 8 channel view right by one. For example: if mixer channels 4 through 11 are displayed on Motor Mix, pressing the Right Arrow Button should cause channels 5-12 to be displayed on Motor Mix.

Bank Switch and LED: Note: "BANK" refers to a Bank of 8 contiguous channels as in channels 4,5,6,7,8,9,10,11, or a Bank of 8 non contiguous voices as in a bank of 8 stringed instruments or wind instruments etc.

Example: Press the Bank switch and the Bank LED Illuminates. When the Left or Right Arrow switches are used, the view should be shifted left or right by one Bank. If mixer channels 4 through 11 are displayed on Motor Mix, pressing the Right Arrow Button should cause channels 12-19 to be displayed on Motor Mix. Pressing the Bank switch a second time should turn the Bank LED off.

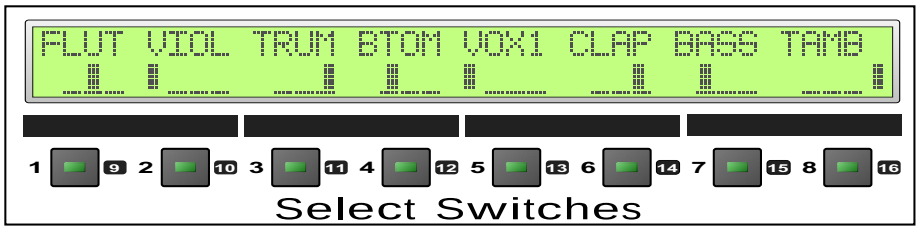
Group Switch and LED: Note: Group refers to Automation Groups.



Example: Press the Group switch, and the Group LED Illuminates and the Bank LED turns off if it was on. This could be used to engage or disengage automation groups.

Select Switches

There are 8 Illuminated Select switches located just below the LCD.



The Select switches are used for the following:

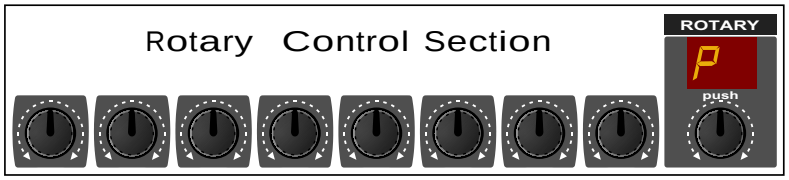
1.) Selecting channels to perform secondary operations on, like Plug In effects settings changes. (See Rotary section below.)

2.) To toggle on / off or otherwise make selections that are displayed on the LCD.

The LED's in the Select switches can be illuminated depending on the current usage. They can be used to indicate the current channel selection(s) or to indicate parameter on / off status.

Rotary Controls Section

The Rotary Controls Section has 8 360-degree rotary pots. There is a detented rotary encoder with a push switch that is used in conjunction with a 2 digit 7-segment display to control the 8 rotary pots. The lower row of the LCD is used to indicate the current rotary pot settings.



The Rotary Controls are used to control: Pan, Aux. Send levels, DSP parameters, and channel input / output assignments.

PAN	P
PAN RIGHT	Pr
AUX 1	A1
AUX 2	A2
AUX 3	A3
AUX 4	A3

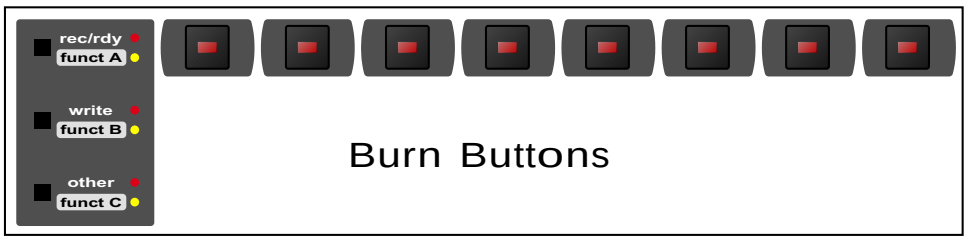
The Rotary controls should power on default to be PAN controls. (PA displayed on the 7-segment display.) **Rotating the encoder should cause the 7-segment display to scroll through the list of possible rotary control usage like:**

Burn Buttons

The Burn buttons include:

1.) 8 Illuminated (Red LED's) Write switches in the mixer channels

2.) 3 Switches and 6 LED's (3 Red and 3 Yellow) to control what is being "written" by the Write switches.

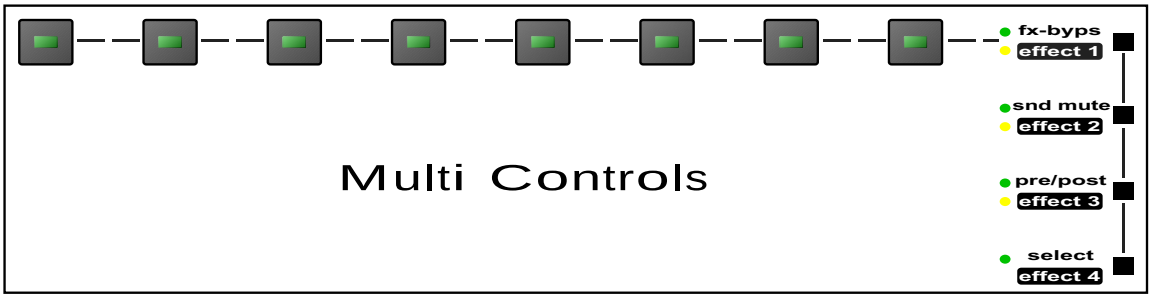


Example 1: Press the switch labeled "rec / rdy". The Red LED adjacent to that switch should illuminate and any other Red or Yellow LED on in that section should be turned off. The Application should then put the track rec / rdy status on the Red Write LED's. If the Red LED is on, that means that that channel is currently recording. If the Red LED is flashing, that means that that channel is record enabled but not currently recording. If the Red LED is off, that means that that on channel is not recording or record enabled. Pressing a Write switch in a channel should toggle on or off the rec / rdy status (and the Red LED) on that channel.

Note: When a channel is record enabled or recording, the fader should control and represent the channel record level.

Example 2: Press the switch labeled "write". The Red LED adjacent to that switch should illuminate and any other Red or Yellow LED on in that section should be turned off. The Red LED's in the channel indicate the automation mode for the channel. If the automation mode is OFF or READ then the LED is off. If the mode is Write, Update, Touch etc, the LED is on. Pressing one of the channel write switches should put the automation mode for that channel on the lower row of the LCD in that channel. Releasing the switch should return the LCD to its previous state. (See "mode" below for changing automation mode)

Multi Controls



The Multi Controls include:

1.) 8 Illuminated (Green LED's) On / Off switches in the mixer channels just below the rotary pots.

2.) 4 Switches and 8 LED's (4 Green and 4 Yellow) to control which effect is being done by the Multi switches.

Example1: Press the switch labeled "fx-byps". The Green LED adjacent to that switch should illuminate and any other Green or Yellow LED on in that section should be turned off. The Application should then put the channel effects On / Off status on the Green On / Off LED's in the mixer channels. If the Green LED is on, that means that the effects are on. Pressing an On / Off switch in a channel should toggle on or off the effects processors (and the Green LED) on that channel.

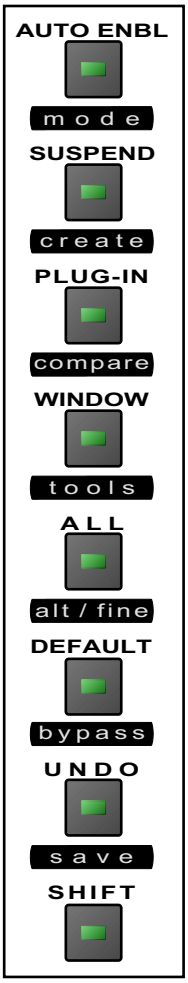
Example2: Press the switch labeled "snd mute". The Green LED adjacent to that switch should illuminate and any other Green or Yellow LED on in that section should be turned off. The Application should then put send mute status (for the current Aux send selected by the rotary section) on the Green LED's in the channel. If the Green LED is on, that means that the send is muted.

Example3: Press the switch labeled "pre / post". The Green LED adjacent to that switch should illuminate and any other Green or Yellow LED on in that section should be turned off. When one of the switches is pressed, the Pre / Post for that channel will be toggled and displayed on briefly on the top row of the LCD. Use the encoder to select other sends for Pre / Post assignment.

Example4: Press the switch labeled "select". The Green LED adjacent to that switch should illuminate and any other Green or Yellow LED on in that section should be turned off. When controlling a Plug In, the "SELECT" switches below the LCD are busy doing other things, so this row of switches can now be used to select channels for control when in "Plug In" mode.

Left Function Switches

(Left of the Faders)



'SHIFT': The "SHIFT" switch is used to add secondary functions to the switches. The secondary functions are indicated on the panel by reversed text below the switch. This switch is also used in conjunction with the select switches. (See "create" below)

'UNDO': *Example: When the project file has been altered during a pass, the UNDO led should light or blink to indicate that the change can be Saved or Undone. Press 'UNDO', and the change to the file should be undone and the LED should extinguish.*

'save': *Example: Press and hold ' SHIFT' and then press 'save', then release. The Application blinks the 'save' LED. Press the 'save' switch again and the application should save the project file and extinguish the led.*

DEFAULT': *Example: Press and hold 'DEFAULT' and then press a channel Select switch. The Application should send the Fader to Unity and Pan to Center. Press "DEFAULT", "ALL", and a "SELECT' switch should default all channels.*

'bypass': *Example: Press and hold ' SHIFT' and then press 'bypass', then release. The Application lights the 'bypass' LED. This should cause the application to place Motor Mix "off-line" so it does not make changes to the current project file.*

'ALL': The 'ALL' switch is used in conjunction with other switches to apply processes to all mixer channels.

Example: Press and hold the 'ALL' switch. Mute a channel, and all channels are muted, or move one fader, and all the other faders should follow.

'alt / fine': *Example: Press and hold ' SHIFT' and then press and hold 'alt-fine'. The Application lights the 'alt-fine' LED. If a fader, pan or aux send pot is moved, the gain / attenuation or pan value is displayed in the bottom row of the LCD. Releasing the "alt-fine" switch should return the LCD to its former state and turn off the "alt-fine" LED.*

'WINDOW': *Example: Press and release the 'WINDOW' switch. The application puts the window choices on the lower row of the LCD and lights the Green LED on the 'Window' switch. Use the 'Select' switches to open or close windows. Use the 'WINDOW' switch on Motor Mix to exit. Upon exit, recall the lower row of the LCD and extinguish the 'WINDOW' LED.*

'tools': *Example: Press and hold ' SHIFT' and then press 'tools', then release. The Application lights the 'tools' LED. The Application puts the tool choices on the lower row of the LCD and lights the Green LED on the 'tools' switch. Use the 'Select' switches to select or deselect tools. Use the 'tools' to exit. Upon exit, recall the lower row of the LCD and extinguish the 'tools' LED.*

'PLUG-IN': *Use the "SELECT" switch to select a channel with a Plug In assigned. Press the "PLUG-IN" switch to enable the LCD, rotary pots and "SELECT" switches to control your Plug INS. Open the Plug In window, and the rotary pots and encoder will become Plug In controls. Use the 7 segment displays to say "IN" for insert control or "PA" for parameter control. Push the encoder to toggle between insert and parameter control.*

Insert control mode: Use the top row of the LCD to display both the inserts and the current channel being controlled. The lower LCD row will display either "no insert" or a short hand label of a Plug In. If a label is flashing then MotorMix / MotorMan is controlling the Plug In. Use a "SELECT" switch to pick an insert to control, and the parameter control mode will become active. Rotate the encoder to move between inserts.

Parameter control mode: The LCD will display the Plug In parameter names and settings. The top LCD row and the "SELECT" switches will control switchable parameters. The lower LCD row and rotary pots control continuously variable parameters. Note that the "SELECT" switch and the rotary pot to move will be just below the parameter values in the LCD. Rotate the encoder to move between parameter pages. The upper left of the LCD will briefly display the Plug In page and label.

'compare': *Example: When in "Plug In" mode described above, press and hold ' SHIFT' and then press 'compare', then release. The Application lights the 'compare' LED. The application should temporarily recall the previous Plug In settings for comparison purposes. Press the 'compare' switch on Motor Mix to exit. Upon exit, recall the current workspace and extinguish the 'compare' LED.*

'SUSPEND': *Example: Press and release 'SUSPEND', and the Application blinks the Green 'SUSPEND' LED and disables the playback of automation moves.*

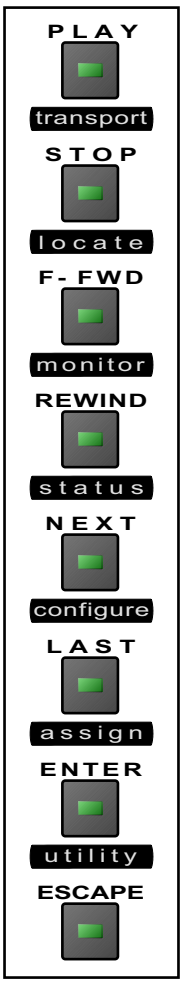
'create': *Example: Press and hold ' SHIFT' and then press some "SELECT" switches. As each "SELECT" switch is pressed, light the "SELECT" led. Press "SHIFT" and then 'create', then release 'SHIFT'. The Application lights the 'create' LED. Open a group creates dialog box to allow labeling operations. Have "ESCAPE" or "ENTER" on Motor Mix end the process. Upon exit, recall the LCD and extinguish the 'create' LED.*

'AUTO ENBL': *Example: Press and release 'AUTO ENBL', and the Application lights the Green 'AUTO ENBL' LED and puts automation enables on the lower LCD row such as Faders, Mutes, Plug In etc. If the operation is automation enabled, the select LED is illuminated. Press a channel Select switch to toggle the enable status. Press the 'AUTO ENBL' switch to exit. Upon exit, recall the LCD and extinguish the 'AUTO ENBL' LED.*

'mode': *Example: Press and hold ' SHIFT' and then press 'mode'. The Application lights the 'mode' LED, and puts automation modes on the lower LCD row. (Like off, Read, Write, Update, Touch, etc.) Rotate the rotary pots to change the mode. If "ALL" is pressed while a rotary pot is moved, have all channels assume the automation mode of that channel. Press the 'mode' switch to exit. Upon exit, recall the LCD and extinguish the 'mode' LED.*

Right Function Switches

(Right of the Faders)



'ESCAPE': The 'ESCAPE' switch is used to exit procedures as described above and may be used as a duplicate to the Escape switch on the computer keyboard.

'ENTER': The 'ENTER' Switch is used to complete processes and may be used as a duplicate to the Enter switch on the computer keyboard.

'utility': Example: Press and hold ' SHIFT' and then press 'utility', then release. The Application lights the 'utility' LED. The lower row of the LCD should then display any utility procedures that the Application may require. Press the 'Select' switch below the desired item to make the choice. Press the 'utility' switch to exit. Upon exit, recall the LCD and extinguish the 'utility' LED

'LAST': The 'LAST' Switch is used to move back one locate point.

'assign': With "SHIFT" down, press the "assign" switch. The LED will flash. Rotate the encoder to select Aux Sends or channel inputs or outputs to assign. The assignment is shown on the lower row of the LCD. Each channel rotary pot is used to change the assignment. Press "ESCAPE" or "status' to close the window.

'NEXT': The 'NEXT' Switch is used to move forward one locate point.

'configure': Example: Press and hold ' SHIFT' and then press 'configure', then release. The Application lights the 'configure' LED. Process requiring may be included at this point. Press the 'configure' switch to exit. Upon exit, recall the LCD and extinguish the 'configure' LED.**'REWIND':** This switch should act like a standard rewind switch.

'status': Example: Press and hold ' SHIFT' and then press 'status', then release. The Application lights the 'status' LED. The application opens the project status window. Press the 'status' switch to exit. Upon exit, recall the LCD and extinguish the 'status' LED.

'F FWD': This switch should act like a standard fast forward switch.

'monitor': Example: Press and hold ' SHIFT' and then press 'monitor', then release. The Application blinks the 'monitor' LED. Monitor selections can be put on the lower row of` the LCD and selections may be made by using the 'Select' switches. Press the 'ESCAPE' switch to exit. Upon exit, recall the LCD and extinguish the 'monitor' LED. With 'monitor' on, the rotary pots (and encoder) can be used to control monitor levels.

'STOP': This switch should act like a standard transport stop switch.

'locate': Example: Press and hold ' SHIFT' and then press 'locate', then release. The Application lights the 'locate' LED. Locate points can be put on the lower row of` the LCD, and selections may be made by using the 'Select' switches. Press the 'ESCAPE' switch to exit. Upon exit, recall the LCD and extinguish the 'locate' LED.

'PLAY': This switch should act like a standard play switch.

'transport': Example: Press and hold ' SHIFT' and then press 'transport', then release. The Application blinks the 'transport' LED. Transport labels (rew, ff, play etc.) can be put on the lower row of` the LCD and selections may be made by using the 'Select' switches. Press the 'transport' switch to exit. Upon exit, recall the LCD and extinguish the 'transport' LED.

MIDI Input/Output Control Messages

Transmitted Messages

Ping Echo 90-00-7F

SWITCHES	Switch Pressed	Switch Released
CHANNEL SECTION:		
FADER TOUCH (1 thru 8)	B0-0F-(00thru07)-2F-40	B0-0F-(00thru07)-2F-00
	Touch ON	Touch OFF
SELECT (1 thru 8)	B0-0F-(00thru07)-2F-41	B0-0F-(00thru07)-2F-01
MUTE (1 thru 8)	B0-0F-(00thru07)-2F-42	B0-0F-(00thru07)-2F-02
SOLO (1 thru 8)	B0-0F-(00thru07)-2F-43	B0-0F-(00thru07)-2F-03
MULTI (1 thru 8)	B0-0F-(00thru07)-2F-44	B0-0F-(00thru07)-2F-04
REC / RDY (1 thru 8)	B0-0F-(00thru07)-2F-45	B0-0F-(00thru07)-2F-05
LEFT SIDE:		
SHIFT	B0-0F-08-2F-40	B0-0F-08-2F-00
UNDO / disk	B0-0F-08-2F-41	B0-0F-08-2F-01
DEFAULT / bypass	B0-0F-08-2F-42	B0-0F-08-2F-02
ALL / alt-fine	B0-0F-08-2F-43	B0-0F-08-2F-03
WINDOW / tools	B0-0F-08-2F-44	B0-0F-08-2F-04
PLUG IN / compare	B0-0F-08-2F-45	B0-0F-08-2F-05
SUSPEND / create	B0-0F-08-2F-46	B0-0F-08-2F-06
AUTO ENBL / mode	B0-0F-08-2F-47	B0-0F-08-2F-07
RIGHT SIDE:		
ESCAPE	B0-0F-09-2F-40	B0-0F-09-2F-00
ENTER / utility	B0-0F-09-2F-41	B0-0F-09-2F-01
LAST / assign	B0-0F-09-2F-42	B0-0F-09-2F-02
NEXT / configure	B0-0F-09-2F-43	B0-0F-09-2F-03
REWIND / status	B0-0F-09-2F-44	B0-0F-09-2F-04
F - FWD / monitor	B0-0F-09-2F-45	B0-0F-09-2F-05
STOP / locate	B0-0F-09-2F-46	B0-0F-09-2F-06
PLAY / transport	B0-0F-09-2F-47	B0-0F-09-2F-07
LEFT ARROW	B0-0F-0A-2F-40	B0-0F-0A-2F-00
RIGHT ARROW	B0-0F-0A-2F-41	B0-0F-0A-2F-01
BANK	B0-0F-0A-2F-42	B0-0F-0A-2F-02
GROUP	B0-0F-0A-2F-43	B0-0F-0A-2F-03
REC / RDY / funct A	B0-0F-0A-2F-44	B0-0F-0A-2F-04
WRITE / funct B	B0-0F-0A-2F-45	B0-0F-0A-2F-05
OTHER / funct C	B0-0F-0A-2F-46	B0-0F-0A-2F-06
FX-BYPASS / effect1	B0-0F-0B-2F-40	B0-0F-0B-2F-00
SEND MUTE / effect2	B0-0F-0B-2F-41	B0-0F-0B-2F-01
PRE / POST / effect3	B0-0F-0B-2F-42	B0-0F-0B-2F-02
SELECT / effect4	B0-0F-0B-2F-43	B0-0F-0B-2F-03
FADER (1 thru 8)	B0-(00thru07)-MSB-(20thru27)-LSB	
	MSB=0 M M M M M M M	LSB=0 L L 0 0 0 0 0

FADER (1 thru 8)	B0-(00thru07)-MSB-(20thru27)-LSB	
	MSB=0 M M M M M M M	LSB=0 L L 0 0 0 0 0
ROTARY 1-8	B0-(40thru47)-VALUE	
VALUE = 0 s r r r r r r	s=1=clockwise	r r r r r r = rotation size
ENCODER (rotate)	B0-48-VALUE	
VALUE = 0 s r r r r r r	s=1=clockwise	r r r r r r = rotation size
ENCODER (push)	B0-49-01 (Push)	B0-49-00 (release)

Recieved Messages

Ping Input	90-00-00
MOTORS (1 thru 8)	B0-(00thru07)-MSB-(20thru27)-LSB
	MSB=0 M M M M M M M LSB=0 L L 0 0 0 0 0
L.C.D. Display	Note: HEADER = F0 - 00 - 01 - 0F - 00 - 11 - 00 -
L.C.D. Text Display	HEADER-10-ADDRESS-V0-V1-V2-V3-V4-.....F7
	ADDRESS is starting address of LCD
	Character from 00 to 4F. Vx is ASCII
	Character value.

For example: to put "Kick " on display starting in Channel 4 at top row of LCD:
F0-00-01-0F-00-11-00-10-0F-4B-69-63-6B-20-F7

For example: to put "Bass1" on display starting in Channel 1 and "Snare" in Channel 2 at top row of LCD:
F0-00-01-0F-00-11-00-10-00-42-61-73-73-31-23-53-6E-61-72-65-F7

Rotary Pointer	HEADER-11-TYPE,ADDRESSx-,Vx,
	ADDRESSy-Vy-.....F7
	TYPE is Graphic Type
	ADDRESSx is channel address of LCD
	from 00 to 07, Vx is Parameter value from 00 to 7F
Rotary Pointer Types	TYPE = 00 = Left justified horizontal Bar graph (AUX Pots)
	TYPE = 01 = Centered horizontal Bar graph
	TYPE = 02 = Right justified horizontal Bar graph
	TYPE = 03 = Single verticle line (PAN or PAN R)
	TYPE = 04 = Left Justified double verticle line
	TYPE = 05 = Centered "Q" spreading bar (FIlter Q)
	TYPE = 06 = Ascending bar graph (Channel Meters)
	TYPE = 07 = Descending bar graph (Gaon reduction)

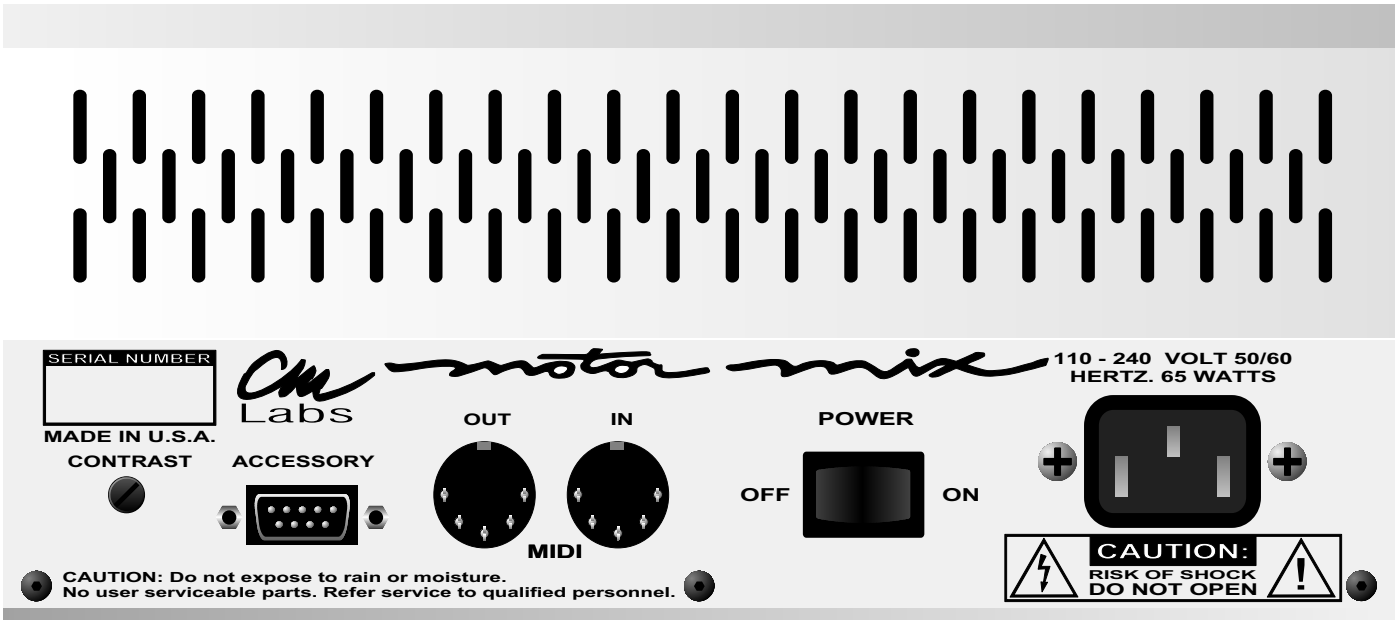
Note: Only one Graphic type can be used at a time.

For example: to put a Left Justified bar display in channel 6:
F0-00-01-0F-00-11-00-11-00-05-40-F7

7 Segment Display	HEADER-12-MSChar(Hi Nibble)-MSChar(Lo Nibble)- LSChar(Hi Nibble)-LS Char(Lo Nibble) -F7 Char is ASCII 0-9, Dash, Space or Upper Case Letters Bit # 6 of Hi Nibble byte is decimal point for each Character

For example: to put "AB" on display: F0-00-01-0F-00-11-00-12-04-01-04-02-F7
For example: to put "C.D." on display: F0-00-01-0F-00-11-00-12-44-03-44-04-F7

SWITCH L.E.D.'S	L.E.D. ON / BLINK	L.E.D. OFF
CENTRAL CHANNEL SECTION:		
SELECT (1 thru 8)	B0-0C-(00thru07)-2C-(41 / 51)	B0-0C-(00thru07)-2C-01
MUTE (1 thru 8)	B0-0C-(00thru07)-2C-(42 / 52)	B0-0C-(00thru07)-2C-02
SOLO (1 thru 8)	B0-0C-(00thru07)-2C-(43 / 53)	B0-0C-(00thru07)-2C-03
BYPASS (1 thru 8)	B0-0C-(00thru07)-2C-(44 / 54)	B0-0C-(00thru07)-2C-04
REC / RDY (1 thru 8)	B0-0C-(00thru07)-2C-(45 / 55)	B0-0C-(00thru07)-2C-05
LEFT SIDE:		
SHIFT	B0-0C-08-2C-(40 / 50)	B0-0C-08-2C-00
UNDO / disk	B0-0C-08-2C-(41 / 51)	B0-0C-08-2C-01
DEFAULT / bypass	B0-0C-08-2C-(42 / 52)	B0-0C-08-2C-02
ALL / alternate	B0-0C-08-2C-(43 / 53)	B0-0C-08-2C-03
WINDOW / tools	B0-0C-08-2C-(44 / 54)	B0-0C-08-2C-04
PLUG IN / compare	B0-0C-08-2C-(45 / 55)	B0-0C-08-2C-05
SUSPEND / create	B0-0C-08-2C-(46 / 56)	B0-0C-08-2C-06
AUTO ENBL / mode	B0-0C-08-2C-(47 / 57)	B0-0C-08-2C-07
RIGHT SIDE:		
ESCAPE	B0-0C-09-2C-(40 / 50)	B0-0C-09-2C-00
ENTER / utility	B0-0C-09-2C-(41 / 51)	B0-0C-09-2C-01
LAST / assign	B0-0C-09-2C-(42 / 52)	B0-0C-09-2C-02
NEXT / configure	B0-0C-09-2C-(43 / 53)	B0-0C-09-2C-03
REWIND / status	B0-0C-09-2C-(44 / 54)	B0-0C-09-2C-04
F - FWD / monitor	B0-0C-09-2C-(45 / 55)	B0-0C-09-2C-05
STOP / locate	B0-0C-09-2C-(46 / 56)	B0-0C-09-2C-06
PLAY / transport	B0-0C-09-2C-(47 / 57)	B0-0C-09-2C-07
BANK	B0-0C-0A-2C-(40 / 50)	B0-0C-0A-2C-00
GROUP	B0-0C-0A-2C-(41 / 51)	B0-0C-0A-2C-01
RECORD	B0-0C-0A-2C-(42 / 52)	B0-0C-0A-2C-02
funct A	B0-0C-0A-2C-(43 / 53)	B0-0C-0A-2C-03
WRITE	B0-0C-0A-2C-(44 / 54)	B0-0C-0A-2C-04
funct B	B0-0C-0A-2C-(45 / 55)	B0-0C-0A-2C-05
OTHER	B0-0C-0A-2C-(46 / 56)	B0-0C-0A-2C-06
funct C	B0-0C-0A-2C-(47 / 57)	B0-0C-0A-2C-07
FX-BYPASS	B0-0C-0B-2C-(40 / 50)	B0-0C-0B-2C-00
effect1	B0-0C-0B-2C-(41 / 51)	B0-0C-0B-2C-01
SEND MUTE	B0-0C-0B-2C-(42 / 52)	B0-0C-0B-2C-02
effect2	B0-0C-0B-2C-(43 / 53)	B0-0C-0B-2C-03
PRE / POST	B0-0C-0B-2C-(44 / 54)	B0-0C-0B-2C-04
effect3	B0-0C-0B-2C-(45 / 55)	B0-0C-0B-2C-05
SELECT	B0-0C-0B-2C-(46 / 56)	B0-0C-0B-2C-06
effect4	B0-0C-0B-2C-(47 / 57)	B0-0C-0B-2C-07



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