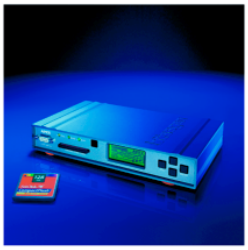
Digital sound in silicon

MPEX

Instruction Manual



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Digital sound by silicium --- MPEX

General information

The MPEX is a compact audio playback device, able to be applied in special tasks in media techniques as well. Unlike traditional audio playback devices (cassette, DAT, CD) it is working without any accessories. All information is saved in semi-conductors, i.e. silicon chips, being part of the exchangeable storage card. The Compact-Flash cards being used are standard products having been developed by SanDisk. Such cards are used as well in digital cameras for example. To keep volume of information saved as low as possible, to enable higher playback time, sound data is compressed. Used is the standard according to MPEG-procedure (Layer 3) shortly called MP3. Data volume can therefore be reduced in a way enabling economic use of storage cards. Data compressing is done by the "Encoder" (encode = xxxx). As data compressing is a highly intensive computing procedure, the PC will always be going to work as an encoder whenever working with MPEX. MPEX is equipped with an integrated "decoder", reversing compressing on playing back. Sound data therefore are processed by the PC, copied to the storage card by means of an adapter and may then be played back by MPEX.

Advantages MPEX offers on practical work

Compared to traditional audio playback devices, the MPEX-technique offers a wide range of advantages:

1) Life time

Even with sound data being used frequently, there will be almost no wear. Compact Flash-cards by SanDisk may be recorded about 1000000 times. Number of data readings from such card is unlimited. On using your MPEX to enter music on hold into your phone installation, MPEX will be able to play that music back without any wear being caused.

2) Synchronized playback

As all time sequences within MPEX are controlled by one and the same quartz, MPEX is able to carry out a great number of synchronization tasks synchronously to sound playback, i.e. issuing of an SMPTE time code or synchronous playback of an IMAGIX slide show. That subjects will be going to be explained in detail. The additional interfaces – MIDI, DMX-512, RS-232 and CAN-bus may be used to trigger external events synchronously to sound. It can therefore be used in a lot of applications from the multimedia field.

3) Triggering

As the MPEX is working without mechanical moving parts, it is also able to react very quickly to external influences. External events may "trigger" different sounds that can be played back without almost any time lag. Possible applications are ghost trains where multiple sounds have to be triggered by a range of light barriers, or announcement devices or of course slide shows set to music with live comment, supported by a speaker (Speaker Support).

Introduction

The present instruction manual is divided up into three sections.

The first section, „First steps“, will be going to explain how to activate the MPEX, how to load a sound-file from PC onto Compact-Flash card and how to play it back.

The second section, „Working with MPEX“, will be going to give explanations on basic structure of menu control enabling to "surf" through functions and settings of the MPEX. Once having read that section, you will be able to handle the menu. Later on, we will just be going to detail effects of respective settings. By means of adequate examples we want to improve technical comprehension to enable you to successfully integrate the MPEX in your application environment.

The third section, „MPEX references“, is an information pool on any possible function of the MPEX. MPEX enables a great variety of settings. They are going to be explained in detail in that section, in form of a table. By means of a few somewhat professional remarks, we will be going to improve comprehension. In that section, internal command language of the MPEX will also be going to be explained in detail together with the possibility to control the MPEX by means of DMX-512 commands as well as MIDI commands.

The „Technical Addendum“ showing assignment of the different connection sockets will be going to complete our instruction manual.

Demo music

We added a demo music to the installation program of the MP3-Tool being part of the MPEX. We got the authorization from Highland Musikarchiv to use that music for demonstration purposes.

Highland Musikarchiv is producing music that is not subject to GEMA fees. Such music can be bought there for different application purposes. Please contact:

Highland Musikarchiv * Wolfhager Str. 300 * D-34128 Kassel.

More info and MP3 audio examples are available on the following homepage:

http://www.highland-musikarchiv.com

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Freiburg, November 2000

If you wish to provide friends of yours with our instruction manual, please refer to our homepage http://www.baessgen.de where its integral version is available in Adobe pdf format

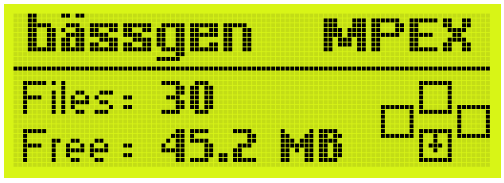
- Personal notes -

MPEX – First steps

Switch-on procedure

Time has come to activate the MPEX. Connect the power unit AC-24 having been supplied to the socket labeled "AC-24" and connect it to an outlet box (power unit is designed for a power supply of 230V; with different power supply please use an adequate power unit). Display should now be illuminated; the welcoming text should be going to appear. During that time, the MPEX will be going to build up internal data structures and try to detect a Compact Flash-card.

Base screen of the MPEX will then be going to appear:



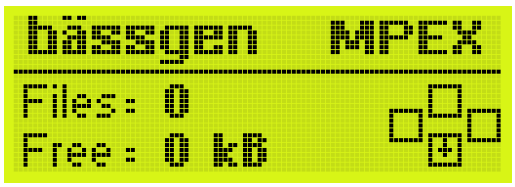
It will be going to show total number of files as well as remaining storage capacity. The four keys are being displayed. The first menu item may therefore be called by means of the bottom key being marked.

Caution: Total number of files is higher than the number of MP3-files being able to be played back. This is due to the fact that each MP3-file will have its index-file. More details are to follow.

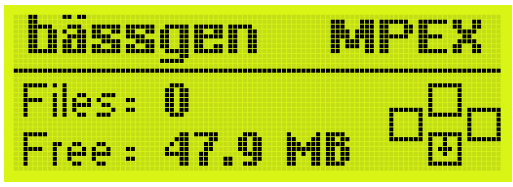
At first, your storage card won't contain any playback-files or no storage card at all will have been installed in your MPEX. As a matter of fact, we recommend storage cards be not exchanged on operation. Doing so will cause the MPEX to completely reboot.

Caution: Inserting or removing of storage cards on operation may cause strong crackling that might damage your loudspeakers. Reduce volume at first, prior to carrying out such operations!

MPEX-display without card:



Display with empty card:



Basic information on the MPEX and its storage card

In its current version, the MPEX is a mere reader for Compact-Flash cards. In general, content of a storage card is generated by means of a computer. Presentations can then be made without that computer. There are different ways to connect Compact-Flash cards to a computer to record the necessary data.

„Image-Mate“ by SanDisk is an external read-write device that offers good value for money. „Image-Mate“ is available with either a parallel or an USB-port. Most notebook computers are equipped with an integrated PCMCIA-insert allowing recording of Compact-Flash cards by means of a small adapter. Drivers issued by Sandisk once having been installed, the storage card will be going to appear on your computer as a hard-disk drive together with respective drive label.

How to connect storage card to PC

The example stated is based on an "Image Mate" by SanDisk that is working with a parallel port. The storage card being used is a SanDisk-product as well.

Caution! Not all Compact-Flash cards offered by other manufacturers are at 100% compatible with SanDisk-cards. Correct function can only be guaranteed on use of SanDisk-cards.

ImageMate by SanDisk.

The driver software supplied with the SanDisk „Image-Mate“ once having been loaded, a Compact-Flash card having been installed will be going to appear under Windows as a hard disk drive together with respective drive label.

Storage card with 96 MB

Connect the SanDisk „Image-Mate“ to your computer, according to manufacturer's instructions enclosed and install driver software having been supplied with your equipment. Installation should be complete Windows once having been rebooted. Once a storage card has been inserted into the „Image-Mate“ check by means of the Windows Explorer whether a new drive label has been generated.

In case you used a different technique to record storage cards on your PC, the instructions to follow will be going to apply as well, based on the assumption that a drive representing the card is available.

How to prepare the MPEX

In a very first step, some sound shall now be played back from the storage card. To do so, the MPEX first has to be connected to our audio chain by means of the audio outputs being located on the rear side of the MPEX.

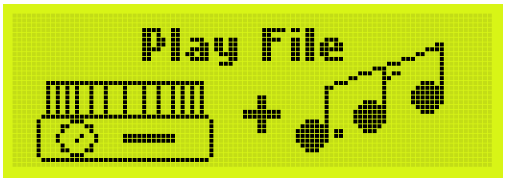
In 2-channel versions, respective sockets are labeled L and R; in 4-channel versions, sockets are labeled 1, 2, 3, 4.

Connect either an amplifier or active loudspeaker boxes. Always consider that strong crackling may be caused on switching the MPEX on or off as well as on exchanging storage cards.

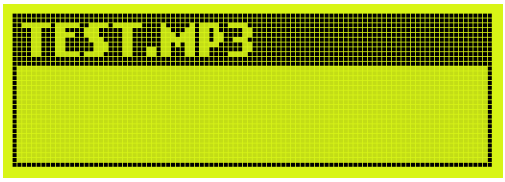
How to play demo back

Insert the Compact-Flash card just having been recorded into the MPEX. The display should show the following message (values stated will of course be going to depend on capacity of storage card).

Press bottom key to get into the menu „Play File“:



If „ENTER“ is pressed, a list of files able to be played back will be going to appear. In the present case, only one file will be available:



Press „ENTER“ again now. The file „test.mp3“ will be going to be played back.

Now listen to the file. The display will be going to show:

That message will be going to tell you:

MP3-player number I is active (I will only be going to appear in the 4-channel version of the MPEX!) and, at present, playing back the file „TEST“, it has reached position 0:07 (in minutes and seconds). By pressing „ESC“ you may interrupt playing back and restart it by pressing "Enter". By keeping „ESC“ pressed (for about 1 sec.) playing will be going to be aborted.

Summary

A music demo has now been played back by means of the MPEX. A Compact-Flash card has been recorded; the respective read-write device has been installed. Moreover, the MP3-Tool has been installed and used to copy respective file (compressing files by that tool is by no means more difficult; a Wave-file just has to be selected that will then automatically be going to be converted into an MP3-file).

- Personal notes -

Working with the MPEX

That section will be giving an introduction into the structure of the MPEX as well as some basic explanations and practical examples dealing with different applications.

How to handle the MPEX-menu

As in other BÄSSGEN-players that are equipped with 4 keys on the front plate, the MPEX allows a lot of settings in a menu system. Those are often functions to be enabled one by one but it may as well be a setting to be saved later on. They all have an impact on the operation of the MPEX. The menu has a hierarchical structure obeying to the following rules:

1) Whenever the MPEX is switched on, the top-level menu will be going to appear.
2) By means of the two center keys at the front plate, (also called "cursor keys", despite the fact they aren't showing any arrows) you may move through the different menu functions to select a specific one.
3) By pressing the „ESC“-key a menu function will be quit. There will be a shift upwards towards the item on top without any modifications being carried out. This means, pressing „ESC“ as often as needed allows returning to the first menu function, without any modification being carried out. That's quite useful in case "you got totally wrong". All the same, the menu system of the MPEX is by no means a highly sophisticated one.
4) Menu functions are selected by the „ENTER“-key. Consequences: You will either get to next lower menu level. That level obeys to the same rules as any other menu level. On the other hand, lowest menu level having been reached, respective menu function will be carried out or selected. In selection menus, such menu functions are mostly followed by a *. The menu is also offering different items in which a function is directly carried out on condition the „ENTER“-key is pressed, i.e. playing a file back.

If a menu contains more than three items, only part of it will be going to be displayed, as the display will normally show three lines only. A small scroll bar will then be going to appear at the right-hand side, showing approximate position in the menu. You surely are already familiar with that technique as it is also used in cell phones.

Save configuration

The settings made in the menu system have not yet been saved. So if the MPEX is simply switched off after some settings having been made, they will be lost afterwards. To keep settings active, they first have to be saved in the configuration memory. Any setting of the MPEX whatsoever is saved there. Whenever the MPEX is switched on, that memory will be read and the whole device will be going to be configured accordingly.

Caution: Re-configuration will also be done whenever storage cards are exchanged!

There are particular menu functions to definitely save configuration. First select "Configuration"-menu in the top-level menu.

The four menu functions of the main menu are shown in graph format; the menus lying below will be going to be shown in a line format.

Select „Configuration“ by pressing „ENTER“, then move down to the last menu function "Config Memory", by means of the cursor key.

The following menu will be going to appear:

„Save Configs“ records current settings in the configuration memory. They will have been saved definitely as they will be going to be read automatically, each time the MPEX is switched on.

„Restore Configs“ will be going to re-read settings from the configuration memory. It may be used whenever you feel you did something wrong, something that might modify configuration.

„Default Configs“, will be going to load an established configuration to the MPEX, the so-called "Default settings". It's the configuration any MPEX will have been equipped with for delivery.

Summary – menu system

Introduction to the menu system is now complete. Please run through the reference section of the present manual once in any case. Any menu function will be going to be explained there in detail. There may be some among them giving answers to specific questions you may be interested in. Every user should at least know what settings are possible and where to find answers in case of need.

Structure of the MPEX

That part will be going to deal with the internal logical structure of the MPEX

The MP3-Player

The MPEX mainly consists of one (two in the 4-channel version) MP3-player. That unit will be going to play back one or more sound-files having been saved from the storage card (playing back of two files at the same time is of course only possible in the 4-channel version being equipped with 2 complete players). The storage card contains a file system that is compatible with MS-DOS. It is working as a generator of sound-files and other ones. As file-systems being used in Windows operational systems go well along with the DOS file system, data transfer won't be going to cause any problems. Other operational systems as well are able to work with MS-DOS file systems.

The IMAGIX-Player

The IMAXIX-player being part of the MPEX will be going to be used in case other data beside sound are to be provided by the MPEX, i.e. synchronous control of slide projectors, a feature being frequently asked for. The IMAGIX-player is a unit that is able to play IMAGIX-files back (in the IMAGIX 2/3-format). It can be operated on standalone, completely independently from the MP3-players but synchronous operation is possible as well. In a synchronous slide show it will mainly be going to be operated synchronously. Never forget that the MPEX is able to carry out different operations in parallel. This is very important when it comes to applications in the multimedia field.

Further MPEX-players

The MPEX is equipped with other players that are quite useful in the field of media techniques. They can be operated synchronously to sound. These are units generating MIDI or DMX-512 signals. The players described are not yet implemented in the current firmware-release 1.00 of MPEX.

Command language

The MPEX-players may be controlled by a command language. It is somewhat similar to a command line entries like the ones being used on MS-DOS operational systems. You won't be going to need that command language to carry out a simple slide show for example. But it can be quite useful when it comes to using the MPEX in media applications. By a command of the type „ASSIGN 1 TEST.MP3“, the respective file will be going to be assigned to player 1 and opened; "Play 1" will be going to play the file back.. „LOCATE 1 25000“ for example will set playback position to 25 sec. For detailed information on commands please refer to reference section.

Triggering

If other devices are to trigger the MPEX in a media field command language described will be going to be used. The same commands may be transmitted to the MPEX by means of a RS-232-interface. The MPEX will then be going to carry out commands transmitted.

Batch processing, batch files

Batch files now may also be written by an ordinary text editor. Those are files containing different commands; every line contains its own command. By calling a batch-file different commands may therefore be enabled.

Practical example: a slide show set to sound is supposed to be triggered by a light barrier. The storage card will contain the respective IMAGIX-file, the respective MP3-file as well as a command-file called „E1.BAT“, containing commands to trigger respective slide show. The light barrier will have been connected to external input 1 of MPEX. In the MPEX-configuration, the file „E1.BAT“ will have been assigned to external input 1. The show will be going to start as soon as the light barrier will have been interrupted.

The LED's of the MPEX

Internal status of the MPEX is shown by three LED's.

LED „CTRL“ flashing: the MPEX has received an external command, usually a command transmitted by the infrared remote control or a trigger signal transmitted by means of an interface having been selected.

LED „PLAY“ lighting: one of the MP3-players is in playback mode. The LED described should be lighting, as soon as sound will start being transmitted. The respective LED flashing means the MPEX is in "Pause state". The file to be played back will still remain opened; MPEX will be waiting at respective playback position. Another play command, i.e. pressing the "Enter"-key will be causing the MPEX to continue playing back.

LED „SYNC“: from its SYNC-output, the MPEX is transmitting a control signal being addressed to a projector control device for example. Such a signal will always be transmitted whenever the IMAGIX-player will be playing back an IMAGIX-file. The respective LED will be flashing with the IMAGIX-player being in the operational state "Pause".

How to run the MPEX (standalone)

The present section will be going to give information on how to apply the MPEX in a typical media environment. Its use in slide projection will be going to be described in an own chapter.

MPEX working as a controllable sound generator

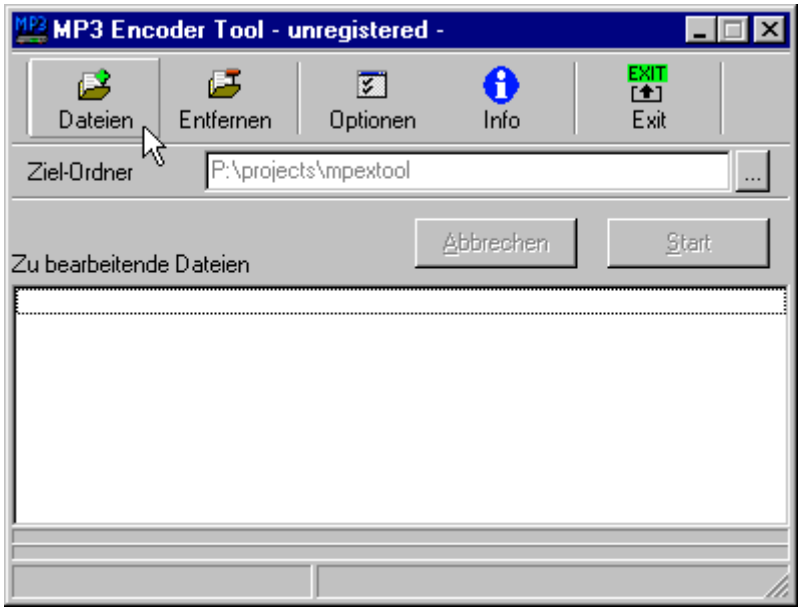
The following rule will always have to be obeyed to, no matter in what way the MPEX will be going to be used as a sound generator: in any case whatsoever, sound first has to processed by means of a PC and copied to the storage card. Use of the MP3-Tool having been supplied is absolutely compulsory. The respective program is waiting for sound having been converted into WAVE-files. One or more of them may be selected. They will be going to be compressed into the MP3-format. The MP3-tool will be equipped with an MP3-encoder manufactured by Fraunhofer Society. Once the MP3-Tool having compressed respective sound, the MP3-file will be going to be read once again; respective index-file will be going to be generated. That file is a vital one as it ensures correct function of the MPEX. If for any reason whatsoever the integrated encoder will not be going to be used or if, for example, sound is only available in an already compressed version, the MP3-Tool may also be used to generate just the index-file. Please refer to the following section dealing with the MP3-Tool.

Prior to initiate the storage card we recommend referring to the section dealing with the tool described. Start it, enter registration code on first use, then copy the file requested onto the card and start the MPEX. For controlling protocols and menu settings please see reference section.

The MP3-Tool

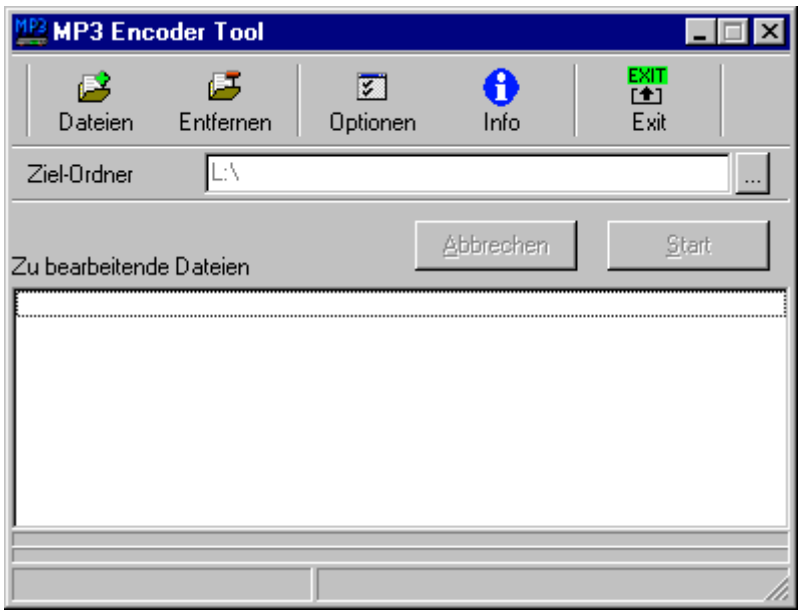
The MP3-Tool is supposed to compress sound-files and to generate the necessary index-files. Start the program, the MP3-Tool once having been installed on your PC.

The following screen should be displayed when the program is started for the first time:



Respective registration code will now have to be entered. Select menu function Configuration -> Diagnostics -> MP3 Encoder Key from the MPEX. A 16-digit key-number will be going to be displayed. Select "Options" from the MP3-Tool; enter that number in respective box. Quit that box by "Ok"; quit the MP3-Tool by "Exit".

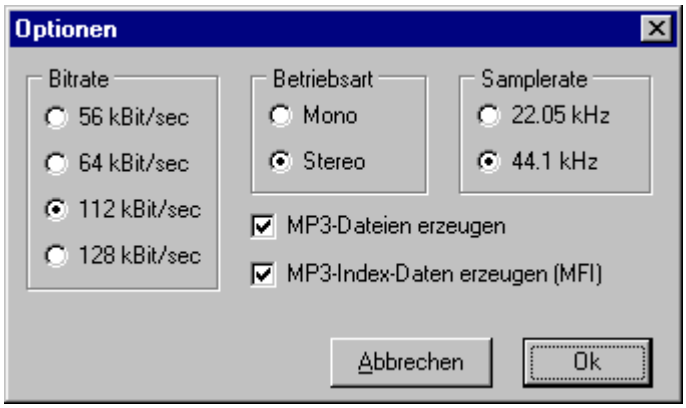
On restarting the MP3-Tool now, registration should have been completed. Your screen will now be going to display:



By means of the control panel „files“ you may now select files. From the dialogue to follow you may select several files at once. The dialogue being quit, the files selected will be going to be registered in the list of the MP3-Tool. You may activate the control panel "files" several times. By doing so, the list of files to be processed can be enlargened.

By means of the control panel „Cancel“ you may remove files having been marked from the list.

Options



By means of the boxes „Bit rate“, „Operating mode“, „Sampling rate“ you may influence quality of the encoder. With high quality requirements we recommend a bit rate of 112 or 128kB be always used. Only in applications where quality requirements are low, you may switch over to a lower quality, to save considerable storage capacity.

With the switch „Generate MP3-files“ not having been marked; no MP3-file will be going to be generated from a WAVE-file. Respective file will simply be going to be copied into the destination folder.

With the switch „Generate MP3-Index-Data“ not having been marked, no index-file will be going to be generated. That switch should absolutely be marked on working with the MPEX.

Generally speaking, further files showing other extensions will just be going to be copied into destination folder (Imagix-files for example).

If sound-files are already available in the MP3-format, the MP3-Tool will just have to be used to generate the necessary index-files. Select respective MP3-files

by means of the control panel "Files". Make sure the switch „Generate MP3-Index-Data“ will have been marked. The MP3-files will be going to be copied into destination file. Afterwards, the index-files will be going to be generated.

How to start compressing

Procedure has to be started by activating the control panel "Start". The two progress bars at the bottom of the screen will be going to indicate progress of compressing. One bar stands for progress within the file being currently compressed; the other one stands for progress with regard to the whole list of files to be processed.

How to quit the MP3-Tool

Task once having been accomplished, quit the MP3-Tool by means of control panel „Exit“.

Technical notice: Many notebooks are equipped with a serial PCMICA-insert, allowing recording storage cards directly by using an adapter. On recording a storage card being installed in a notebook by means of an Ethernet network, make sure network configuration has been set in a way to provide you the necessary recording rights with regard to your storage card. Otherwise, the MP3-Tool will of course not be able to record the card.

How to run the MPEX together with IMAGIX

When working with IMAGIX Vers. 3.xx only, the statements made with regard to „standalone“-operation will be going to apply here as well. By means of the MP3-Tool make sure the IMAGIX-file is copied onto the card; an MP3-file showing the same name (except extension) is generated together with the index-file and saved on the card.

On working with IMAGIX 5, IMAGIX must at least be available in its version 5.04. Version 5.04 and later ones are equipped with a support for the MPEX. A specific dialogue will enable you to prepare data transfer onto the card. Imagix 5.04 will be going to start the MP3-Tool on its own and to transmit the necessary parameters. Details are to follow below.

Operation with IMAGIX 5

Let's assume you programmed a slide show by means of IMAGIX 5 and you now want to play it back by means of the MPEX. It doesn't matter whether that show is a completely programmed one or a Speaker Support Show. In case of a Speaker Support Show, automatic stops will have been programmed that will be going to be converted into the IMAGIX-format. On playing back, they will be going to cause the MPEX to pause at the stops having been programmed.

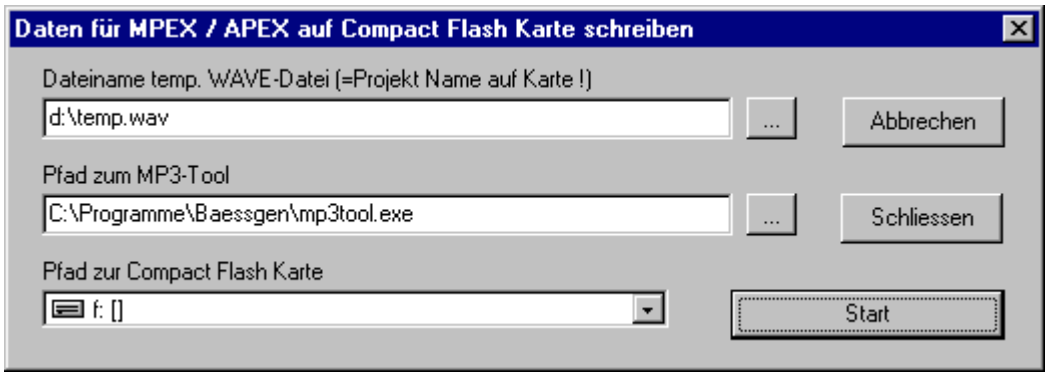
IMAGIX 5 (from 5.04 onwards) is equipped with a menu function going to assure preparing of the storage card. To put it quite clearly, we once again listed all the steps that have to be carried out in that procedure (They may also be carried out one by one on their own, result will be same!)

1) Call menu function „Export IMAGIX 2/3 file“ and save file on storage card.
2) Call Merge-function that will be going to convert any sound into a WAVE-file. That WAVE-file will be going to be saved on the disk.
3) Start the MP3-Tool that will be going to compress the whole WAVE-file and to record it onto the storage card as an MP3-file.
4) The MP3-Tool will now be going to generate the necessary index-file.
5) The MP3-Tool will be going to end.

That steps can all be started at once (from version 5.04 onwards) by means of the menu function MPEX/APEX in the main menu.

Some information must be made available to enable that procedure.

In IMAGIX 5, call menu function MPEX/APEX. The following dialogue will be going to appear:



In the entry box on top, enter a filename under which IMAGIX will be going to save sound that hasn't been compressed yet. The name to be selected will be taken over on the storage card. Please consider that with the MPEX such entries are limited to 8 signs due to the fact it is ruled by the MS-DOS file-system!

You may also use that temporary WAVE-file to record an audio CD that will be going to contain sound that hasn't been compressed.

Please make sure enough storage capacity to record that WAVE-file as a temporary file is available in the folder selected.

In the next box you will have to enter location where IMAGIX 5 can find the MP3-Tool. It is usual to install it in the same folder as IMAGIX itself.

From the bottom box, select the drive on which your storage card can be reached.

Start process by activating the control panel "Start". In a first step, the IMAGIX-file will be going to be copied to the card. Afterwards, mixing of audio events will be going to be started. You may follow that procedure by observing progressing of locator. Once the WAVE-file having been generated, the MP3-Tool will be started automatically. Progress will be going to be indicated by the blue bars in the two bottom boxes.

Personal notes

Reference of MPEX

General information

The reference section will be going to provide detailed information on any menu function as well as on any protocol. Get somewhat familiar with it. You will then know what possibilities the MPEX is offering even if you will be going to need them later on only. Users working exclusively with slide shows normally won't need that technical background information.

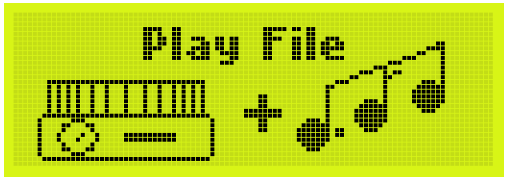
Files on the card

All files being recorded on the card must be included in the main directory. Sub-directories are not supported by current software. The LCD-display being quite small long names with many directories couldn't be shown without difficulties. The card has a maximum storage capacity of 500 files.

Exception:
Special BATCH-files to be used in external triggering of the MPEX by means of DMX-512 or MIDI signals are included in special sub-directories being on the card!

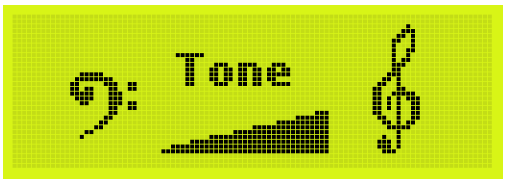
Menu functions

„Play File“-menu



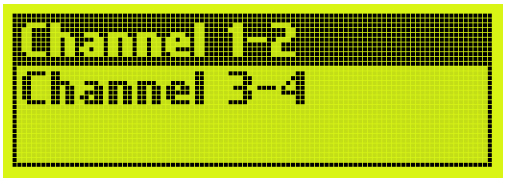
From that menu a list may be opened, showing the files being "able to be played back" that have been transferred to the storage card. The "ENTER"-key makes appear all files able to be played back. Files on that card but not being able to be played back won't be shown. Under the up-dated software version 1.00, the following files can be played back: MP3-files, IMAGIX-files and Batch-files (*.BAT).

„Tone“-menu

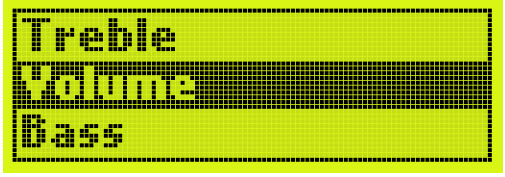


That menu enables modifying both tone and volume.

The menu will be going to differentiate between the 2-channel and the 4-channel version:



With the 4-channel version, a menu item will be going to appear at first, asking whether setting will have to apply to output 1-2 or output 3-4.



Channel once having been selected (i.e. direct selection in the 2-channel version) the following menu will be going to appear:

Select parameter you wish to adjust:

„Treble“ (pitch tones) and „Bass“ (low tones) both have a setting range ranking from –15 dB to +15 dB. Tone therefore can be set to perfection.

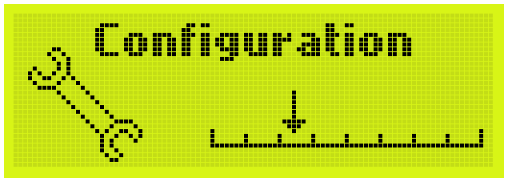
Notice: On amplifying either treble or bass (increase, i.e. a positive DB-value); the internal signal processor may reduce overall volume to prevent overshooting causing distortions. It seams at first sight as if reducing bass carried out amplifying treble. That's wrong. On increasing volume on your amplifier you will get aware of the difference.

Volume setting range ranks from –30 dB to 0 dB. –30 dB means strong reducing; 0 dB corresponds to nominal volume.

Important notice ! A subsequent amplifier must compensate any volume reducing. We absolutely recommend that setting be kept at 0 dB. Better modify volume by means of an audio mixer or an amplifier succeeding the MPEX. It's no use to reduce volume at first and to amplify it afterwards. Any secondary noise, hum etc. will as well be going to be amplified to the extent a subsequent amplifier will have to amplify volume. Clicks due to switching on and off devices connected will also get stronger. Therefore, whenever possible, volume setting should be kept at 0dB.

„Configuration“-menu

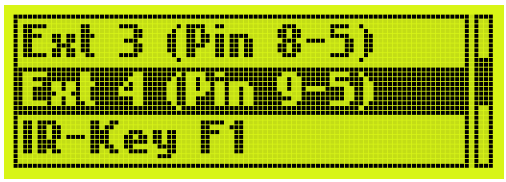
„Configuration“-menu is a kind of gateway giving access to a wide range of sub-menus. Almost all of them are dealing with configuration.



„Ext. function keys“-menu

That menu enables assigning functions to both the four direct external inputs of the MPEX and the four keys F1-F4 of the infrared remote control. The four external inputs are located on four contacts of the V24/EXT IN-socket. Please refer to the menu or the technical addendum to check the numbers of contacts described. The two pins indicated just have to be connected by a contact to enable function. Pin 5 is the connection to earth of the MPEX, the other one will be going to be kept at about +12V by means of a Pull-up resistor.

Select the input to be used for a specific function.



"Off" may be activated for any external key and the F1-F4-keys. The respective key will be disabled by that function. A directly pre-defined BAT-file may be started for any input. Such files may enclose different commands.

The last function to be named is „XX.BAT if idle“. That setting makes sure a BAT-file will only be started with the MPEX being in idle state. Let's assume an application in media showroom. If music is to be triggered by means of a light barrier, it must be made sure, that music won't start anew if the light barrier is interrupted once again. That's exactly what „XX.BAT if idle“ is doing. The MPEX will only have to react, once the piece of music having run down.

Please also refer to the parameter „Exit at End“ in „Advanced functions“, that is also related to that function.

At the external keyboard inputs, E1 and E2-key, there are two more special settings: „Start func“ (with E1) and „Stop func“ (with E2). That function is the standard being used to control „Speaker Support“-slide shows. With the slide show running and being automatically stopped at a previously programmed position, it may be restarted by means of „Start func“. Therefore, if a speaker is quite far from the MPEX, both the ESC-key and the ENTER-key may be imitated by means of a cable-connected remote control.

Take Ext 1 as an example: special setting has been selected. Both the external keys E3 and E4 aren't equipped with any special setting; "reserved" will be going to appear at respective position.

If a BAT-file having been selected doesn't exist, respective function will be going to remain disabled. As any other setting, those configurations will have to be saved in the configuration memory, to make sure they will still be going to be active on restart.

„Infrared Remote“-menu

By means of that menu, the infrared remote control may easily be disabled by means of the settings „On“ and „Off“. Switching the infrared remote control off may be useful on working with several BÄSSGEN-devices in the same room, granted that only one will be going to be supposed to react.

„Trigger Mode“-menu

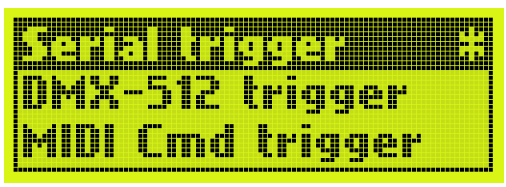
There are three different possibilities to run the MPEX in serial environments:

1) Ordinary RS232-control
2) Control in DMX-512-environments
3) Control in MIDI-environments.

Only one of the three possibilities described can be used at a time.

Select one of the three triggering possibilities from that menu:

Basic setting is „Serial trigger“ (i.e. RS232-standard).



Notice:

All DMX-512-functions as well as the MIDI-functions (including Diagnostic functions) won't be going to work without having been set to respective type of signal.

That parameter therefore is essential in multimedia environments!!

„Advanced functions“-menu

That menu includes the somewhat more sophisticated functions:

„Serial baud rate“-menu

Set serial data rate for the RS232/V24-interface. Any standard baud rate from 300 up to 38400 baud may be set. Default setting is 9600 baud.

„DMX-Addressing“-menu

Select a DMX-512-address on which the MPEX will be going to receive DMX-512-commands, whenever it is supposed to be triggered by means of a DMX-512 light mixer.

„MIDI-Addressing“-menu

Select a valid MIDI-address within the range from 1 to 16, on which the MPEX will be going to receive MIDI-signals.

„Exit at End“-menu

By means of that setting you may configure state to which the MPEX will have to switch over to, playing back of an MP3-file once having been completed. If "off" is set, the MPEX will be going to switch over to "Pause" after a file will have been played completely back. It will all the same never be going to switch completely over to idle state. A time period may be set as well. That period having run down, the MPEX will be going to switch back to base state.

The function described is very important with regard to external inputs. A time period may be set making sure a whole installation may only be restarted the period fixed having run down.

„RS232 Echo“-menu

An echo on the RS232-interface may be switched on or off. With the echo-function being switched on, the MPEX will be going to return all bytes having been transmitted as commands to the V24-input socket as a copy. That function may be quite useful with some of the tests that can be carried out by means of the MPEX in connection with a terminal program.

„Autolink“-menu

Autolink-function is very important in the Speaker Support-field, on running the MPEX together with slide projectors. In that case "Autolink" should be enabled as it has the following functions:

If an MP3-file gets started by means of the „Play File“-command, an IMAGIX-file showing the same name (except for extension) will automatically be started at the same time. Moreover, an MP3-file will be going to be started in a way to make sure stop marks (if any) included in the IMAGIX-file will really stop sound. The philosophy of the MPEX also allows standalone playing back. That mode is anything but desirable in Speaker Support. For more information about possible operating modes with regard to playing back please refer to commands overview.

Furthermore, playing back of an IMAGIX-file will be going to be started in an operating mode making sure that the IMAGIX-player won't continue working when respective MP3-file is stopped.

Notice:
To start a Speaker Support Show you may start either the IMAGIX-file or the MP3-file. "Autolink" makes sure they will both be going to be started in the correct mode. Filename must be the same (except extension). Example: „TEST.MP3“ and „TEST.IMX“.

„Global Autoloop“-menu

In certain applications a continuous presentation is to be run. That presentation is supposed to start anew when the MPEX will have returned to idle state. The function „Global Autoloop“ will be going to take over the task requested. A BAT-file from the storage card will be needed; its name is „AUTOLOOP.BAT“. The MPEX will be going to execute the AUTOLOOP.BAT-file whenever it is in idle state, granted that that file exists and the parameter „Global Autoloop“ will have been enabled. Playing back of one or more files may be started in that file for example.

AUTOEXEC.BAT

We want to mention another characteristic of the MPEX that is working without menu setting. If there is an "AUTOEXEC.BAT"-file on the storage card, it will be executed just once on putting the MPEX into operation. It helps to carry out a media application in the morning, when power is switched on: let that be an announcement or making travel projectors to a previously established position.

„Player Loop“-menu

Enable a loop function separately for both the two MP3-players (only 4-channel version) and the IMAGIX-player. This means, as soon as one player will have finished playing back its file, it will be going to restart independently from the others. That function is frequently used if, on using a 4-channel version, continuous music is to be played in two different rooms, with pieces of music being of different length.

„Power fail save“-menu

In some applications the MPEX should continue playing at the position at which it has been interrupted by a power failure. There are also applications in which that function shouldn't be active (if other systems not being equipped with that characteristic are integrated). That function may be enabled or disabled in the MPEX. If "Power fail save" is set to "on", playing position will be going to be saved in an internal non-transitory memory in case of power failure. On switching on, the MPEX will continue playing at the position having been saved.

Caution! It is forbidden to exchange storage card following a power failure. The MPEX wouldn't be able to find correct position on the other storage card as such position will partly be saved in sector addresses. Please also note it will always be going to take a short while on switching on, time needed for initializing a storage card.

„Ignore IMX-Stops“-menu

That menu function being set to „on“, the MPEX will be going to ignore the stops having been programmed in an IMAGIX-file. For Speaker Support slide shows such stops are very important. Default setting is "off". It is normally only set to "on" for test purposes.

„Do IMX-Comments“-menu

That menu function being set to „on“, the comments included in the IMAGIX-file will be going to be interpreted as commands to be executed once respective line being carried out. Such comments may be edited by IMAGIX 2 (MS-DOS) or IMAGIX 3. That function allows programming complex processes. Default setting is "off". Comment lines beginning with "#" will be going to be ignored in any case.

„Default Player“-menu

That menu function only exists in the 4-channel version. If a file to be played back is started from the menu „Play File“, a 4-channel MPEX will first be going to use the MP3-player having been selected as its „Default Player“. In case that player was already taken, the other one will be going to be used.

„Diagnostics"-menu

The whole „Diagnostics“-menu consists of test functions giving information on state of the MPEX or that may be used to test external cable connections.

„Revision + ID“-men

That menu function will be going to show current software state of the MPEX as well as its internal ID-number. The ID-number is a specific serial number being part of your device. That number will remain the same, even if an up-dated software version is installed for example. Up-dated software versions being issued by us are usually made available for download on our internet site: http://www.baessgen.de

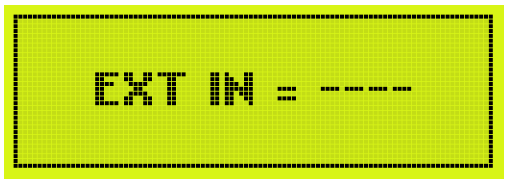
„MP3-Encoder Key“-menu

That menu will be going to provide you the enabling code related to the MP3-Tool-software being part of your MPEX. Enter the 16-digit code in the respective box of the MP3-Tool-software to get authorization for regular use.

„DMX-512 Input“-menu

If the MPEX is used in a DMX-512 environment (to control sound-files by means of a light mixer for example) that menu will be going to help you to easily check your cabling. Two channels may be selected; their values may be checked either in decimals, hexadecimals or percent. The cursor keys "Up" and "Down" allow switching the channel forward.

„Ext. function keys“-menu



The MPEX is equipped with four external inputs allowing direct playing back of four MP3-files or other ones in media applications. Connections of those four external keys may be checked by means of „Ext. function keys“-menu. As soon as a key will have been enabled, the respective "-"-sign will be going to turn into an "X"-sign.

„CF-Card directory“-menu

That menu allows displaying all files being included in the main directory of the storage card. Index-files of the MP3-files are showing the extension *.MFI (MPEG File Index). Current up-dated software version doesn't support sub-directories. Operation of the MPEX won't be affected if there are sub-directories containing files on the storage card. The card will then just be going to show less memory capacity. No sub-directories are used at present, as they would only render menu structure more complicated. Moreover, the LCD-display is too small to allow displaying of a complete name.

Notice:
Triggering the MPEX by DMX-512 or MIDI requires two specific sub-directories; they won't be going to be displayed in that menu.

„Config Memory“-menu

That menu is to supervise configuration memory. Whenever configuration is modified; that modification will only be going to last until the device will have been switched off. On switching on again, configuration being saved in the configuration memory will be set. If a modification shall remain active, call menu function „Save configs“ once modifications having been carried out.

„Save configs“-menu

Any current setting of the MPEX will be going to be copied to the configuration memory. On switching on again (or reset of the MPEX, due to exchange of storage card for example) that setting will be called.

„Restore configs“-menu

Setting of the configuration memory will be going to be read. Current setting of the MPEX will be going to be same as the setting having been saved.

„Default configs“-menu

The MPEX will be going to be set to a base setting, corresponding to the one the device will be going to be equipped with on delivery. Configuration memory won't be going to be affected. If you wish to set configuration memory as well to base setting, you will have to recover it by „Save configs“ now.

Command language used in MPEX

Command language used in MPEX has been developed for advanced users and commercial applications. Basic knowledge in command-line orientated programming will be going to be needed. By means of that language, the MPEX may be configured for use in a wide range of applications.

As mentioned earlier on, the MPEX may be operated by means of a command language, i.e., commands consisting of ASCII-lines. They enable controlling the players being integrated. That command language is the backbone of the MPEX. It is used on serial triggering of the MPEX by means of RS-232-commands or on using BATCH-files. Those are ordinary text files enclosing a set of commands having been integrated. A separate line has to be used for each command.

Notice:
Seen the fact an MS-DOS file-system is used, filenames mustn't enclose more than 8 signs as well as an extension of 3 signs at maximum. Extension will be going to define file-type and can't be freely chosen. On working with sound-files, the MPEX will always be looking for files showing the extension "MP3". Using mutated vowels such as ä, ö, ü as well as dots, colons or blanks in filenames is also forbidden!

Particularities in serial control

On controlling the MPEX by serial commands, baud rate having been set in the menu of MPEX will always be used. Use the option "V24 Echo" on doing tests with a terminal program. That option will be going to return signs having been typed and will therefore enable you to detect spelling errors for example.

Neither cursor keys nor special keys will be enabled in such case! By the same token, make sure the parameter "Trigger mode" will have been set to "Serial". Otherwise, the MPEX will be going to look for entries being made by means of the DMX-512 or the MIDI-input.

Commands always have to be completed by an end-of-line (OD hex.).

Player Address

The different players integrated in the MPEX have invariable addresses by which they may be called. When it comes to ASSIGN, there are different addresses, as only one player at a time may be called by that command. All other commands allow calling different players at the same time. Addresses may simply be added as they are construed in powers of two. Exact simultaneous calling of different players is therefore possible (time needed for transmission by means of serial interface would become audible already if the two MP3-players were started at the same time for example). An example will be given later on.

The table below shows the different addresses being used in the MPEX:

Player	Address	Address f. ASSIGN
MP3-player A	1	1
MP3-player B (only with 4-channel version)	2	2
Time code-player (virtual player)	16	5
IMAGIX – player	32	6
V24-player	256	9

Further player addresses are reserved and haven't been implemented in the current software version yet.

Options

Some commands are furthermore equipped with one or more options. They are preceded by a backslash, followed by a sign (number or letter). Options will be going to be explained together with respective command.

Time data

In some commands exact time data are transmitted. Such time data are always expressed in milliseconds (1 millisecond = 1 / 1000 second).

MP3-files are made of "frames" whose length may slightly vary according to bit rate and sampling rate. Variation is about 25ms. More precision can't be achieved as only whole frames may be played back. As a time unit, we all the same used milliseconds, as it is easy to use and doesn't depend on sampling rate etc.

Short commands

Any command of command language mentioned may be abbreviated. An abbreviated command consists exactly of the first two command letters. Therefore, instead of "PLAY", you may also write "PL". In applications with serial transmission where time is critical (p.e. low baud rate) time may be saved by doing so. Commands being incorporated in IMAGIX can only be entered that way, entries being limited to 20 signs (please refer to following section).

Commands being incorporated in IMAGIX-files

That function is for experienced users, but enables trouble shooting even in complexe installations!

The IMAGIX-player being integrated in the MPEX plays back files showing the extension .IMX. Such files may directly be edited by IMAGIX 3-software. IMAGIX 3 is a classic line editor. A comment may be added to any command line, its length being limited to 20 signs. An IMAGIX-file being played back, it is possible to cause the MPEX to interpret respective comment as a command from command language. That function first has to be enabled by means of the menu function „Do IMX Comments“ (from the menu „Adv. Functions“). That function having been enabled, the MPEX will be going to interpret any comment in an IMAGIX-file as a command to be directly executed by the MPEX. Highly complex processes may be programmed. MP3-players may be started or external devices may simultaneously be controlled by means of TASC/THEX-commands for example. Range of possibilities is wide, but use requires sound experience in programming. As a matter of fact, by using the possibilities described a great number of problems arising in a media station may be solved.

Real comments to be used in such a program that mustn't be transmitted to the command interpreter of the MPEX will have to be preceded by an "#". Such lines will be going to be completely ignored by the MPEX.

Commands

ASSIGN

ASSIGN will be going to open both a file and a player. No data will yet be going to be read from the file, no playing back will yet be going to take place. Calling several players at the same time by ASSIGN is forbidden.

General pattern:

ASSIGN player filename options

Caution: ASSIGN is ruled by a different address assignment than other commands! ASSIGN must always be used with only one player at a time.

Addresses (for ASSIGN only)

MP3-player A	1
MP3-player B (only in 4-channel version)	2
IMAGIX -player	6

Options:

Player selected being an MP3-player and /I being entered under "options" means: ignore stop marks from IMAGIX-player. In that case, the MP3-player will continue working even with the IMAGIX-player getting stopped by an X-mark. With no option entered, ASSIGN will be going to set the MP3-player to the operative mode in which stopping of the IMAGIX-player will also be going to stop the MP3-player. That feature is very import with Speaker Support mode.

Player selected being the IMAGIX-player, three different options will be available: /1, /2 or /6. That option establishes the source of the time base the IMAGIX-player will be going to work on. If the IMAGIX-player is opened by /1, it will run as a slave of the MP3-player no 1. If the MP3-player stops, the IMAGIX-player will be going to stop as well. /2 selects the MP3-player 2 as a time base. If the IMAGIX-player is opened by /6, it will work freely, ruled by its own internal clock.

Notice:

With a player being started at the MPEX manually, the menu function "Autolink" being active, and both an MP3-file and an IMAGIX-file of the same name existing, both will be started together. As a time base the IMAGIX-player will always be going to use the MP3-player 1 having been started at the same time. The MP3-player will be going to obey to the stop marks of the IMAGIX-file.

Examples:

`ASSIGN 1 TEST.MP3`
MP3-player 1 is going to be opened for TEST.MP3

`ASSIGN 6 TEST.IMX /1`

IMAGIX-Player is going to be opened for TEST.IMX, player 1 will be registered as a time base.

`ASSIGN 2 SOUND.MP3 /i`
MP3-player 2 (4-channel MPEX !) is going to be opened for SOUND.MP3. Player 2 is supposed to continue working even with the IMAGIX-player obeying to stop marks.

PREPARE

PREPARE will be going to make one or more players ready for playing back. Reading from the storage card will already get started; all buffer memories will be going to be filled with data. That command is especially important with the two players of the 4-channel version having to work absolutely synchronously. Even if extremely short answering times are requested, procedure will get quicker if PREPARE is called first, prior to PLAY, a command going to be described later on. In applications, where fractions of seconds do not matter, PREPARE may well be left aside, as PLAY will implicitly be going to call PREPARE at first if that command hadn't been called already.

General pattern:

PREPARE player

PREPARE may be called for several players by simply adding the numbers of the different players. Please refer to examples:

PREPARE 1
MP3-player 1 will be going to be prepared.

PREPARE 35
Both the MP3-players 1 and 2 and the IMAGIX-player will be going to be made ready for playing back (35 = 1 + 2 + 32)

PLAY

PLAY starts one or more players synchronously. That/those player(s) first has/have to be opened by ASSIGN; a filename will have to be assigned otherwise that command will not become effective. If PREPARE wasn't called that step will be going to be carried out now.

General pattern:

PLAY player

Examples:

PLAY 1
MP3-player 1 will be going to be started.

PLAY 33
Both the MP3-player 1 and the IMAGIX-player will be going to be started (33 = 1 + 32)

PAUSE

PAUSE interrupts one or more players synchronously. The player(s) must first have been started by PLAY, otherwise that command will not become effective. One (or more) player(s) being on PAUSE may be restarted at the same position by PLAY.

General pattern:

PAUSE player

Examples:

PAUSE 1
MP3-player 1 will be going to be stopped.

PAUSE 33
Both the MP3-player 1 and the IMAGIX-player will be going to be stopped (33 = 1 + 32)

STOP

STOP will be going to stop one or more players completely. The file enclosed on the storage card will as well be closed; the assignment player-to-file will be going to be cancelled. That file may only be restarted after another ASSIGN-command having been issued.

General pattern:

STOP player

Example:

STOP 1
MP3-player 1 will be going to be definitely stopped.

MAXPLAY

MAXPLAY enables setting a stop mark in a file. The MPEX will automatically be going to stop playing back once having reached that mark. Many applications require a certain sequence of a file be played back. MAXPLAY sets a virtual end-of-file. Together with LOCATE, a sequence may be established by a few commands. That sequence may then be started without a controlling computer having to supervise switch-off.

General pattern:

MAXPLAY player time

In the parameter "player" an MP3-player has to be named; time means maximum playback position expressed in milliseconds. Only MP3-players may be called by that command. The IMAGIX-player isn't able to interpret that command.

Example:

MAXPLAY 1 180000
MP3-player 1 will be going to be limited to a playback position of 3.00 min (min. = 180 sex. = 180000 ms)

LOCATE

LOCATE is very important. That command sets a player (one or more players) to a position having been established. Such player(s) must be on PAUSE, if not, it/they will automatically be set to PAUSE. LOCATE once having been called, the player(s) will at first have to be restarted by means of PLAY to make them start playing back at that position.

General pattern:

LOCATE player time

In the parameter "player" an MP3-player has to be named; time means the new playback position expressed in milliseconds.

Example:

LOCATE 33 184000
Both the MP3-player 1 and the IMAGIX-player will be going to be set to a playback position of 3:04 min. (3:04 min = 184 sec. = 184000 ms; 33 = 1 + 32)

LPLAY

LPLAY (= LOCATE + PLAY) will at first be going to execute a LOCATE-command followed by a PLAY-command for the players having been selected. One or more players (having of course been opened by ASSIGN at first) may be started at an established position by just one command.

General pattern

LPLAY player time

In the parameter "player" a player has to be named; time means the new playback position expressed in milliseconds.

Example:

LPLAY 35 210000

Both the MP3-player 1 and 2 and the IMAGIX-player will be going to be set to a playback position of 3:30 min. and started from there (3:30 min = 210 sec. = 210000 ms; 35 = 1 + 2 + 32)

LCPREP

LCPREP (= LOCATE + PREPARE) will at first be going to execute a LOCATE-command followed by a PREPARE-command for the players having been selected. One or more players (having of course been opened by ASSIGN at first) may be set to a position having been established and made ready for start by just one command.

General pattern:

LCPREP player time

In the parameter "player" a player has to be named; time means the new playback position expressed in milliseconds.

Example:

LCPREP 35 210000
Both the MP3-player 1 and 2 and the IMAGIX-player will be going to be set to a playback position of 3:30 min. and made ready for start. (3:30 min = 210 sec. = 210000 ms; 35 = 1 + 2 + 32). Start will be executed by a PLAY-command to follow.

LINK

LINK is mainly used to simply start a slide show. A filename will be going to be transmitted to that command; the MPEX will then be going to look for an IMAGIX-file and an MP3-file showing the same name. The only difference will be their extension. Both files will then be going to be started at the same time. That procedure corresponds to manual start of a file with "Autolink"-option having been set (please refer to reference: Menu of the MPEX).

General pattern:

LINK filename

Example

LINK TEST.MP3
The MPEX will be going to start both TEST.MP3 and TEST.IMX, if found, together with the correct options to play a slide show back (Speaker Support).

CALL

CALL will be going to call a BATCH (= batch processing). By that command, BAT-files being on the storage card may be started by means of serial interface. As mentioned earlier on, BAT-files always enclose further commands in an ordinary ASCII-format.

Extension must always be *.BAT.

A BAT-file mustn't call further BAT-files. CALL may therefore only be executed serially. It mustn't be executed within a BAT-file.

General pattern:

CALL filename

Example

CALL TEST.BAT
That command causes searching for the file TEST.BAT on the storage card and executing of commands being enclosed.

DIR

DIR is supposed to transmit information on the files enclosed on the storage card to a device being remote controlled by the MPEX by means of the V24/RS-232 serial interface. Once having received a DIR-command, the MPEX will be going to transmit any filenames found on the storage card by its serial interface. Each name will be transmitted in an own line; a blank line stands for end of transmission. That command doesn't support any parameters. A possibly required file-selection is to be done by the machine asking for such information.

Make sure „Trigger Mode“ is set to „Serial“, otherwise transmitting would not be going to be done by means of the V24-interface. Although possible, executing that command within a Batch-file is generally useless.

General pattern:

DIR

Example

DIR
That command causes transmitting of any file found on the storage card by means of serial interface.

JUMP

JUMP is quite similar to LOCATE. Playback position may be modified. Unlike LOCATE that command may not only be used in PAUSE-mode, it furthermore allows modifying playback dynamically as well. The pre-loading buffer will be going to be emptied. Seen the volume of pre-loading buffer, there will be going to be a short delay until the jump may be perceived outside as well, but there will be no pause that can't be prevented on using the commands LOCATE or LPLAY.

General pattern

JUMP player time

In the parameter "player", a player will have to be named; time is the new desired playback position in milliseconds.

Example:

JUMP 3 65000
Both the MP3-players 1 and 2 will be going to jump to a playback position of 1:05 minutes. With players being in the "Play-mode", that jump will be carried out dynamically, i.e. without any pause arising (1:05 Min = 65 sec. = 65000 ms; 3 = 1 + 2)

Technical notice:

In huge MP3-files playing back may not be continuous due to technical reasons: shifting the file pointer takes more time in huge files, as FAT-file-system on the storage card needs more time to carry out that operation. During that time, the MPEX will have to draw information from the buffer. If file-system needs more time than buffer is able to compensate there will be fading.

MUTE

MUTE will be going to mute an MP3-player. That function may be reversed by DEMUTE.

General pattern:

MUTE player

With MP3-players only.

Example

MUTE 1
That command will be going to mute MP3-player 1.

DEMUTE

DEMUTE reverses muting of an MP3-player.

General pattern:

DEMUTE player

With MP3-players only.

Example

DEMUTE 1
That command will be going to de-mute MP3-player 1.

TASC

TASC (=Transmit ASCII) transmits any ASCII-string by means of serial interface. "Trigger Mode" setting of the MPEX must absolutely be correct. To make sure signs are transmitted by the V24/RS-232-interface, "Serial" must have been set. Purpose of that command is to control further devices by means of the MPEX (another MPEX, video-players, special effects-devices etc.). That command can be incorporated in Batch-files or in an IMAGIX-file. TASC is only able to transmit concrete ASCII-signs. Transmission of binary signs is done by THEX.

General pattern:

TASC string

A string may also include blanks. Any sign from the first to the last concrete one will be going to be transmitted. Strings are limited to 64 signs at maximum.

Example

TASC Candlelight magic
That command will be going to transmit the string Candlelight magic by means of serial interface.

THEX

THEX (=Transmit HEX) transmits any binary sign by means of serial interface. "Trigger Mode" setting of the MPEX must absolutely be correct. To make sure signs are transmitted by the V24/RS-232-interface, "Serial" must have been set. Purpose of that command is to control further devices by means of the MPEX (another MPEX, video-players, special effects-devices etc.). That command can be incorporated in Batch-files or in an IMAGIX-file. THEX is supposed to transmit binary signs. To transmit huge volumes of ASCII-signs TASC should be used.

General pattern:

THEX xx xx xx xx

The dyads xx represent bytes in hexadecimals that will be going to be transmitted. Blanks between the hex-signs may be omitted; but number of hexadecimal signs must be even-numbered. Those signs will afterwards be going to be transmitted; one byte for two signs each. THEX may be followed by 64 signs at maximum.

Examples

THEX 0D 0A
That command transmits an end-of-line consisting of CR-LF.

THEX 41420D0A
That command transmits the string "AB" as well as the CR-LF dyad.

SET

SET enables settings that can also be made by using the menu of the MPEX be made by command. Any setting made in the "Configuration"-menu may be modified. If specific settings are required in a commercial installation, they may for example be realized by an AUTOEXEC.BAT-file enclosing a range of SET-commands. Users will just have to exchange storage card; the MPEX will be going to be programmed according to their needs. Even on remote control by a supervising computer or in case of incorporated IMAGIX-commands configuration may be modified dynamically.

SET will always be going to show the following pattern:

SET variable value

A value will be going to be assigned to a variable. There are two different types of variables: to the first one, a numerical value can be assigned; to the second one, a value from a list of possible values can be assigned (enumeration). Menu functions to which only the value "On" or "Off" can be assigned will have to be set by means of the values 0 or 1. For detailed description, please refer to table given below stating values that the MPEX is able to process. Values stated in the "Default"-column are the ones that will have been set by the manufacturer.

Variables with a numerical value

Description (same as in menu)	Name of variable	Value range	Default
DMX-512 address (DMX-ADR)	DMXADR	1..512	1
MIDI-address(MIDI CH)	MIDIADR	1..16	1
Default player	DEFPLAY	0..1	0
RS232 Echo	V24ECHO	0..1	1
Autolink	AUTOLINK	0..1	1
Infrared remote	IRMODE	0..1	1
Global Autoloop	AUTOLOOP	0..1	0
Player Loop	PLAYLOOP	0..7	0
Power fail save	RECOVER	0..1	0
Ignore IMX-Stops	IGNOSTOP	0..1	0
Do IMX-Comments	EXECIMX	0..1	0

The variable „Player Loop“ is a specific one. It allows setting of that function separately for both the two MP3-players (in 4-channel version) and the IMAGIX-player. The following interrelationship will be going to apply to:

Value	MP3-1 on Loop	MP3-2 on Loop	IMAGIX-Player Loop
0	no	no	no
1	yes	no	no
2	no	yes	no
3	yes	yes	no
4	no	no	yes
5	yes	no	yes
6	no	yes	yes
7	yes	yes	yes

If single players are configured as loops, each of them will be going to start playing over again immediately once having finished its playing task. "Global Autoloop"-function on the other hand causes the AUTOLOOP.Bat-file to be executed once all players having finished their task.

Variables with enumeration

Description (in the menu)	Name of variable	Values enabled	Default
Trigger Mode	TRIG	SERIAL, DMX, MIDI	SERIAL
Serial baud rate	BAUD	300, 600, 1200, 2400, 4800, 9600, 19200, 38400	9600
Exit at End	EXITEND	0, 1, 2, 5, 10, 25, 60, 120, 300, 600	1
Ext 1 (Pin 1-5)	EKEY1	OFF, DEF, RUN, RUNIF	DEF
Ext 2 (Pin 6-5)	EKEY2	OFF, DEF, RUN, RUNIF	DEF
Ext 3 (Pin 8-5)	EKEY3	OFF, DEF, RUN, RUNIF	OFF
Ext 4 (Pin 9-5)	EKEY4	OFF, DEF, RUN, RUNIF	OFF
IR-Key F1	IRKEY1	OFF, RUN, RUNIF	OFF
IR-Key F2	IRKEY2	OFF, RUN, RUNIF	OFF
IR-Key F3	IRKEY3	OFF, RUN, RUNIF	OFF
IR-Key F4	IRKEY4	OFF, RUN, RUNIF	OFF

The different values correspond to the functions that may be selected in the respective menu.

Examples:

SET DMXADR 70
DMX-512-receiver address is set to 70.

SET IRMODE 0
Locks infrared remote control

SET EXECIMX 1
Enables execution of incorporated IMAGIX-commands.

SET EKEY2 RUNIF
External key 2 will be going to start the E2.BAT-file, but only with the MPEX being in "Idle-mode", i.e. with all the players being in stop-mode.

SET EKEY1 RUN
External key 1 will immediately be going to start the E1.BAT-file regardless of state the MPEX is in.

SET BAUD 19200
Sets baud rate to 19200. Caution: if that command is executed serially, the next command will have to show a new baud rate, maybe a short break will have to be foreseen to enable re-configuring of serial interface. That command on the other hand is well suited to definitely set baud rate in an AUTOEXEC.BAT-file right from the beginning.

GET

GET authorizes a supervising system being connected to the MPEX to check configuration having been set. The values of the variables being asked for are transmitted in the same format in which they may as well be modified by means of SET.

GET, general pattern:

GET variable

Value of the variable will be re-transmitted by serial interface. Value once having been transmitted, an end-of-line will automatically be going to be issued. Make sure "Trigger Mode" is set to "Serial", otherwise answers won't be transmitted to the RS-232-interface.

For information on names of existing variables please refer to the table stated in the "SET"-command section.

Example:

GET EKEY1
The MPEX will be going to answer by stating value of respective variable. A possible answer may be „RUNIF“.

Special case: version check

GET is able to recognize two variables that can be read but not recovered. Those variables show both a version string as well as the current up-dated software version of the MPEX. That command is available from version 1.07 onwards. It is used to distinguish variables having been modified later on or to recognize commands being included in the MPEX that were not available in earlier versions.

GET VER
Simply re-transmits up-dated software version in an x.yy-format, i.e. 1.08 followed by an end-of-line.

GET VERSION
Re-transmits the whole version string, i.e. "MPEX 4-CH V.1.08". It is therefore possible to find out whether a 2-channel or a 4-channel version has been connected.

VOLUME

VOLUME enables modifying volume of the MP3-players.

VOLUME, general pattern:

VOLUME player value option

Player stands for the address of the MP3-Player. Both the MP3-players may be influenced at the same time. Value stands for the new volume value expressed in dB. Values ranking from 0 to 30dB are admissible. Values entered may be positive or negative, absolute amount will always be calculated. 0dB means full volume, the standard value on switching on. Volume may be reduced down to 30dB. If "/D" is added as an option, the value won't be an absolute volume value in dB but a relative one being based on current volume. Positive values will be going to increase volume by the number of dB required.

Examples:

VOLUME 3 -10
Both the MP3-players in a 4-channel MPEX are set to a volume of –10 dB.

VOLUME 1 +1 /D
Volume of MP3-player 1 will be increased by 1 dB.

Notice:
Excessive volume reducing has to be compensated by means of a subsequent amplifier. Secondary noise and interferences will be going to be amplified to the same extent.

BASS, TREBLE

Those commands are used to remotely control integrated tone regulation of the MPEX.

General pattern of command:

BASS player value option
TREBLE player value option

Player stands for the MP3-players. Both the MP3-players may be influenced at the same time. Value stands for the new value of an increase/decrease in dB. Admissible are values ranking from –15 to +15dB. If "/D" is added as an option, the value won't be an absolute volume value in dB but a relative one being based on present volume. Positive values will be going to increase amplifying of respective tone level by the number of dB required.

Examples:

BASS 3 -5
Basses in both MP3-players are reduced by 5 dB.

TREBLE 1 +4 /D
Trebles in MP3-player 1 are going to be increased by 4 dB, taking the value having been set at present as a base.

Notice:
If basses and/or trebles are increased, the MPEX will automatically be going to reduce overall volume, regardless of value of increase. Such reduction is necessary, as a simple increase of a tone level might cause over-shootings that can't be expressed in the digital range within the 16-bit resolution being used. Strong increase of the nonlinear distortion factor would be going to result. That is the somewhat strange characteristic of pure digital tone regulating. It doesn't at all matter in equilibrating acoustics of the room where a show is going to take place.

Controlling of the MPEX by means of DMX-512

The MPEX is easy to control by a DMX-512 light mixer system and offers a wide range of possibilities in that field. Integrating sound or noise on stage may easily be realized.

\DMX-512\-folder

Technical principle is quite simple: by means of the PC a folder showing the name \DMX-512\ has to be generated on the storage card. That folder will now be enclosing a large number of BAT-files. Those BAT-files are all named XX.BAT.

XX expresses brightness value of respective DMX-channel in hexadecimals.

Simple example:

1) In the menu, the MPEX will have been addressed to DMX-channel 234.
2) Value on channel 234 will be going to jump from 0 to 3F (hex).
3) The MPEX will be going to execute the BAT-file 3F.BAT in the \DMX-512\-folder.
4) Nothing will be going to happen as long as the value on channel 234 won't have gone to change.
5) Value on channel 234 once having changed, a new BAT-file will be going to be started.
6) Case apart: value being 0 will always be going to stop all players.

Controlling of the MPEX by MIDI

Analogously to DMX-512, the MPEX may easily be controlled by MIDI and offers a wide range of possibilities in that field.

\MIDI\-folder

Technical principle is quite simple: by means of the PC a folder showing the name \MIDI\ has to be generated on the storage card. That folder will now be enclosing a large number of BAT-files. Those BAT-files are all named XX.BAT.

XX expresses hexadecimal value of a MIDI-program number (0-7F)

Simple example:

1) In the menu, the MPEX will have been addressed to MIDI-channel 7.
2) A „Program Change 4D“-command (hex) will follow.
3) The MPEX will then be going to execute the BAT-file 4D.BAT in the \MIDI\-folder.
4) Another „Program Change“-command to follow will be going to start another BAT-file.
5) Case apart: „Program Change 0“ will be going to stop all players.

Caution! If the operative modes described are used (DMX-512 or MIDI), the menu-function „Trigger-Mode“ has to be set correctly, otherwise functioning will be going to be impeded!

Summary

The two examples stated show that both sound and noise may be integrated in an installation. Reliability with regard to triggering is very high; there will be no wear at all.

Time-Code player

Time-code player generates a continuous SMPTE time-code with 25 frames a second. It can't be that to be a real player, as no file will be going to be played back. It is a time-code generator that may be called by the same syntax as all other players.

The commands ASSIGN, PAUSE, PLAY, STOP and LOCATE do exist here as well. LOCATE more or less sets a start value, from which the player will be going to be started. An end-of-time at which time-code generating will be going to be stopped may be set by means of MAXPLAY.

Time-code player has been designed for sophisticated media applications. It may only be started by commands from Batch-files. No displaying of the activities of the time-code generator has been foreseen.

V24-Player

In an all-round show, control of external devices is often required. Many media devices may be externally controlled by an RS232/V24. The V24-player having been already described enables transmitting sign strings synchronously to sound at any moment. As many devices are equipped with deferring protocols, a completely abstract protocol has been established, transmitting simple sign strings. Such sign strings together with times they are to be transmitted at are saved in a binary file being enclosed on the CF-card.

Only users having experience in the field of commands and simple programming should use the V24-Player!

V24-player may be controlled by ordinary command language. Operation by means of menu keys as well as detailed activity displaying hasn't been foreseen. The player should be started from a Batch-file together with all other necessary commands.

The commands ASSIGN, PAUSE, PLAY, STOP and LOCATE work in the same way as commands in the other players.

Technical notices:

If current position within a V24-file is modified by means of LOCATE, commands having been left aside won't be transmitted. Generally speaking, that would be useless in any case.

Baud rate will have to be set in the menu or in a Batch-file by means of a SET-command. The MPEX is equipped with an integrated 256 byte-deep emission buffer. Users have to make sure that buffer won't overflow. With buffer overflowing, a delay will be caused that might require playing back to be interrupted. Basing yourself on density of sign strings transmitted and baud rate, check whether buffer capacity will be sufficient. V24-player doesn't need PREPARE-command, entering it would be useless seen the fact it won't cause any effects.

V24-Player may alternatively work being ruled by its own frequency (system frequency of the MPEX) or draw its synchronization from one of the MP3-players. In the second case, after an MP3-player will have stopped the V24-player will be going to be interrupted as well after 0,5 sec at latest. Respective frequency generator will have to be included in the ASSIGN-command.

Description of the V24-file format

That description is to be seen as a reference of the V24-file format. It allows developing own computer programs by means of which control files for other devices may be realized.

To enable the MPEX to recognize V24-files, they all must show the extension *.V24. Such files are lists of data sets showing all the same length. So even in large files, you can easily get access to any position whatsoever. A file may contain up to 30000 data sets at maximum. That description applies to the V1.0 format.

File-header

Any V24-file has to start with header with a fixed length of 256 bytes. The first 12 bytes are assigned to the following values:

`MPEX V24 V10`

0 has been assigned to the 244 remaining bytes. That version number makes sure that compatibility will remain preserved when extensions are made later on. The header will then be followed by respective data sets.

Data sets

Each data set includes a string whose length is variable and a time at which that string will have to be transmitted.

Caution!

It is absolutely compulsory, data sets be classified in ascending time order! Any irregularity in that classifying order might affect correct functioning. Especially LOCATE working with a quick search algorithm might fail and cause malfunction. Classifying work that may be required therefore has to be carried out by means of a user program generating the respective V24-file.

Structure of data set with 128 bytes:

Byte 0..3	Time expressed in a 32bit-value in ms.
Byte 4	Number of bytes to be transmitted (max. 120)
Byte 5..6	reserved (must be zero!)
Byte 7	Version identification, must be 0 with V1.0
Byte 8..127	Data

Data bytes that won't be transmitted due to byte 4 stating an insufficient number will be going to be ignored. Data are directly read in binary mode. Therefore, the whole 8-bit sign set may be used.

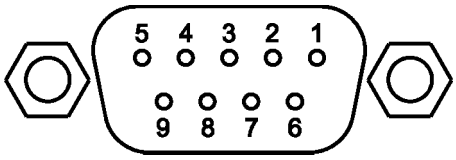
According to Intel-convention storing of the 32-bit value of time in the memory will be going to start by the lowest byte.

Technical addendum

Assignment of connection sockets

V24 in-socket

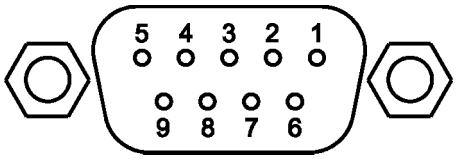
1 Ext 1 (External input 1)
2 TxD (Data input)
3 RxD (Data output)
4 not assigned
5 Connection to Ground BASIX
6 Ext 2 (External input 2)
7 not assigned
8 Ext 3 (External input 3)
9 Ext 4 (External input 4)



PIN 1, 6, 8, 9 are equipped with internal Pull-up resistors against +12 V.

CAN/DMX Out-socket

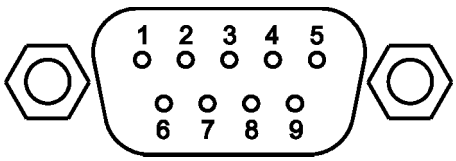
1 DMX-512 minus (inv. output)
2 CAN Bus (low)
3 Ground MPEX
4 DMX-512 plus (not-inv. output)
5 Connection to Ground MPEX
6 Connection to Ground MPEX
7 CAN Bus (high)
8 not assigned
9 Output *12V max. 50 mA



Total load voltage on Pin 9 of both the sockets CAN/DMX OUT and CAN/DMX IN mustn't exceed 50 mA in total!

CAN/DMX IN-socket

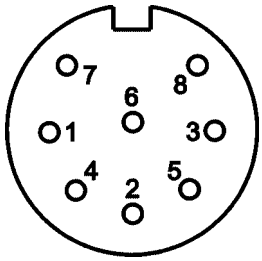
1 DMX-512 minus (inv. input)
2 CAN Bus (low)
3 Connection to Ground MPEX
4 DMX-512 Plus (un-inv. input)
5 Connection to Ground MPEX
6 Connection to Ground MPEX
7 CAN Bus (high)
8 not assigned
9 Output *12V max. 50 mA



Total load voltage on Pin 9 of both the sockets CAN/DMX OUT and CAN/DMX IN mustn't exceed 50 mA in total!

AC-24-socket

2 Connection to Ground BASIX
5 24 V input, power supply



The remaining pins of the MPEX are not used.

MIDI IN-socket

MIDI OUT-socket

The MIDI-sockets are showing the standardized MIDI-assignment. According to specification, MIDI-input is conductively separated by an photocoupler.

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