

MM24 TECHNICAL REFERENCE MANUAL

VERSION 1.12

PRELIMINARY REMARK

In this document, all commands descriptions use the following names convention for machine buttons and keyboard keys:

Left button: SEL
Right button: VOL

Left upper key: MODE
Right upper key: BAL
Most left lower key: CTRL
Most right lower key: MUTE

Remaining lower keys: CH1 ... CH7 (from left to right)

THEORY OF OPERATIONS OF THE Mimesis 24

MM24 Machine is an audio controller with:

- 7 digital inputs.
- 2 analog 5.1 multi-channels inputs.
- 5 analog stereo inputs.

- 16 digital outputs with 4 of them with input direct linking capability.
- 1 analog REC output.

- 2 DSP for signal treatment (signals mixing, gain, delays).
- 1 DSP for signal decoding (AC3, DTS, etc...).

About inputs

Speaking of the inputs capabilities, both pair of analog 5.1 multi-channels

inputs and all 5 analog stereo inputs are not device dependent nor medium format dependent.

It is not the case with the 7 digital inputs. Here, input capabilities of a given digital input depend on the device capabilities connected to this input and also the type of media you intend to play with.

It is the reason why MM24 "Configurator" program will not ask you any settings about analog inputs, but will ask you to set digital inputs capabilities for each digital input.

Settings can be a combination of the following capabilities:

- Stereo capability
example: an old CD only player.
- 5.1 multi-channels capability
example: a classic DVD-player.
- 7.1 multi-channels capability
activate this capability too, if you want the input to support also this format (see paragraph "7.1 format" for more information).

Zone concept

A MM24 "Zone" is a group of output(s), devoted to a single broadcasting system (loudspeakers set), located into a single place.

MM24 Zone can be organized in the following way:

- Up to 14 Zones can be created.
- Each Zone is built from a group of 1 to 8 contiguous output(s).
- Zone #1 is always the "local Zone" and has volume + balance(s) mixing controls.
- Other Zones are "Distant listen Zone" or "Record Zone" and do not have any mixing controls.

In most cases, the number of output(s) a Zone has, is determinant for the level of "output mode capabilities" this Zone can have. Level can go up to "pseudo 8.2 multi-channels" capability:

- With 1 or 2 output(s), Zone will only have "Stereo" capability.
- With 3 outputs, Zone will have, in more, "5.1 multi-channels" capability.
- With 4 outputs, Zone will also support "7.1 multi-channels" capability.

- With 5 outputs and over, Zone will be able to support up to a "pseudo 8.2 multi-channels" capability, built from either 5.1 or 7.1 multi-channels signals (see also here after, "Balances mixer" and "Configurator concept" paragraphs on this matter).

Now to say, the number of outputs a Zone has, can not only be dictated by the "output mode capabilities" level we want to obtain, but also by some technical constraints, regarding the loudspeaker system used for this Zone. In this case, it is useful to be able to restrict "output mode capabilities" level, down to a fixed level, corresponding to the real level this Zone can achieve (more on this into the User Manual "MM24Conf.txt" of MM24 "Configurator" program).

"Digital direct" and "Analog direct" capabilities (REC output) depend on the output No (part of the MM24 hardware design).

Outputs #13 to #16 have "Digital direct" capability. To obtain a Zone with "Digital direct" capability, Zone must be fully defined within the range of outputs #13 to #16. In most cases, these outputs will be used to define up to 4 single output "Record Zone". But note that these outputs are fully compatible with output #1 to #12 and can be therefore used within a simple "Listen Zone". For example: a 5 outputs Zone defined with output #12 to #16 will be perfectly operational and will not have "digital direct" capability (because of output #12).

Output #17 has ONLY "Analog direct" capability. Therefore, only a single output Zone, which will have only "Analog direct" capability available, can be created. Moreover, this Zone will not require any signal(s) mixing setup (see after).

MM24 SEL button allow to show the list of Zone. First the "Zone No" is shown. Then, following a two dots character, the name of the Zone. If the Zone has an input channel selected, you will see, after the name of the Zone, an indication of this channel selection built with up to 3 characters.

- First character: "A" for ANALOG input channel.
"D" for DIGITAL input channel.
- Second character: The input channel No.
- Third character: "*" indicate the decoder DSP is in use for this input channel.

This third character "*" is very useful to quickly found which Zone(s) is/are actually using the decoder DSP. You may need to know this information, for example, if you want to select for your Zone #1 (local Zone) a specific output format requiring the decoder DSP and you can't found this format into the output format(s) list. This mean decoder DSP is busy for one or more other Zone(s). Looking for "*" character into the Zone list will allow you to quickly found

Zone(s) where you must change the setting, in order to free up the decoder DSP.

To select a Zone, you must press MODE key. You will always know on which Zone you are working on, because main MM24 display state also show the "Zone No" before the input channel name.

MM24 will always return automatically to Zone #1 (local zone) if the user stop to use the interface (about 10 sec of inactivity).

Output formats

On one side (inputs), you can have different kind of signal(s) set, depending on the input type and/or the signal(s) delivered by the device itself. This can be:

- A simple analog stereo signal.
- A set of decoded analog 5.1 multi-channels signals.
- A simple digital PCM stereo signal.
- A digital encoded stereo signal.
- A digital encoded 5.1 or 7.1 multi-channels signal.

On the other side (outputs), the capacity to manage what is coming from the input, will depend on Zone capabilities, as described before. For example, a Zone having only a "Stereo" capability will be, in principle, not able to deal with a multi-channels signal.

We need therefore, in between, to be able to convert a format to an other, in order to be able to use any kind of incoming formats on any kind of output Zone.

Also in between, a coded signal will require the usage of the MM24 decoder DSP, to decode the signal into a set of decoded multi-channels signals. But because we only have one decoder, MM24 will be able to decode only one incoming signal in the same time.

Finally, the fact that the incoming signal is already present or not at the MM24 input plug and can be therefore identified or not, also influence the list of potential possible output format(s).

To deal with all that, MM24 firmware has a complex and sophisticated logic control, based on static capabilities of inputs and Zones (defined with the MM24 "Configurator" program) and dynamic capabilities, relative to decoder DSP activity and the input signal detector.

Each time the user change the input channel of a given Zone (MM24 CH1 to CH7

keys

or remote control "1" to "7" keys), logic control will try to determine all possible output format(s) which will be a subset of all possible formats listed here after (shown in MM24 display format):

Standard formats:

- ANALOG STEREO
- ANALOG 5.1
- DIGITAL PCM STEREO
- DIGITAL ENCODED STEREO (require decoder DSP)
- DIGITAL 5.1 (require decoder DSP)
- DIGITAL 7.1 (require decoder DSP)

Conversion formats:

- ANALOG 5.1 -> STEREO
- DIGITAL STEREO -> 5.1 (require decoder DSP)
- DIGITAL STEREO -> 7.1 (require decoder DSP)
- DIGITAL 5.1 -> STEREO
- DIGITAL 7.1 -> STEREO

Direct link format:

- DIGITAL DIRECT

Logic control will always try first to restore the previously used format for this channel, if any. In the case this format wouldn't be anymore compatible, logic control will choose the next more suitable format. Finally, if logic control didn't found any compatible output format, user will not be able to switch to this input channel.

This list of possible output format(s) is available to the user, through the user interface (MM24 SEL button or remote control "MODE" key). User has the possibility to access this mode, when a channel is selected and even if the selected input receive actually no signal at all.

For analog input channels, no problems. Signal do not need to be analyzed in order to determine the available output format(s). But for digital input channels, if the signal is not present, logic control will obviously not be able to take in account characteristics of the input signal to determine the format(s) list. Therefore, the logic control will present a list of all potentially possible format(s), according to input and Zone capabilities only. This will allow the user to pre-select the format he want, which will be probably the right one. In the case it wouldn't, the auto-commutation feature, described later in this paragraph, will enter in action as soon as the input receive the digital signal.

When the digital signal is received from the input, logic control will be able to produce a fully accurate list of all possible output format(s) at that time.

You will know if the list is accurate or not, because if the selected digital input receive no signal when you are into the output format(s) list selection mode, LED of MODE key will blink.

The fact you are into the output format(s) list selection mode does not mean your list is a frozen list established when you activated the function. The list is kept all the time up to date. You may remark it, if the input signal change, during the time you are looking the list. If the format displayed become incompatible with the new signal, it will be replaced by the next format compatible and even with the indication "NO FORMAT AVAILABLE", in the case logic control didn't found any valid format for the new signal.

When you are into the output format(s) list selection mode, you can examine all available format(s) With the SEL button. To activate a selected format you must press MODE key. With the remote control, you will simply select and activate, one after the other, all available format(s) with the "MODE" key.

MM24 also has an auto-commutation feature. In case the nature of the signal change and the selected output format is not anymore suitable, the logic control will automatically change the output format to the most appropriate new format available. If no format is found, the Zone will be muted and MODE key LED will start to blink, to show this status.

About output formats, please read also paragraph "7.1 format".

Signals Mixing

Basically, MM24 can do the following, with the help of both signals treatment DSP's and the firmware:

- Mix together up to 2 available input signals for channel left and channel right of an output, with a gain setting for both signal on both channel.
- For Zone #1 (local Zone) only, each channel (left/right) of an output has to be allocated to a mixer balance spatial position (see "Balance mixer").

"Configurator" concept

A "Configurator" is a set of "Signals mixing" setup parameters, for each available output(s) of a Zone.

With a first thought, we can believe that we require a "Configurator" for each output formats requiring signals mixing. But in fact, these output formats can be classified into 3 different types of inputs signal set:

Stereo set

Signals: Left/Right

- ANALOG STEREO
- DIGITAL PCM STEREO
- DIGITAL ENCODED STEREO

Multi-channels 5.1 set

Signals: Front-Left/Front-Right/Rear-Left/Rear-Right/Center/Sub

- ANALOG 5.1
- DIGITAL 5.1
- DIGITAL STEREO -> 5.1 (conversion done by decoder DSP)
- ANALOG 5.1 -> STEREO
- DIGITAL 5.1 -> STEREO

Multi-channels 7.1 set

Signals: Front-Left/Front-Right/Rear-Left/Rear-Right/Center/Sub/
Aux-Left/Aux-Right

- DIGITAL 7.1
- DIGITAL STEREO -> 7.1 (conversion done by decoder DSP)
- DIGITAL 7.1 -> STEREO

At this stage, we can believe that we need only 3 "Configurators" to cover all possible cases. In fact, we need 2 more, because "multi-channels to stereo" conversion is accomplished with a separate custom "Signals mixing". Therefore, to cover all cases, we need finally the following 5 "Configurators":

- STEREO
- MULTI-CHANNELS 5.1
- MULTI-CHANNELS 7.1
- MULTI-CHANNELS 5.1 TO STEREO
- MULTI-CHANNELS 7.1 TO STEREO

The number of "Configurator" to be set for a Zone, will depend on the level of "output mode capabilities" this Zone has (see Zone concept). But in minimum, we will always have the 3 Stereo "Configurators" ("stereo only" and both 5.1 & 7.1 "multi-channels to stereo" converters).

Note that if none of the digital inputs and output Zones capabilities has 7.1 capability defined, in this case, none of the 7.1 "Configurators" will be used by the system and therefore, don't need to be set.

Outputs delays

For each of the 16 digital outputs, you can set a broadcast delay, for both left and right channel, in the range 0 to 20 ms. These delays allow you to virtually farther the position of the loudspeaker(s) connected to each channel of these outputs and is totally independent of Zone setups and "Configurator" concept.

Balances mixer

As already mentioned before, Zone #1 (local Zone) has volume and balance(s) controls.

Mixer can have the following balance controls:

- Left-right balance
- Rear-front balance
- Center balance
- Subwoofer balance

Both Center balance & Subwoofer balance are relative to the whole other signals level. Positive settings of these two balances are effective only if the general volume control is not set to maximum level. In other words, with general volume set to maximum, Center & Subwoofer volume level can only be attenuated with the balance control.

Mixer is built with the following spatial positions:

front-center

front-left front-right

 subwoofer

left right

 aux-subwoofer

rear-left rear-right

 rear-center

Like you can see, this construction support up to a 8.2 multi-channels system.

Thanks to MM24 "Signals Mixing" capabilities it is possible to create a good "virtual" 8.2 multi-channels system, from either 5.1 or 7.1 multi-channels signals set.

Left-right balance apply to:

front-left < > front-right

left < > right

rear-left < > rear-right

Rear-front balance apply to:

front-center

front-left front-right

^ ^ ^
v v v

rear-left rear-right

rear-center

All these spatial positions are used in the "Signals mixing" setup of all "Configurators" for Zone #1 (local Zone). See user manual of "Configurator" program: "MM24Conf.txt".

MM24 VOL button or remote control "VOL+" and "VOL-" keys allow to set the general main volume.

Balance(s) accessibility from the user interface will depend on how is configured Zone #1 (local Zone) and their "Configurators". For example, if the "STEREO" local zone "Configurator" only use "left" and "right" spatial positions, only Left-right balance control will be accessible.

Pressing the BAL key will enter into balance control mode, where SEL button will allow you to select the desired balance control and the VOL button, to set the desired level. To exit this mode user MUST press BAL key again.

On remote control, you will have direct access to specific balances, of course, only if they are in use for the present active "Configurator". "Center balance"

and "Subwoofer balance" require to switch the remote control unit to the appropriate mode, where these balances can be set.

Mixer calibration

MM24 has a mixer calibration feature, which allow to set an attenuation value for each used spatial positions of each existing "Configurators" of the Zone #1 (local Zone).

The target of mixer calibration is to get an overall equilibrated sound level of all different sound sources of the MM24 local Zone loudspeakers system, based on a generated reference "pink noise" sound, with all mixer balance(s) set to their "zero" neutral position and this, for each available "Configurators" of the local Zone.

Then, mixer balance(s) can be used to compensate eventual not well balanced records or to modify original sound levels mix of records, to fit personal taste.

Only spatial positions used by a given "Configurator", will be accessible for the sound level calibration.

Calibration is always an attenuation value applied to the final mix sound level computation of a given spatial position.

An attenuation value can be set for each used spatial positions of each local Zone "Configurators". By default (factory setup), they are all set to "zero" (no attenuation). All these values are permanently memorized into MM24 EEPROM.

IMPORTANT REMARK: If you intend to upgrade firmware of MM24, it is a good idea to note all calibration values for all "Configurators", because upgrade process will reset them all to default "zero" factory setup. This remark do not concern all DSP's firmware upgrade.

It is because each "Configurator" can be potentially a completely different signal mixing, where even a specific loudspeaker channel can be attributed to a different spatial position, that calibration has to be done FOR EACH AVAILABLE "Configurator" of the local Zone.

To access each "Configurator" mixer calibration, user must select an output format, belonging to the "Configurator" he want to calibrate the mixer for. The following list will help to determine which output format to select:

- STEREO "Configurator"
output format: ANALOG STEREO
output format: DIGITAL PCM STEREO
output format: DIGITAL ENCODED STEREO
- MULTI-CHANNELS 5.1 "Configurator"
output format: ANALOG 5.1
output format: DIGITAL 5.1
output format: DIGITAL STEREO -> 5.1
- MULTI-CHANNELS 7.1 "Configurator"
output format: DIGITAL 7.1
output format: DIGITAL STEREO -> 7.1
- MULTI-CHANNELS 5.1 TO STEREO "Configurator"
output format: ANALOG 5.1 -> STEREO
output format: DIGITAL 5.1 -> STEREO
- MULTI-CHANNELS 7.1 TO STEREO "Configurator"
output format: DIGITAL 7.1 -> STEREO

Mixer calibration can be made from both the MM24 keyboard and the remote control.

First thing to do is to select an input channel and an output format for the "Configurator" you want to calibrate the mixer. The choice of the input channel is just dictated by the output format(s) this selection made available.

Verify that you are not into "MUTE" mode. Then, verify that your general volume control is not set too high. This is just to not be surprised by a very loud noise sound when you will enter into calibration setup. The general volume control will remain active into calibration setup.

You don't need to worry about the actual settings of your mixer balance(s), because the calibration setup state will automatically reset them all to their neutral "zero" positions and restore your original setting(s), when calibration mode is exited.

Now you can enter into calibration setup by using MM24 CTRL-BAL keys combination or the key "TEST" of the remote control unit.

When you enter into calibration setup, you will be automatically into the main "PINK NOISE AUTO SINGLE POSITION" calibration mode.

In this mode, you will always hear the pink noise sound on the actual selected spatial position. When you change the spatial position, the pink noise sound will be automatically moved to the new position.

Use, at any time, the MM24 CH1 key or remote control "1" key to reactivate this mode when required.

The secondary calibration mode is the "PINK NOISE MANUAL" calibration mode. In this mode, you can set the pink noise sound on any combination of spatial positions, because changing the spatial position will not modify pink noise attribution. You will enter into this mode if you press any of the three keys used for this mode, on either the MM24 keyboard or remote control. These keys are:

CH2 or "2" keys With this key, you can manually toggle the current spatial position between: "no sound" and "pink noise sound".

CH3 or "3" keys With this key, you can set all spatial positions to "no sound".

CH4 or "4" keys With this key, you can set all spatial positions to "pink noise sound".

With the MM24 SEL button or the "< >" balance keys on the remote control, you can change the spatial position selection.

The display will always show: "CAL>SPATIAL POSITION NAME -XX", followed by the main volume level display. Spatial position is also indicated by MM24 keyboard LED's (see after for more details).

With MM24 BAL and MUTE keys or the "^ v" balance keys of the remote control, you can set the attenuation value for the selected spatial position, into the range "00" (no attenuation) to "-40" (maximum attenuation). It is a fine resolution range, where two steps correspond to one step of the main volume range.

With MM24 VOL button or the "VOL+/VOL-" keys of the remote control, you can modify, at any time, the main volume.

You can exit the calibration setup at any time, with the MM24 CTRL-BAL keys combination or the remote control "TEST" button.

REMARKS: An OPTIMUM mixer calibration MUST ALWAYS HAVE ALMOST ONE

SPATIAL

POSITION SET TO ZERO (no attenuation). Therefore, it is recommended, before to leave calibration setup, to check it is the case. If it is not the case, determine what is the smallest attenuation value and shift up all spatial positions attenuation of this value. This will insure you get the maximum possible sound dynamic range.

Because MM24 use the decoder DSP to generate the "pink noise", any distant Zone (Zones other than Zone #1) which are using the decoder DSP will be muted during the time the MM24 is into calibration mode.

If you are relatively far from the MM24, while doing mixer calibration, maybe it will be difficult for you to read what is written on the MM24 display. But hopefully, you will be still able to identify the MM24 keyboard LED's lit patterns, indicating the spatial position actually selected.

On the following little schemas, "O" indicate a lit LED, "X" an unlit LED.

Here are the basic LED lighten patterns which are combined together, to indicate a precise spatial position:

"Front" is indicated by: O O
 X XXXXXXXX X

"Rear" is indicated by: X X
 O XXXXXXXX O

"Center" is indicated by: X X
 X XXXOXXX X

"Left" is indicated by: X X
 X XOXXXXX X

"Right" is indicated by: X X
 X XXXXXOX X

For example:

"Front-center" will be: O O
 X XXXOXXX X

"Rear-right" will be: X X
 O XXXXXOX O

Etc...

Finally, "Subwoofer" positions are indicated with following special patterns:

"Subwoofer" will be: O O
 O XXOOOXX O

"aUX Subwoofer" will be: O O
 O XOOOOOX O

Setup functions

All MM24 setup parameters are divided in two different categories:

The "Main category" regroup all parameters which concern Zone, input/output static capabilities and Zone "Configurators" setups. All these numerous and complex setups, which are all interdependent, are managed with a separate PC program called "MM24Conf.exe", which allow to edit and upload to MM24 a configuration binary file.

The "Local category" regroup all remaining parameters, which do not have any direct implications with the "Main category". These "Local parameters" can be managed directly from the MM24 keyboard user interface.

IMPORTANT REMARK: If the MM24 firmware upgrade will not affect "Main category"

of setups, IT IS NOT THE CASE with the "Local category".
Each time you will change the MM24 firmware, all "Local parameters" will be reset to their default "Factory setup".
This remark do not concern DSP's firmware upgrade.

With CTRL-MODE keys combination, you will enter into MM24 "Local setup mode".

As long as you issue the same key combination command, you will select the next group of settings or return to the first group, when you have reached the last group. Setup groups are:

- First group:
 - Display brightness
 - Display timeout

- Second group:
 - Analog channel#1 name
 - ...
 - Analog channel#7 name

- Third group:
 - Digital channel#1 name
 - ...
 - Digital channel#7 name

MM24 keyboard left-upper key allow to select a specific item of a group.

To modify selected item setting, use the following commands:

- Display brightness:
 - MUTE key.
 - BAL key.
 - VOL button.

- Display timeout:
 - MUTE key.
 - BAL key.
 - VOL button.

- Any analog or digital channel name:
 - To select the character to edit:
 - CH1 key.
 - CH2 key.
 - SEL button.

To edit the selected character:

- MUTE key.
- BAL key.
- VOL button.

To set selected character to first upper case character "A":

- CH4 key.

To set selected character to first lower case character "a":

- CH5 key.

To set selected character to first numeric character "1":
CH6 key.

To set selected character to first special character " ":
CH7 key.

As soon as you enter into a group by selecting an item of the group and/or by modifying the item setting, the CTRL-MODE key combination you have used to enter in the setup mode and to select the wanted group, become now the "Exit local setup mode" function.

In any cases, by doing nothing for a while (about 10 seconds) MM24 will automatically exit from the "Local setup mode".

Miscellaneous functions

MM24 has a mute function. By pressing MM24 MUTE key or the "MUTE/STDBY" key on the remote control, you will toggle the MM24 mute state. When MM24 is muted, the main display state will display the string "MUTE" instead of the actual main volume level. Muting function of MM24 only concern the Zone #1 (local zone). For distant Zone, this function will deselect the actual input channel, if any.

MM24 has a standby function. By pressing CTRL-MUTE keys combination, MM24 will enter in "STANDBY" mode. In this mode, the display become inactive and the "STBY" LED will lit. In this state, MM24 will only accept the same key combination to return to normal operation. When MM24 is in standby mode, Zone #1 (local Zone) will be muted, but all other Zones remain fully operational. This standby function can also be activated from the remote control, with a long press on the "MUTE/STDBY" key, only for the transition listen->mute. Exit of "STANDBY" mode with the remote control also require a long press of the "MUTE/STDBY" key.

MM24 has a "input signal type" query function. If you press CTRL-CH1 key combination, the type of input signal will be displayed on screen for about 1 second. Here are all possible display:

```
"    ANALOG    "  
"    NO SIGNAL "  
"    PCM      "  
" DOLBY PRO LOGIC II "  
"  DOLBY DIGITAL  "  
"   DTS CD/LD    "
```

```
"    DTS DVD    "  
"    AAC    "  
" SORRY ACTUALLY UNABLE "
```

You will get "unable" message, in case the input receive a digital coded signal and the DSP1 decoder is busy with an other channel.

"NO SIGNAL" mean nothing is received on this digital input. Note that the channel key LED will also blink. So you will know that no digital signal is locked, without the need to use this query function.

7.1 format

Format 7.1 is not really supported by the actual version of MM24. If both decoder DSP and MM24 hardware already implement the necessary "Aux-left" and "Aux-right" signal channels, none of the included actual decoder DSP firmware formats codes (AC3, DTS, AAC) support an encoded 7.1 signal. We can say that actual version of MM24 is "7.1 ready".

What does this mean, practically ?

From the capabilities point of view, all output formats involving 7.1 are strictly identical to those involving 5.1 formats. Only static capabilities of digital inputs and Zones (defined with MM24Conf.exe program) are considered to determine if an output format should be included or not into the available output format(s) list. In other words, MM24 is actually not able to include EITHER 7.1 or 5.1 format, or to auto-commute from one format to the other, by looking the kind of encoded format received (dynamic capability).

Nevertheless, both 7.1 and 5.1 output formats groups use SEPARATE "Configurators", where 7.1 "Configurators" can use "Aux-left" and "Aux-right" signal and 5.1 "Configurators" not. In other words, this mean that the day the decoder DSP firmware is updated with a decoder code supporting 7.1, this version of the MM24 firmware will immediately be able to support 7.1, with only the limitation that output format selection between 7.1 or 5.1 will have to be done manually.

With actual MM24, 7.1 format should be considered like a "5.1 bis" format, which allow to extend the number of available configurations. Actually, what will work with 5.1 will also work with 7.1. This especially true if for all the 7.1 "Configurators", you do not use "Aux-left" and "Aux-right" signals. In this case, 7.1 "Configurators" can simply be a variant of 5.1 "Configurators".

Finally, note that if none of the digital inputs and output Zones capabilities has 7.1 capability defined, you will never see any 7.1 output format in the output format(s) list. This is equivalent to a MM24 without 7.1 format support. We recommend to configure the MM24 in this way, unless you want to use 7.1 format as a "5.1 bis" format. Excluding 7.1 format also has the advantage to reduce the configuration work, because you don't need to set any of the 7.1 "Configurators".

RS232 CHANNEL FOR THE Mimesis 24

User can communicate with the machine, via RS232 channel, for two purposes:

- Firmware's upgrade.
- Machine remote control.

For both applications, host computer in communication with the machine must use the following RS232 setting:

14'400 baud / 8 bits data / parity none.

For firmware's upgrade, please refer to firmware upgrade tools documentation. For machine remote control, here follow the fully description of this feature:

NOTE: Not all existing RS232 remote commands are documented here. Only those useful to build a remote control of the machine are documented. Undocumented commands are devoted to data communication for all firmware upgrade tools (MM24 firmware, both signals treatment DSP's firmware's and finally, decoder DSP firmware modules).

Machine is always listening RS232 channel for eventual incoming control command.

Therefore, assuming you have the machine connected to some host computer, able to send valid commands, you don't need to do any further settings or initialization.

Any terminal emulator program, like Windows Hyper Terminal™ can be used, as long as it allow to set the used RS232 COM channel to required settings. It should be noted that such a tool will be useful only for all setting commands but not really adapted for most query commands, which will return information into binary format.

In order to not type "blind" commands, we recommend to set your terminal emulator in "echo" mode. You must also set line termination to any of the following settings: CR / CR-LF / LF-CR (CR = carriage return / LF = line feed).

If you have connected the RS232 cable with the machine already powered ON, we recommend to send some empty commands (just press return several times) to clean any parasite characters which might have been generated during cable plugging.

Commands are composed of a keyword, eventually followed by one or more arguments which can be either a numeric or literal argument. Keywords and literal arguments are identified by their first character only. This first character **MUST ALWAYS** be typed in upper-case form. Further characters of keywords or literal arguments are simply ignored (skipped). This mean, for example, that the command:

SOFTWARE VERSION<CR>

can be also typed in any of the following other forms:

Soft Version<CR>
S VER<CR>
S V<CR>

Commands must not exceed 40 characters, including the <CR> characters. When used into programs, the shortest form of commands should be preferred, because it reduce the RS232 traffic to the minimum.

When accepted, commands will always acknowledge by either returning the asked information (query type commands) or by sending decimal 255 (0xFF in hex) for a setting command.

For setting commands, byte 255 is returned just before the machine start to execute the command. For query commands, answer can be a variable number of bytes, depending of the query command.

RS232 channel is shared with firmware Kernel which use several low code (0 to 10 decimal) for its own commands set, which allow for example, to program EEPROM (software upgrade). To avoid conflict, we must guaranty to never use these reserved codes in ANY communication direction. Command themselves and literal answer are not a problem, alpha-numeric ASCII code range required never use these codes. In any cases, user must absolutely avoid to transmit these reserved codes. For numeric answer, we could have translated them into ASCII literal, but this would have been less efficient (more bytes to transmit). Therefore we use

several binary formats which all apply the same rule: most significant bit of returned byte(s) is always set.

Finally, a command which do not immediately acknowledge mean the command was not accepted or host to machine communication channel is in trouble.

SETTINGS COMMANDS OF TYPE KEYBOARD EMULATION

Keyboard emulation mean that the machine will behave exactly in the same way as if the keyboard would have been pressed. But this also mean that a command which has been recognized and acknowledged may produce no effect at all or several different effects, depending of the whole logical context of the machine, when receiving the command.

For example, a simple "LISTEN C<CR>" command may switch from one channel to an other or toggle from digital to analog channels.

Speaking of designing a software which will use this type of commands, require first that the programmer know perfectly the machine control logic behaviors. Then, the software must be designed in a way to know the machine context at any time, by using appropriate query commands (see after), This will allow to always generate the appropriate command required for the desired action.

Finally, keyboard emulation also mean that the machine display and all LED's will also react like if a normal keyboard command was issued.

All these commands will acknowledge with decimal 255 (hex 0xFF).

LISTEN C<CR>

This command emulate a CH# 1-7 key press. C argument must be in the range 1 to 7.

Command is only accepted if machine is in main state (command is refused and will not acknowledge during initialization state, when in standby state, when in parameters setup states, etc).

ZONE N<CR>

This command will switch MM24 to Zone N. Argument N can be in the range 1 to

14.

Of course, if the MM24 is configured with less than 14 Zones, valid range is reduced to real MM24 Zone range. Command is only accepted if machine is in main

state (command is refused and will not acknowledge during initialization state, when in standby state, when in parameters setup states, etc).

REMARK: Standard keyboard operations for Zone change require two steps. First, to go inside Zone list, then to select desired Zone. With this remote command, you select straight forward the desired Zone. Therefore, the MM24 will not show the Zone list on the display for this command.

Display will immediately turn to new Zone standard display. Attention that the automatic return to Zone #1 (local Zone) will occur also for this remote command (after about 8-10 sec of no activity with the user interface).

UNIT MUTE B<CR>

This command emulate a MUTE key press only if the specified B Boolean argument

is different from actual machine mute state. B=1 mean muted, B=0 mean not muted. This allow to avoid a simple toggle command and have an explicit command instead.

Command is only accepted if machine is in main state (command is refused and will not acknowledge during initialization state, when in standby state, when in parameters setup states, etc).

UNIT STANDBY B<CR>

This command emulate a CTRL-MUTE keyS combination press, only if the specified B

Boolean argument is different from actual machine standby state. B=1 mean machine

goes to standby state, B=0 mean machine return to normal state. This allow to avoid a simple toggle command and have an explicit command instead.

SETTINGS COMMANDS OF TYPE SETUP

In opposition to keyboard emulation command type, result of these commands will never depend on the machine logical context. What can depend on the machine logical context is the acceptance or not of the command itself. But if command is refused, it will not acknowledge, so you will know it.

All these commands will acknowledge with decimal 255 (hex 0xFF).

UNIT LOCK B<CR>

This command will lock/unlock the machine. A locked machine (B = 1) mean that it will not accept any keyboard nor RC5 remote commands. All RS232 commands are accepted, including keyboard emulation commands. This command was implemented to allow a remote control program to prevent any external machine control interferences.

VOLUME N<CR>

This command will set the general volume control for Zone #1 (local Zone). N can be in the range 0 to 199 (fine resolution range), where 2 steps correspond to one step of the volume range of the display (range 0 to 99). This command can be always issued. Of course, if command is issued, for example, when machine is in the mute state, the new volume setting will become effective only when the machine is demuted.

BALANCE T N<CR>

This command will set the type "T" balance to value "N". Valid range for "N" is "-99" to "+99". Type "T" is:

T = 1 = LEFT/RIGHT balance

T = 2 = REAR/FRONT balance

T = 3 = CENTER balance

T = 4 = SUBWOOFER balance

But for the command to be accepted, the balance type must be part of the specific Mixer actually in use for the Zone #1 (local Zone). Command will not be accepted, if the type of balance is not active for the actual "Configurator" in use. For more details, please read "THEORY OF OPERATIONS OF MIMESIS 24".

FORMAT N<CR>

This command will select the given output format "N" for the currently selected Zone and input channel of this Zone. Command will not be accepted if Zone has no input channel selected or if the output format is not compatible. Command will also fail if "N" is not one of the following output format code:

0x001 (decimal 1) is ANALOG 5.1

0x002 (decimal 2) is DIGITAL 7.1
0x004 (decimal 4) is DIGITAL 5.1
0x008 (decimal 8) is ANALOG STEREO
0x010 (decimal 16) is DIGITAL PCM STEREO
0x020 (decimal 32) is DIGITAL ENCODED STEREO
0x040 (decimal 64) is DIGITAL STEREO -> 7.1
0x080 (decimal 128) is DIGITAL STEREO -> 5.1
0x100 (decimal 256) is DIGITAL 7.1 -> STEREO
0x200 (decimal 512) is DIGITAL 5.1 -> STEREO
0x400 (decimal 1024) is ANALOG 5.1 -> STEREO
0x800 (decimal 2048) is DIGITAL DIRECT
Command is only accepted if machine is in main state (command is refused and will not acknowledge during initialization state, when in standby state, when in parameters setup states, etc).

DISPLAY BRIGHTNESS N<CR>

This command will modify the display brightness setup to N.

N = 0 is brightness 100%
N = 1 is brightness 80%
N = 2 is brightness 53%
N = 3 is brightness 40%
N = 4 is brightness 27%
N = 5 is brightness 20%
N = 6 is brightness 13%

DISPLAY TIMER N<CR>

This command will modify the display timer setup to N.

N = 0 is permanent display
N = 1 is 5 seconds
N = 2 is 10 seconds
N = 3 is 15 seconds
N = 4 is 20 seconds
N = 5 is 25 seconds
N = 6 is 30 seconds

NAME C string<CR>

This command will modify channel C name setup to string.

C = 1 to 7 for the corresponding analog channel.
C = 8 to 14 for channels 1 to 7 digital.

String can be composed with ASCII code range from 0x20 Hex to 0x7E Hex (decimal 32 to 126). Any code outside this range will be converted into a SPACE character. But attention, we remind you that you must NEVER include code 0 to 10, which are strictly reserved for Kernel low level commands.

String will begin after channel C specification, on the first character which is not a SPACE. If you want to include leading SPACE character(s), you can start the string with a QUOTE (") character. You can also end the string with a QUOTE, but this is not mandatory, because string shorter than 16 characters will be automatically complemented with SPACE character(s). string longer than 16 characters will be truncated. To include character QUOTE within the string, you must type TWO CONSECUTIVE QUOTES ("") characters.

QUERY COMMANDS

As explained into introduction of keyboard emulation commands, it is capital to be able to determine the whole machine context at any time, especially to be able to correctly use these emulation key commands. This mean to be able to know for example, which channel is actually selected, wich Zone is actually activated for settings, etc... This is possible with the set of following query commands.

Query commands produce their answer as an acknowledge.

As already said into general introduction of this chapter about RS232 channel, we must guaranty to never use codes reserved by Kernel commands. Therefore, to build binary numeric answers, we use several binary formats which all apply the same rule: most significant bit of returned byte(s) is always set. Despite of this restriction, most of query numeric answers can still be sent back into a single byte. User will simply have to mask the answer most significant bit to get the true binary answer. Some few numeric answers, which require more than 7 bits, use a more complex format which is explained in detail in concerned commands.

The only non binary numeric answer concern the QUERY NAME C<CR> command, which simply return all 16 ASCII characters of the given channel name. It is safe, because Kernel reserved codes are not allowed to be used into a channel name by either machine editor or name setting command.

IMPORTANT CODING NOTE: when using these commands repetitively in your code (for example: into a loop waiting a query condition occur), you must avoid to

overload RS232 channel. We recommend that each consecutive execution of a single command or a group of commands is separated by almost 50ms to 150ms delay. The optimal delay depend on the number of bytes sent and received in all. Therefore, it is recommended to use the shortest possible version of the command. Using a timer routine which will execute required query command(s) and update some internal variable(s) of your code is also a good solution in many cases (pooling technique).

QUERY LISTEN Z<CR>

This command return a byte with the input channel actually selected for the given "Z" Zone. If "Z" is equal to zero, returned value will be for the currently selected Zone. If "Z" is different of zero, returned value will be for the Zone specified by "Z". Command will fail if "Z" is out of the range of existing Zone.

- bits 0 to 2 = channel selected (zero mean no channel selected)
- bit 3 = if set channel is digital.
- bits 4 to 6 unused (always zero)
- bit 7 always set

QUERY ZONE<CR>

This command return a byte with the No of Zone (1 to max 14) actually selected.

- bits 0 to 3 = Zone No
- bits 4 to 6 unused (always zero)
- bit 7 always set

QUERY STATUS N<CR>

This command return different type "N" of machine status information's at the time of the command.

N = 0 / MACHINE MISCELLANEOUS STATUS BITS (this command return 1 byte).

- bit 0 = when set, machine is in "EEPROM_data_in_mode".
- bit 1 = when set, indicate the machine is "RS232_data_in_mode".
- bit 2 = return actual "ProgrDSP1StatusBusy" state.
- bit 3 = status of user Mute (bit set mean muted).
- bit 4 = return actual "ProgrDSP1StatusIdle" state.
- bit 5 = return actual "ProgrDSP1StatusError" state.
- bit 6 = unused
- bit 7 always set.

REMARK: Except for the bit#3 (mute status) all other bits are not useful to build a remote control of the MM24. They are used in conjunction with other undocumented remote commands, by all PC MM24 system tools, for data transfer, data memorization to EEPROM banks or to decoder DSP.

N = 1 / DECODER DSP BOOT CODE (this command return 1 byte).

This command return a code which tell which decoder code is actually booted by the decoder DSP.

bits 0 to 4 are the code.

bits 5 to 6 are unused

bit 7 always set.

Code 0x01 = decoder DSP is booted with PCM code.

Code 0x02 = decoder DSP is booted with AC3 code.

Code 0x04 = decoder DSP is booted with DTS code.

Code 0x08 = decoder DSP is booted with AAC code.

Special Code 0x1F mean that MM24 has invalidated the code actually booted for decoder DSP, in order to force a decoder DSP reboot, as soon as a supported signal type will be present on decoder DSP input.

N = 2 / ACTUAL MACHINE STATE (this command return 1 byte)

Return the current main logical State of the machine at command time.

bits 0 to 6 are machine State code.

bit 7 always set.

0 is INIT_STATE All initializations after MM24 power ON.

1 is MAIN_STATE Principal state of machine.

2 is ZONE_SET_STATE State to select the active zone.

3 is OUT_FORMAT_SET_STATE State to select the output format.

4 is BALDEL_SET_STATE State to set balances.

5 is STANDBY_STATE State to put machine idle.

6 is SETUP1_STATE State to set display brightness & timer parameters.

7 is SETUP2_STATE State to set analog and digital channels names.

8 is PROGR_DSP1_STATE State to upload decoder DSP new firmware.

9 is CALIBR_STATE State to calibrate sound levels of local zone.

N = 3 / PROGR_DSP1_STATE ERROR CODE (this command return 1 byte)

This command return the code of errors which may occur when MM24 is in the "DSP1 PROGR MODE" state. Bit 5 of MACHINE MISCELLANEOUS STATUS BITS command

report if such an error occur.

bits 0 to 6 are the error code.

bit 7 always set.

2 is FLASH_UP_MODE_INIT_ERROR_2 DSP1 does not return seq ACK - SYNC.

3 is FLASH_UP_MODE_INIT_ERROR_3 DSP1 does not answer ACK to my ACK.
 4 is FLASH_UP_SECTOR_ERASE_TIMEOUT Erase sector operation timeout.
 5 is FLASH_UP_CODE_ADR_TIMEOUT Code address operation timeout.
 6 is FLASH_UP_CODE_LEN_TIMEOUT Code length operation timeout.
 7 is FLASH_UP_CODE_FLASH_ERROR Byte returned is different of byte sent.
 8 is FLASH_UP_CODE_FLASH_TIMEOUT Byte to flash operation timeout.
 9 is FLASH_UP_CODE_SIZE_ERROR Too much bytes.
 REMARK: The error code will also be displayed on the MM24 display, if such an error occur. "DSP1 PROGR MODE" is a special MM24 mode which allow to upgrade the firmware of the decoder DSP.

N = 4 / NUMBER OF ZONE(S) (this command return 1 byte)

This command return the number of Zone for the actual configuration of the MM24.
 bits 0 to 6 = number of zone in range 1 to 14 max
 bit 7 always set

QUERY FORMAT Z N<CR>

This command return different type "N" of output formats information's at the time of the command, for the given "Z" Zone. If "Z" is equal to zero, returned value will be for the currently selected Zone. If "Z" if different of zero, returned value will be for the Zone specified by "Z". Command will fail if "Z" is out of the range of existing Zone.

N = 0 / ACTUAL OUTPUT FORMAT FOR "Z" ZONE (this command return 3 bytes)

This command return an unsigned short with the actual selected output format for the "Z" Zone. Command will not be accepted if Zone has no input channel selected. Command return 3 bytes with the following binary format:

Byte#1, bits 0 to 6 = bits 0 to 6 of short integer
 bit 7 = always set
 Byte#2, bits 0 to 6 = bits 8 to 14 of short integer
 bit 7 = always set
 Byte#3 bits 0 to 4 = unused
 bit 5 = bit 15 of short integer
 bit 6 = bit 7 of short integer
 bit 7 = always set

Translation of returned code:

0x001 (decimal 1) is ANALOG 5.1
 0x002 (decimal 2) is DIGITAL 7.1
 0x004 (decimal 4) is DIGITAL 5.1
 0x008 (decimal 8) is ANALOG STEREO

0x010 (decimal 16) is DIGITAL PCM STEREO
0x020 (decimal 32) is DIGITAL ENCODED STEREO
0x040 (decimal 64) is DIGITAL STEREO -> 7.1
0x080 (decimal 128) is DIGITAL STEREO -> 5.1
0x100 (decimal 256) is DIGITAL 7.1 -> STEREO
0x200 (decimal 512) is DIGITAL 5.1 -> STEREO
0x400 (decimal 1024) is ANALOG 5.1 -> STEREO
0x800 (decimal 2048) is DIGITAL DIRECT

N = 1 / COMPATIBLE OUTPUT FORMATS FOR "Z" ZONE (this command return 3 bytes)

This command return an unsigned short with a bit mask of all compatible output format(s) for the "Z" Zone. Each bit set mean the corresponding output format is available. Command will not be accepted if Zone has no input channel selected. Command return 3 bytes with the following binary format:

Byte#1, bits 0 to 6 = bits 0 to 6 of short integer
bit 7 = always set
Byte#2, bits 0 to 6 = bits 8 to 14 of short integer
bit 7 = always set
Byte#3 bits 0 to 4 = unused
bit 5 = bit 15 of short integer
bit 6 = bit 7 of short integer
bit 7 = always set

Translation of bits:

bit 0 is ANALOG 5.1
bit 1 is DIGITAL 7.1
bit 2 is DIGITAL 5.1
bit 3 is ANALOG STEREO
bit 4 is DIGITAL PCM STEREO
bit 5 is DIGITAL ENCODED STEREO
bit 6 is DIGITAL STEREO -> 7.1
bit 7 is DIGITAL STEREO -> 5.1
bit 8 is DIGITAL 7.1 -> STEREO
bit 9 is DIGITAL 5.1 -> STEREO
bit 10 is ANALOG 5.1 -> STEREO
bit 11 is DIGITAL DIRECT

Assuming the answer of this command is received into a char array named "ComBuf",

the following "C" code will decode this answer binary format:

```
ComBuf[0]=(ComBuf[0] & 0x7F) | ((ComBuf[2] & 0x40) << 1);  
ComBuf[1]=(ComBuf[1] & 0x7F) | ((ComBuf[2] & 0x20) << 2);
```

Then, this "C" code can be used to rebuild short integer:

Val=(ComBuf[0]+(ComBuf[1] << 8));

QUERY DISPLAY BRIGHTNESS<CR>

This command return a byte with display brightness actually set.

bits 0 to 2 return brightness

0 is brightness 100%

1 is brightness 80%

2 is brightness 53%

3 is brightness 40%

4 is brightness 27%

5 is brightness 20%

6 is brightness 13%

bits 3 to 6 unused (always zero)

bit 7 always set

QUERY DISPLAY TIMER<CR>

This command return a byte with display timer time actually set.

bits 0 to 4 return timer time

0 mean permanent display.

other values are the time in second, by multiple of 5.

bits 5 to 6 unused (always zero)

bit 7 always set

QUERY NAME C<CR>

This command return all 16 ASCII characters of the specified channel C.

C = 1 to 7 for the corresponding analog channel.

C = 8 to 14 for channels 1 to 7 digital.

QUERY VOLUME<CR>

This command return an unsigned short integer for actual volume setting. Volume range is 0 to 199. Command return 3 bytes with the following binary format:

Byte#1, bits 0 to 6 = bits 0 to 6 of short integer

bit 7 = always set

Byte#2, bits 0 to 6 = bits 8 to 14 of short integer

bit 7 = always set

Byte#3 bits 0 to 4 = unused

bit 5 = bit 15 of short integer

bit 6 = bit 7 of short integer

bit 7 = always set

Assuming the answer of this command is received into a char array named "ComBuf",

the following "C" code will decode this answer binary format:

```
ComBuf[0]=(ComBuf[0] & 0x7F) | ((ComBuf[2] & 0x40) << 1);
```

```
ComBuf[1]=(ComBuf[1] & 0x7F) | ((ComBuf[2] & 0x20) << 2);
```

Then, this "C" code can be used to rebuild short integer:

```
Val=(ComBuf[0]+(ComBuf[1] << 8));
```

QUERY BALANCE T<CR>

This command return a signed short integer for actual balance type "T" setting.

Balance range is -99 TO +99. Balance type "T" are:

T = 1 = LEFT/RIGHT balance

T = 2 = REAR/FRONT balance

T = 3 = CENTER balance

T = 4 = SUBWOOFER balance

Command return 3 bytes with the following binary format:

Byte#1, bits 0 to 6 = bits 0 to 6 of short integer

bit 7 = always set

Byte#2, bits 0 to 6 = bits 8 to 14 of short integer

bit 7 = always set

Byte#3 bits 0 to 4 = unused

bit 5 = bit 15 of short integer

bit 6 = bit 7 of short integer

bit 7 = always set

REMARK: This command will always work for ANY legal "T" type of balance, even if the balance is not in use for the actual configuration. In this case, the returned value will be the last value used, when this balance was active.

Assuming the answer of this command is received into a char array named "ComBuf",

the following "C" code will decode this answer binary format:

```
ComBuf[0]=(ComBuf[0] & 0x7F) | ((ComBuf[2] & 0x40) << 1);
```

```
ComBuf[1]=(ComBuf[1] & 0x7F) | ((ComBuf[2] & 0x20) << 2);
```

Then, this "C" code can be used to rebuild short integer:

```
Val=(ComBuf[0]+(ComBuf[1] << 8));
```

HARDWARE VERSION<CR>

HARDWARE REVISION <CR>

SOFTWARE VERSION<CR>
SOFTWARE REVISION<CR>

Both pair of commands will return one byte with a number between 0 and 99.
bits 0 to 6 = number in range 0 to 99
bit 7 always set

REMARK: To compose a numeric value representing the full hardware,
respectively
software signature, can be done by: VERSION+(REVISION/100).

ACS / 12.07.2004