DOEPFER MUSIKELEKTRONIK

DREHBANK

Drehbank : The machine with the licence to turn.

Owners manual, 2nd edition.

(Version July 20, 1999)

Doepfer Musikelektronik

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Foreword

You will have received your **Drehbank** with software version 1.xx (where xx is the current revision number of the version 1 software). This software has been checked by Doepfer and by our beta-testers, and is believed to be practically bug-free.

But in any new software of such complexity, we know that it's possible that hidden bugs may still exist. If you find one, we would be grateful if you could let us know the exact details. We will try to remove the bug as quickly as possible.

To update your device at the current state you then had to contact your local dealer.

This offer only applies to software faults. It doesn't apply to updates which improve upon the facilities in your current software, as detailed in this manual.

Actual upgrades of the software will regularly be available to buy.

To update the software, it's necessary to open up the **Drehbank** to change the EPROM. Users carry this out at their own risk: problems caused by incorrect insertion of an EPROM are not covered under guarantee.

Throughout this manual, reference is made to various products which have registered trademarks, without necessarily indicating they are registered. The absence of the ® mark shouldn't be taken to imply that the product name can be freely used by anyone. Nor should it imply any right to use material that is legally protected by a registered trade name or mark, or protected by patent.

Please also take note that DOEPFER Musikelektronik GmbH offers no warranty and accepts no legal responsibility for damage caused by or consequential on the use of this equipment, its hardware or its software, or this manual. We categorically deny responsibility. We also reserve the right to alter software and/or the contents of this manual without notice.

Contents

Chapter

1

Introduction

About the Owner`s manual

This manual is intended for those who enjoy to browse through instruction manuals, and for those of you who have picked this book up for the very first time, only because something doesn`t work or through misuse of the **Drehbank** irreparable damage has been caused to the future of all mankind. ☺
But jokes aside, systems damage through use of the **Drehbank** is almost impossible.
The worst things that can happen to the user during use are (1) that the computer crashes, (2) you experience a systems error which can only be cured by the resetting of your computer, (3) you experience a systems error while in the editor program before you have saved the data.
But before you integrate the **Drehbank** onto your Midi setup please read the following chapters to see which systems are compatible and how you should install the editor software.
So as not to become confused while reading the manual we recommend that you read each chapter through from start to finish and in order. In that way each chapter will make more sense.
We also recommend that you read the **README.TXT file** on the Editor disc and print it out because the information on the disc will be more up to date than the information found in the manual.

Warning
This goes especially for units that are sold after February 1999. Here you will find several important notes on the 4 ROM presets, information on which is not listed in the manual, also any errors that we have found in the writing of the manual will be updated in the README.txt file.

Also after the installation of the editor program you will find an built-in **'DB_HELP.HLP'** help file available to you online. In this file you will find the most up to date information on the **Drehbank** Unit.
Site address:
http:// www.doepfer.de/pub/download.htm

Presets / Files

There are several preset files incuded on the Editor Disc → **README.TXT file.**
These can be used directly or used as a basis for creating your own preset libraries.
We at **Doepfer** are continually creating new presets that will be available for downloading from the InterNet.
Site address:
http:// www.doepfer.de/pub/download.htm

NOTE

Information that we feel is of extra importance is printed in boxes of grey and black like this one throughout the manual.

Chapter

2

Installation

The hardware unit: Drehbank

Front panel
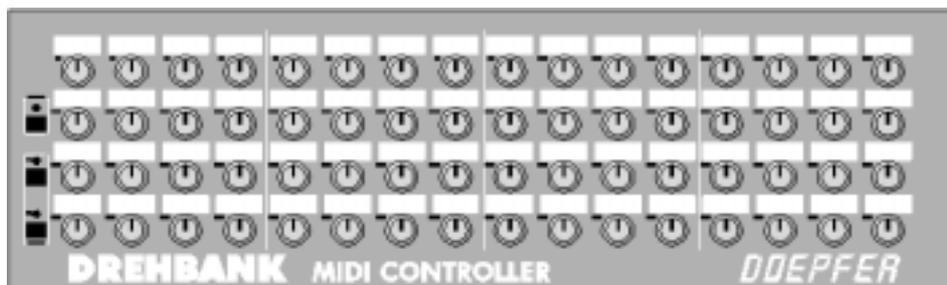
- 64 control knobs
- 64 labelling pads (for the user to label the function of each control knob).
- 3 switches (on the left side of the unit; black):
  - (one) to create a „Snapshot" (the top switch)
  - (two) to switch from one bank to the other (the lower 2 switches)
- 3 L.E.D.s, one above each switch which indicate:
  - When a 'Snapshot" is being sent
  - Midi events
  - Which of the two banks is in use

Back panel

- 8 external control inputs (optional)
- Power input connection
- Midi Ports
- MIDI-In
- MIDI-Out / Thru (Merge)

OPTIONS: THE 8 EXTERNAL CONTROL INPUTS

If you have a unit fitted with the optional external control inputs, you will find the 8 external inputs at the rear of the unit (labelled **external inputs**)

The 8 external inputs are assigned to the following control knobs;

External input (at rear, left to right)	Control knob on front panel	Default settings
1	31	Control voltage
2	15	Control voltage
3	47	Control voltage
4	63	Control voltage
5	32	Foot controller
6	48	Foot controller
7	16	Foot controller
8	64	Foot controller

NOTE:

Further information on the external control inputs is to be found in the Appendix

UPDATING THE OPERATING SYSTEM

For this you will need a new EPROM, a Phillips screwdriver, and an I.C. tool. If you don't have your own EPROM burner we will send you a new EPROM (you must pay for the post and package costs).

NOTE

If you decide to update yourself you'll have to exchange the   old **EPROM** against one with the latest software.

First of all, ensure that the unit is disconnected from the mains. When installing the new EPROM make sure to install it in the correct position, the notch on one side of the component is there to guide you. The EPROM I.C. socket should have a corresponding mark. Be careful when installing the new EPROM because the component is quite delicate.To exchange the EPROM we recommend that you pull it out horizontally eg. with two screwdrivers simultaneously or with a specialized I.C. tool. Be careful not to to damage the component by bending its pins. The same care is needed for the installation of the new component. Don't push too hard! Check that the pins of the new component are not bent out of shape.

The EPROM component.
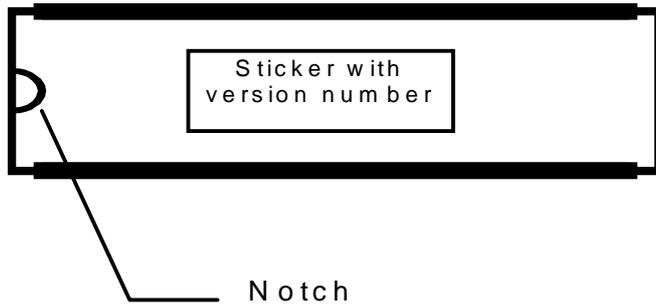
- Before you reassemble the unit make sure that
- the EPROM is inserted correctly (if incorrectly inserted then it's goodbye Mr EPROM when you turn on the unit)
- you haven't loosened or disconnected any of the components or the wiring.

With the second version of the **Drehbank** series (availible from February 1999 and identifiable by the 3 switches and L.E.D.s) the non-volatile EEPROM memory is doubled. Therefore, with each control knob you can generate a Midi-string comprising 113 bytes, instead of 55 bytes as is the case with units from the first series.
If you want to update the first series you'll need software versions above 1.1 and a new EEPROM memory chip (type X25128). With this installation please take the same care recommended for the EPROM update (see previous page).

You'll find the EEPROM memory chip (with the notch of the EPROM pointing upwards) on the right hand side of the processor (that's the large black square component at the centre of the circuit board). Owing to the small size of the chip it may not have a notch to guide you, but it does have a spot - indicating pin no. 1 - printed in one corner to act as a guide. This point should be in the corner furthest away from the processor when correctly installed.
Only power up once you have correctly reassembled the unit and screwed the case back together.

Software: The Drehbank Editor

On the included DOS–formated disc you will find the **Drehbank** editor software.

> ### Warning
>
> Before you install the editor program (**Please, Please, Please**) read the README.TXT(help) file.
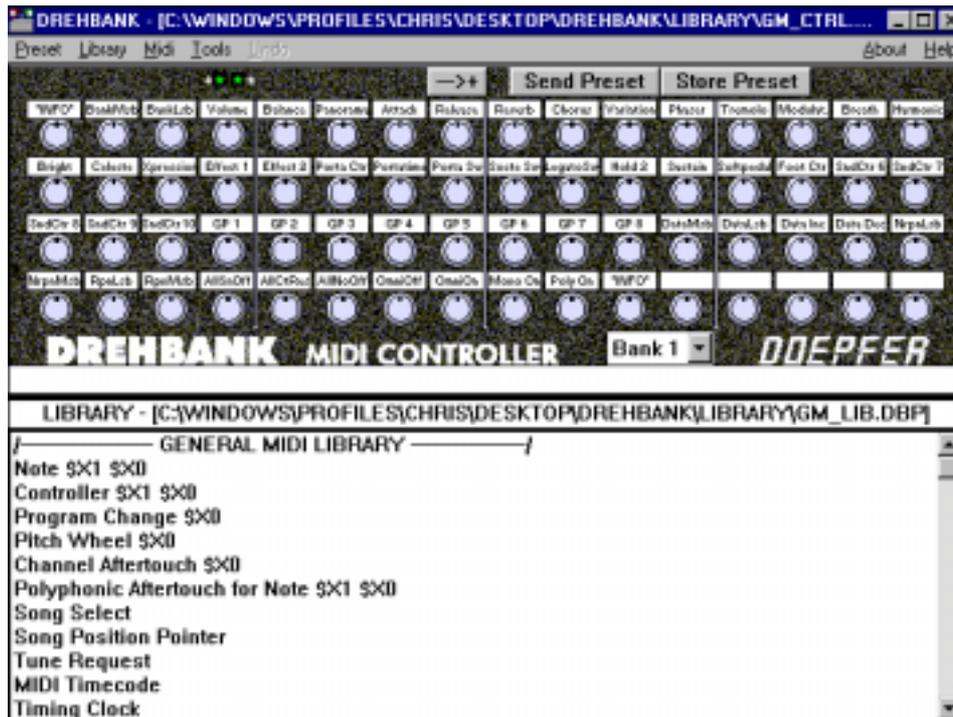
Installing the Drehbank Editor

System requirements

The **Drehbank** Editor is a Windows application which requires the following system
- IBM compatible PC .
- CPU > 90 Mhz (recommended)
- > 8 Megabyte RAM (recommended)
- > 2 Megabytes of free space on the hard drive/disc.
- Windows 3.x, Windows 9x, or Windows NT.
- VGA Monitor with a resolution of at least 640x480.
- MIDI Interface (e.g. soundcard with MIDI Interface).
- Multimedia Midi cable to connect the **Drehbank**.
- 3.5" floppy drive or InterNet connection.
- **Drehbank**.

The editor program also works <u>without</u> a **Drehbank**, because the program needs no feedback from the **Drehbank.**

Installation

To install: initiate/execute INSTALL.EXE. Once you've installed the application you'll find a subfolder titled **Drehbank** in the directory you have chosen.
You can also create a link on the desktop for quicker access to the editor application. To start the program simply doubleclick on the **Drehbank**.EXE file.

De-installation
The editing software has no effect on the operating system of your computer, therefore you can simply delete the **Drehbank** folder from your hard disc.

Updating the Editor Software

You will always find the most up to date version of the editor software on the Doepfer homepage: **http://** www.doepfer.de/pub/download.ht**,** stored as a file titled **DBXX.ZIP** where XX stands for the version number. For example version 1.1 is titled DB_11.EXE. Simply download the file, unpack it into a temporary directory and install it in the same way as a new installation.

The Editor on the Emagic SoundDiver(OEM-Basis) for PC& MACINTOSH.
From autumn 1999 we at Doepfer hope, that we will be able to offer a special version of the Emagic SoundDiver program.
This could be very interesting alongside an existing **Drehbank** editor as those of you who work with the SoundDiver won't have to switch to a new editor program. Above all it gives Macintosh users the possibility to edit their **Drehbank**s without having to buy a P.C. ☺
Further Information on this topic can be attained by reading the README file on the disc or on our homepage.
When available it will become part of the standard **Drehbank** package.
We cannot offer this software on the InterNet to download free of charge because the OEM-Version from **Emagic** is not public domain software.

Chapter

3

The Basics

What is the Drehbank?

The Doepfer **Drehbank** is a user definable Midi control unit with 64 rotary control knobs.

Any midi event can be assigned to any control knob. Each knob lets you control Midi events in the form of Midi-strings. You can control simple events like volume, reverb, panorama, etc., or you can create complex **SysEx** strings.

The setting of each control knob is stored in a preset. A preset is organized into two interchangable banks, each containing 64 control knob functions. The presets are normally created in the **Drehbank** editor, stored on a **PC,** and from there sent to the **Drehbank**.
You can store a preset in the non-volatile memory (EEPROM) of the **Drehbank**. So that the **PC** editor program can have a little snooze as soon as the preset is stored in the memory of the **Drehbank**. ☺

Features

- 2 banks (each activated by a corresponding switch)
- indicators for the activated bank (2 L.E.D.s one above each bank)
- 64 controllers per bank, each with the following parameters:

- Midi strings with a maximum of 113 bytes per string.
- Up to 16 definable variables per Midi string (each variable needs 7 Bytes).
- Any variable can be assigned to any control knob.
- For the variables there are 20 predefined data formats available.
- The scale and range of each variable is adjustable.
- control resolution can be definable up to 255 steps.
- control threshold adjustable from1 to 255.
- The offset and reference voltage of the AD converter is adjustable in 12 steps per control knob.

- The non-volatile saving of presets (2X64 control knobs).
- „Plug & Pray" ☺ →You „switch on" and the preset from the non-volatile memory works.
- The possibility to connect 8 external controllers.
- ‚Snapshot' function.

The front panel

64 control knobs/potentiometers

Drehbank incorporates 64 control knobs/potentiometers that have a control voltage range from 0..+5V. Internally the control voltage is translated into digitial information. A full turning of the control knob has a range of 256 values from 0..to.255.That means that the variables have a range of 256 steps.

> ### Note
>
> There may be slight fluctuations in the potentiometer tolerance levels for which we accept no liability.

The spacing between the potentiometers is rather small. _We know._ This is a compromise owing to the exeptionally large number of control knobs. Would you buy a unit that's 8 feet long? ☺

64 Labelling pads

These pads allow you to label each individual control knob for easy reference of your setups.

> ### Note
>
> Only use light pencils when writing on the labelling pads, otherwise it won't be possible to use the pads again and again.........

SWITCHES

On the left of the unit you`ll find 3 black switches with the following functions:

RECALLING THE ORIGINAL SETTINGS/ ROM PRESETS

As you will see the **Drehbank** unit has no ON button/switch. To activate the ROM presets you must press a switch at the same time as you plug the power In (see the README.TXT file).
The indicator above the pressed switch will not light up, but instead the other two indicators will flash.
E.g., when turning the unit on you press switch 1 (the top switch), to select ROM preset 1. The L.E.D. above that switch will not light up, but the other 2 L.E.D.s will light up. This inverted indication system also goes for the recalling of the other presets.

This means that the **Drehbank** at that moment loads the ROM preset and will wait until you release the switch.
After this the **Drehbank** returns to normal operation mode and switches to bank 1, the L.E.D.s are now also in normal operation mode.
Now the **Drehbank** is ready _to ROCK._ ☺

The recalling of the ROM presets has no effect on the nonvolatile memory (EEPROM). The preset that you loaded from the editor software into the nonvolatile memory still exists. To activate it again you must turn the unit off and on again.

SWITCHING BETWEEN THE 2 BANKS

For each bank there is one switch and one L.E.D. indicator.

Simply select a bank by pressing either of the bank switches on the **Drehbank**. The **Drehbank** will then activate the selected bank, which is indicated by the flashing of the L.E.D. above the pressed switch.

CREATING AND SENDING A SNAPSHOT

To create a Snapshot you must first press the top switch (labelled snap)**.** When the switch is pressed for about a second the L.E.D. (that is otherwise inactive except for Midi activities) blinks rapidly. Press the switch again within a second and a **Snapshot** will be sent, indicated by a long flash of the L.E.D. This flash is important, because if you trigger a **Snapshot** accidentally (or at the wrong time) you could overload the Midi connection.

Once the **Snapshot** has been sent the **Drehbank**   returns to bank indicator mode.

Important

If you change your mind and don't want to send a Snapshot (or if you go into the mode by accident) just wait until the L.E.D. stops blinking, (after one second)

Remember

A Snapshot sends the controller values of all 64 knobs from the active bank.

L.E.D.s

The L.E.D.s are on the left side of the unit, one above each switch.

They indicate the different operation modes and actions of the   **Drehbank**.

OPERATION INDICATORS

When the **Drehbank**   is switched on all 3 L.E.D.s light up and stay lit for about 5 seconds. In this time the data from the non-volatile memory (EEPROM) is transfered to the work buffer (RAM, volatile memory) of the unit. When this is completed the L.E.D.s switch off and the L.E.D. that indicates bank 1 lights up, as bank 1 is then active. If this does not happen then either the power input is not correctly connected to the **Drehbank** or it's possible that the plug or the **Drehbank** has a defect.

BANK INDICATORS

The indicators show which bank is active:

- L.E.D lit over Bank 1 (Bank 2 off) indicates **BANK 1 is** active.

- L.E.D lit over Bank 2 (Bank 1 off) indicates **BANK 2 is** active.

SNAPSHOT MODE

Once the snapshot switch has been pressed the L.E.D. above it blinks rapidly. By pressing the switch once again within a second a „Snapshot" will be sent and this is indicated by the L.E.D staying lit (again for about a second). After this the L.E.D.s returns to bank indicator mode.

MIDI EVENTS INDICATOR

Under normal operating the L.E.D. which indicates the Snapshot mode is switched off. For that reason this L.E.D. (top) is also used to indicate **Midi events**.
The L.E.D. flashes for every activity on the Midi bus (both Midi In, and Midi Out).
Midi events are normally performed very quickly and therefore the flashing of the L.E.D. is hardly noticeable. Turn a controller and watch the glow of the L.E.D.
The indicator also shows if a control knob is sending an event. Also you can see, if the **Drehbank** is receiving Midi data.(e.g.the receiving of information from the editor program.)

MIDI TRANSFER ERRORS.

If the **Drehbank** experiences an error in the receiving of data, the unit will turn the bank indicator off and switch on the Snapshot L.E.D. which will flash continually. Despite this the **Drehbank** unit is still operational. By pressing the Snapshot switch you can reactivate the Bank and Snapshot indicators.

> Note
>
> Under normal operating conditions this error should not occur.

Non volatile memory/presets

When you turn on the **Drehbank** without going into the editor program you'll find several complete presets already available.

These are:

- **The Fixed ROM Presets**, which are found on the EPROM, with the operation software of the **Drehbank**, but this can only be altered by updating the EPROM.

> Note:
>
> The layout of ROM preset 1 is printed in the appendix. Information on ROM presets 2, 3, and 4 is found in the README.TXT file.

- The Changeable non-volatile EEPROM Preset. This preset is located in the internal non-volatile memory (EEPROM) and will under normal operating conditions be loaded into the work buffer (RAM).

Power input/ Power supply

The **Drehbank** is powered by an external DC power supply. A 230V power supply with Euro plug is included in the package. For countries with different voltages or plug sockets you'll have to buy the appropriate power supply in your country (9V DC@250mA output required). On the unit there is no On/Off switch. So to turn the unit on and off you have to connect / disconnect the power cable. Alternativly we recommend using a multiple mains socket with an On/Off switch.

The MIDI Connection

The **Drehbank** merges the Midi data coming into the Midi In port with the generated data of the respective control knobs. The complete merged data is then sent to the Midi Out port.

> **Note**
>
> **Drehbank** normally works in Midi Merge mode.

> **Important**
>
> If there is a lot of data coming into the Midi In port it is possible that the **Drehbank** will have problems with merging, as the internal memory has a limited capacity.
> When transferring a lot of Midi events we recommend the use of an external merger.

The **Drehbank** editor and the **Drehbank** communicate via Midi. This requires a sound card with Midi interface or a special Midi card that works with the **Windows** multimedia driver (e.g. the Unitor from **Emagic**). You can configurate the Midi In and Out ports through the **Windows** menu titled Multimedia/Midi.

Use a Multimedia cable to connect the **Drehbank** to the 15- pin Sub-D socket on your soundcard joystick connection).
Connecting the **Drehbank**s **Midi Out** to the P.C. is not necessary, because the **Drehbank** doesn't require a "handshake".

> **Note**
>
> Please take care that you don't create Midi loops, because the PC could crash!

To avoid creating loops we have built in the option to deactivate the merge mode in 3 steps (found in the editor program).

Editing with the Editor software

The basic concepts of editing with the editor software are based upon the *"Drag & Drop"* principle. In **"Control Copy"** mode you can „drag" a controller and „drop" on the chosen control knob; you use the „drag and drop" also when working with the library. In „**Control Exchange"** mode you can exchange the controllers. To switch between the modes press the following symbols.

--->+   for "Control Copy" mode.
<--->   for "Control Exchange" mode.

If you „drop" something unintentionally, **DON'T PANIC,** there is a seperate **undo** function for each bank**.**

Every step you make will be sent straight to the **Drehbank** so that you can check every function right away.

You can „**Drag"** and „**Drop"** from bank to bank. First: **click once** on the bank symbol „**Drag"** and then select the bank with the arrow keys, Then click on „**Drop"** in the selected position.

If you click with the rightmouse above a control, you'll go into the „**Properties Dialogue".** Here you can change various parameters of the control knob functions.

If you're big into Midi then with a **doubleclick** of the leftmouse you can access the **edit control dialogue.** Here you can also create SysEx strings.

> ### Warning
>
> If you don't have the "Know How" you should leave Edit Control Dialogue alone!

The **GM_LIB.DBP** file includes the complete control functions of the General Midi Standard.

The Editing Software

Opening and saving a Preset

The **Drehbank** editor includes some presets that you can use as a basis for creating your own preset files.

Click in the **„preset"** menu on **open** to access the data browser. There you can select a preset and load it by clicking on **O.K.** The information in the preset is then loaded to the **Drehbank** editor and sent to the **Drehbank** unit.

To save a preset click on **save** in the **„preset"** menu, and then title the preset in the data browser. Take care when writing the file name, the letters **.DBP** must appear at the end of the file name e.g.**"NONAME.DBP"**

Opening a Library

To create a preset, you have the option to use the original control functions settings in the Library. Click in the*"Library"* menu on **open** to access the data browser. Select a library file and then click on **O.K.**.You will see the „Descriptions" of the control functions listed in the library window on the **Drehbank** editor.

Note

You can also open a preset as a library, to enable you to use the control functions from other presets.

The difference between presets and libraries is that the Libraries are formed from a collection of „Universal" controller functions, whereas presets are built from control functions that perform specialized jobs. For easier use the presets and libraries are tored in different folders.

Controller Properties

Most of the control functions from the libraries have variables with which you can control Midi events e.g. Midi channel.

To change the properties of a knob click once on the rightmouse and then on „properties". Now you're going to get what you've been looking for! (the properties menu, **yippee**) ☺. Here you can alter the settings of the selected control knob with the **pop up menus**, e.g. Midi channel, controller numbers. To activate the changes click on „**O.K.** or cancel to abort.
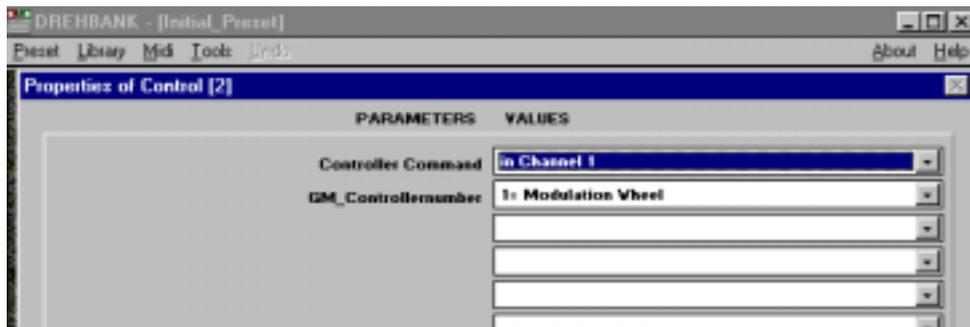
When the **Drehbank** is connected correctly to the P.C editor you can then immediately check the revised control functions.

Preset sending and storing

When you press the **" Send Preset"** button you send the complete preset from the editor to the volatile memory (RAM) of the **Drehbank.** With the **„Store preset"** button you copy the complete preset into the non-volatile memory (EEPROM) of the **Drehbank**. This takes about 82 seconds. During this **eternity** ☺ the L.E.D. will blink constantly.
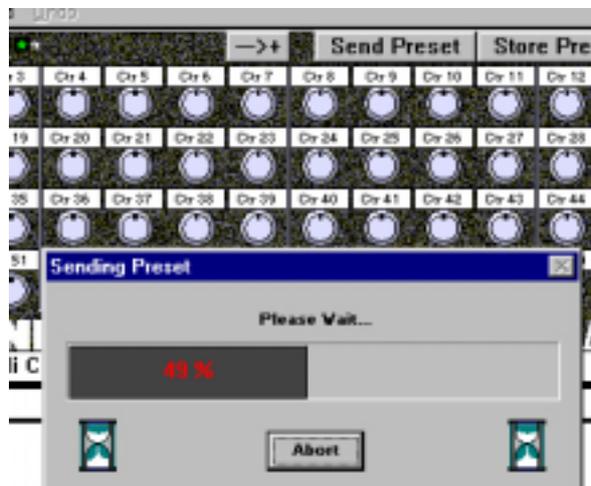
Note

1. Don`t forget to save your preset.
2. When you switch the unit Off and On again the non-volatile memory still exists.

Sysex files / Preset Text files

SysEx Files .**SYX** are files with one or more MIDI system exclusive messages in binary code.
The **Drehbank**   needs to have one separate SysEx message per control knob, so that a complete **Drehbank** SysEx File is built from 128 single SysEx messages (2 banks with 64 control knobs per bank).

Remember

SysEx stands for "System Exclusive Message". SysEx is a Midi event that has only one norm. This norm begins with byte F0 (Start of System Exclusive Statusbyte) and ends with byte F7 (End of System Exclusive Statusbyte).
All bytes between F0 and F7 are freely definable. The format for SysEx implementation is usually to be found in the manual of the equipment you are using with the Drehbank.

Generating SysEx files

Select "**Make Sysexfile**" from the "**Preset**" menu and a dialogue window opens. Here you can select the knob you want to integrate into the SysEx file. Click on O.K. to open the data browser so as to name and save the file. Make sure that at the end of the file name you type .**SYX**
You can send these SysEx files from a sequencer or a SysEx dumper to the **Drehbank**.

Warning

When dumping Sysex data from a sequencer or SysEx dumper to the **Drehbank** make sure that between the SysEx information of each control knob there is a gap of at least ten (or more) milliseconds. If the gap is not long enough then it is possible that you could **overload** the Midi buffer. An Midi buffer overload is indicated by the constant glowing of the L.E.D.

Generating Text files

If you click on "**Make Textfile**" in the **"Preset"** menu you can generate a **textfile** to document your **SysEx files.** In this case make sure that the letters at the end of the file name are **.TXT**

Editor Tools

In the **"Tools" menu** the following functions are available.
Be aware: there is no **undo** function!

Copy Bank 1 ---> Bank 2
Copies all of the control functions of bank 1 to the control functions in bank 2.

Copy Bank 2 ---> Bank 1
Copies all of the control functions of bank 2 to the control functions in bank 1.

Init Bank 1
Returns all the control functions in Bank 1 to their default settings: MIDI Controller 0 to 63 for controls 1 to 64.

Init Bank 2
Initiates all the control functions in Bank 2 to their default settings: MIDI Controller 64 to 127 for controls 1 to 64.

Exchange Bank 1 <---> 2
Swaps the control settings of bank 1 with those of bank 2.
Be aware: there is no **undo** function!

Options

Go into the main menu and click on „options". Here you will find the following options -
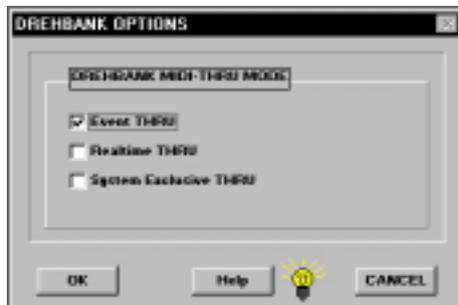
The Midi Thru Mode in the **Drehbank** determines which type of MIDI messages "get-THRU-ed" from the **Drehbank** Midi Inputs to the **Drehbank** Midi Outputs.

Event Thru

When enabled all Midi channel messages e.g. note events, controller events from Midi In are forwarded to Midi Out.

Realtime Thru

When enabled all Midi realtime messages e.g. start, stop, timing clock from Midi In are forwarded to Midi Out.

System Exclusive (SysEx) Thru

When enabled all Midi SysEx messages from Midi In are forwarded to Midi Out.

Editing a control function

Doubleclick the control knob you want to edit and you will get the **Edit Control** dialogue. If you are not familiar with MIDI details you should take a look at the MIDI 1.0 Specification and the Midi Table. Further take also a look how theTables works.

After all (if you are a professional in MIDI) take the Technical Manual of the device you want to control with the **Drehbank**. Here you will find (mostly) its special MIDI implementation. For hexadecimal codes you will need the conversation table or better use the scientific Calculator (->XG-Sysex Example).

If you are complete confused of this hexadecimal arithmetical mysteries, you may find a library that already contains the function that you are looking for. For GM and XG compatible device you have already everything you need in the libraries and there are several more for other specific devices. The ability to edit a control function is made as a tool for Midi pros. Normal users who only work with standard events like Midi Controller etc. should not need to edit a control knob this way. (Notice that your editing can also result in useless Midi Trash which may confuse or hang up some Midi-Expanders or the PC !).
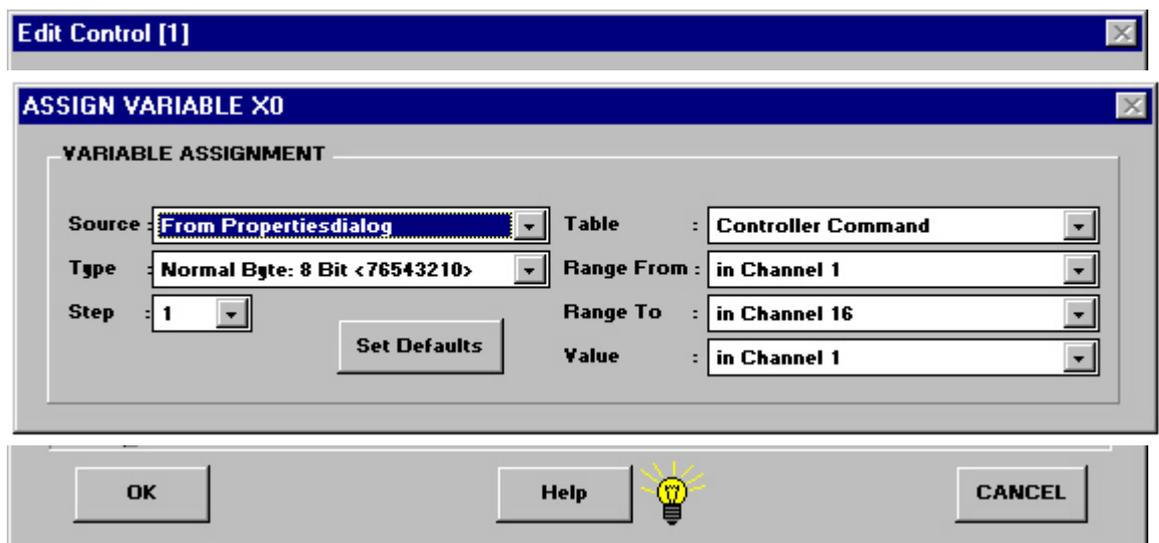
Edit Control: Midi - String

Here you input the byte sequence of the desired MIDI event in hexadecimal notation. You can separate the bytes using space but this is not needed (e.g. B0 07 X0   for Volume Controller in Ch 1).

> ### Remark
>
> Hex is the abbreviation for hexadecimal. HEX is a numerical system (like decimal) using the following 16 characters: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A (=10), B (=11), C (=12), D (=13), E (=14), F (=16)

There are 16 different variables X0..XF you can use in the string for realizing control properties. If you need only one variable for the value byte of the function (e.g. the value byte of a Midi-Controller) just use X0 and set its source on "from itself". This causes the Drehbank to replace X0 with the current value of the control knob.

> ### Remark
>
> A Midi string is a chain of Midi bytes transmitted via the Midi interface to represent a Midi event. Well-known Midi events are e.g. note-on, note-off, program change, controller, pitch-bend after-touch.

Edit Control: Description

Input here a description which identifies the control function. The maximum length is of the description is 80 characters. You may also values, parameter names or table terms in the description. Use the following shorthand expressions:

!XN decimal value of XN
?XN parameter name of XN
$XN entry from the associated table

"N" stands for the number of the variable and must be replaced by 0...F (i.e. X0...XF).

Putting variables in the description string makes only sense if they are assigned as a property of the control function.

Examples therefore can be found in every good library or preset e.g. the GM-Mixer Preset "GM_MIXER.DBP" in which the control functions all have properties to alter the Midi-Channel and the Controller-number whereby this values also appear "dynamically" in the description.

Edit Control: Label

Input here a label for the control knob. Labels can have a max. length of 16 characters. You can also put values of variables in it using **!XN**, **?XN**, **$XN** in the label, the same way as for the description.

<table>
<tr><td>Note</td></tr>
<tr><td>Use low case characters to match in the box without truncation. It is also recommended to use abbreviations (e.g. "ctr" instead of "controller").</td></tr>
</table>

Edit Control: Variable Assignment

You can use 16 different variables X0..XF within the Midistring. As default they are all assigned to represent the value of the control knob itself. Each variable can also be assigned by altering its parameters for more complex functions e.g. to realize SysEx strings which includes checksum or values having another data format. You can also define a value that is linked from another control knob.
Click on the button with the name of the variable or doubleclick on the variable directly in the Midi string to get the dialogue for the corresponding **"Variable Assignment"**. After that in the Edit Control dialogue the **Variable Assignment** window is added or changes if you select another variable.
To select another variable you have to repeat the whole procedure. It is not necessary to close this window. You may continue the input in the Edit control window.
If you **Cancel** the Edit Control dialogue the inputs of the Variable Assignment window are cancelled as well.

Edit Control: Source

Here you select the source of the variable (X0...XF). This means that for the regarding XN the control value of the current control knob is inserted. But you may link a value from another control knob by selecting "fixed from control xy in bank z". The value for the XN in question is now taken from these control knob.

As default each variable is assigned to represent the value of the control knob itself (from itself) with a range of 0...127 and a resolution of 1 digit (Step=1).

<table>
<tr><td>Remark</td></tr>
<tr><td>The value of a control knob results from ist position in a proportional relation.</td></tr>
</table>

If you select "From Properties" the XN is adjustable in the properties dialogue. Values for properties are set directly in the corresponding properties dialogue of the editor and transmitted to the Drehbank as **constant** values.
You can make a control function more flexible and universal by using property variables. With properties you can make changings of the control function e.g. of the Midi channel "on the fly".

Edit Control: Type

Here you can select the data format of the variable. As default each Xn is defined as "Normal byte" which is mostly used. The bit weight notation of a normal byte is <76543210>. You have also the choice of other formats that you should only use if you know what you are doing - if you do not, it is the best way to let it be "normal byte".

> ### Remark
>
> The poperties dialogue supports only the normal byte format.

Edit Control: Table

To show the values of property variables in plain text (e.g. Controller names instead of numbers) and for easier editing each variable is associated with a table that contains plain text for each value. The setting of the table takes no effect in the control function and is also left unrecognized by the Drehbank. If you dont need a special table then let it be on "Hex".

> ### Attention
>
> The settings of the tables are used only in the editor and has no meaning in the **DREHBANK** device.

Edit Control: Range From

This setting represents the value of the assigned control knob at its left end position (ccw, fully counter clock wise). For property variables this defines the lowest available value.

Edit Control: Range To

This setting represents the value of the assigned control knob at its right end position (cw, fully clock wise). For property variables this defines the highest available value.

> ### Note
>
> You obtain an inverted control characteristic if "Range to" is lower than "Range from".
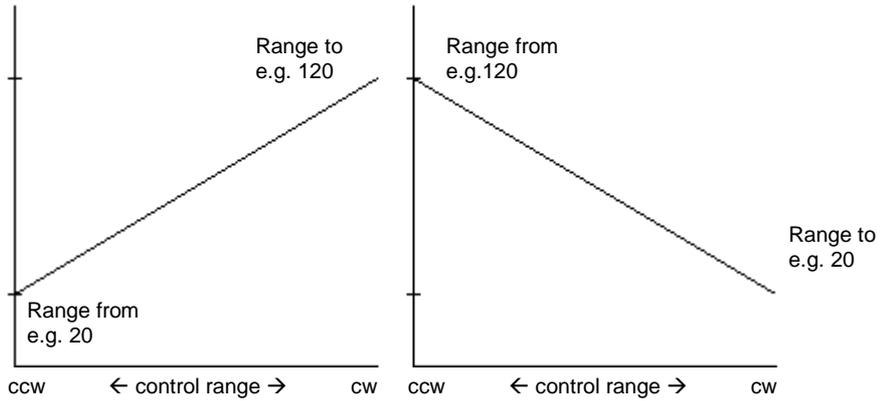
The left picture shows an example with Range from = 20 and Range to = 120. If the knob is turned from left (ccw) to right (cw) the data 20...120 are generated.
The right picture shows an example with Range from = 120 and Range to = 20. If the knob is turned from left (ccw) to right (cw) the data 120...20 are generated. The characteristics is reverse compared to the first example.

Edit Control: Step

Here you set the step resolution of the corresponding control value. As default step is set to 1 for having the full resolution. The 4 pictures show increasing values for the step parameter. The step value cannot be less than the Threshold value.
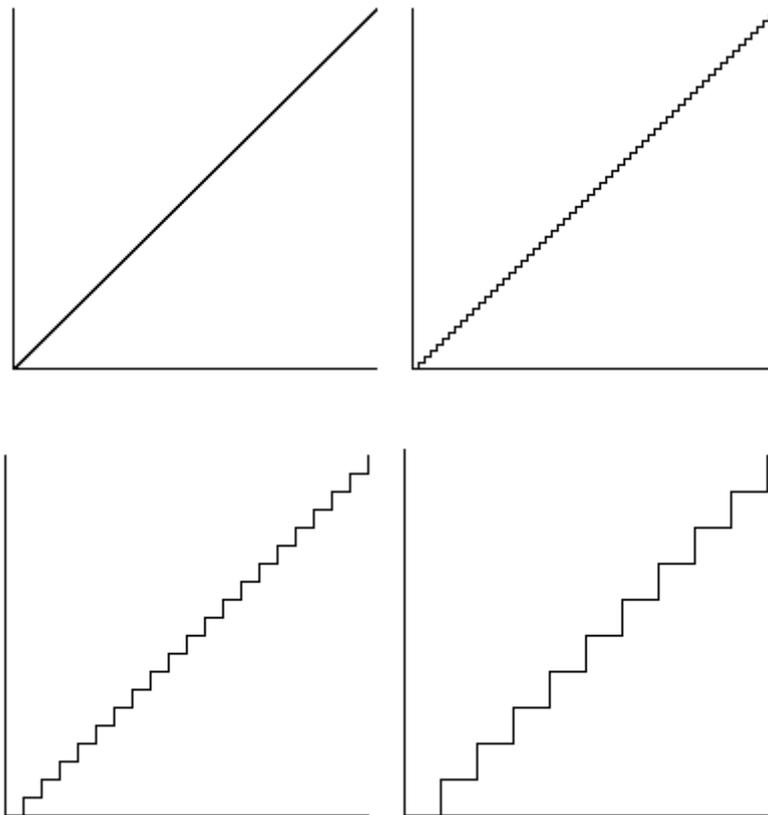
Edit Control: Value

For property variables this is the current or default value. If not on property, this parameter is transmitted to Drehbank but not yet used. For the future this may be used as default value, so set it as default e.g. as the center value for Panorama Controllers or 100 for volume controllers having a headroom of 27 digits.

> ### Remark
>
> For variables not assigned to the Properties Dialogue this value has no meaning !

Edit Control: Sample- Rate

This parameter sets the sample rate of the control knob. It is shown as the cycle time in which the control knob is scanned for its value. Each new value causes the **Drehbank** to send out the Midistring. If the device that you control with the **Drehbank** is not able to process the data coming from the **Drehbank** decrease this value to lower the data stream (e.g. if the message "MIDI buffer full", "MIDI overflow" or similiar appears in the display of the device controlled by the **Drehbank**).

Edit Control: Threshold

Here you can set the threshold for the control knob. A new Midistring will only be sent if the new value of the control knob differs more than the threshold value. Increase this setting to supress redundant Midi data caused by minimal fluctuations. Higher settings lower the Midi data stream and suppress undesired minimal fluctuations. The step value (see above) cannot be smaller than the treshold value.

Edit Control: ADC_GND/ADC_REF

The values of ADC_GND and ADC_REF define the working range of the internal ADC (analog-to-digital converter). The 64 controls of the Drehbank cover a voltage range of 0...+5V as the rotary potentiometers used are connected between GND and +5V. The setting for ADC_GND or ADC_REF should be changed only if a external control voltage or foot controller is used that covers not the whole voltage range of 0...+5V. If the maximal or minimal data values cannot be reached the values for ADC_REF or ADC_REF may be changed to obtain the complete data range. Especially many foot controllers do not cover the whole voltage range as the potentiometers inside do not turn the full cw-ccw range but only a part of the full range.

Building a Library

Since the **Drehbank** library files use the same file format as the preset files they are made as a Preset using the Editor. The difference between libraries and preset is that libraries may have all the control functions of a special device whereby the presets have a special arrangement of this control functions. How to build your own control function is described at "Editing a control function". Librarys should be saved in the Library folder of the **Drehbank** directory to keep them away from the Presets.
For building a new Preset or Library we recommend to start with the empty preset **EMPTY.DBP.**

If you have built a good library for a device or a special preset we would be glad if you send it to us via E-Mail and we will do our best to put it immediately onto the download area of our web page so that other customers could use them as well. There you will find several other presets and libraries which are not yet included in the latest Software.

If you send us a preset or library make sure that it is only made for one special device and that it works well. Maybe you will also take profit from the presets/libraries of other users.

Chapter

5

Appendix

ROM Preset 1

Bank 1

In bank 1 there is a preset full of the most important Midi controllers, all to be found on Midi channel 1.

Slot-Nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Channel	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01
Midi-Controller	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Slot-Nr.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Channel	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01
Midi-Controller	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Slot-Nr.	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Channel	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01
Midi-Controller	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
Slot-Nr.	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Channel	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01	01
Midi-Controller	91	92	93	94	95	64	65	66	67	68	69	86	87	88	89	90

Bank 2
Bank 2 includes a selection of 4 Midi controllers (Expression, Modulation, Panorama, Volume) each controller is to be found on the Midi channels 1 to 16.

Slot-Nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Channel	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Midi-Controller	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Slot-Nr.	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
Channel	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Midi-Controller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Slot-Nr.	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Channel	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Midi-Controller	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Slot-Nr.	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
Channel	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
Midi-Controller	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Key to Midi controller numbers

0= Bank select MSB
1= Modulation wheel
2= Breath control
4= Foot control
5= Portamento time
6= Data entry MSB
7= Channel (Main) Volume
8= Balance
10= Panorama
11= Expression Control
12= Effect Control 1
13= Effect Control 2
16= General Purpose 1
17= General Purpose 2
18= General Purpose 3
19= General Purpose 4
64= Damper Pedal (Sustain)
65= Portamento Switch
66= Sostenuto Switch
67= Softpedal
68= Legato foot switch
69= Hold 2
70= Soundcontrol 1 (Variation)
71= Soundcontrol 2 (Harmonic)
72= Soundcontrol 3 (Release)
73= Soundcontrol 4 (Attack)
74= Soundcontrol 5 (Brightness)
75= Soundcontrol 6
76= Soundcontrol 7
77= Soundcontrol 8
78= Soundcontrol 9
79= Soundcontrol 10
80= General Purpose 5
81= General Purpose 6
82= General Purpose 7
83= General Purpose 8
84= Portamento Control
91= Effects Depth 1 (External)
92= Effects Depth 2 (Tremolo)
93= Effects Depth 3 (Chorus)
94= Effects Depth 4 (Celeste)
95= Effects Depth 5 (Phaser)

> Note : all numbers that have no fixed function are free to be defined by you.

External Inputs Option

If you have bought a unit with the external inputs option you will find 8 ¼" sockets at the rear of the unit, which are labelled *External Inputs*.

The 8 external sockets correspond with 8 of the control knobs on the right hand side of the unit (15, 16, 31, 32, 47, 48, 63 and 64). See below.

Input socket number (at rear, left to right)	Controller knob on front panel	Default settings
1	31	Control Voltage
2	15	Control Voltage
3	47	Control Voltage
4	63	Control Voltage
5	32	Foot controller
6	48	Foot controller
7	16	Foot controller
8	64	Foot controller

Inserting a jack into an external input plug overrides the corresponding control knob on the front panel of the **Drehbank** unit. The transmitted control values are derived from the external control voltage.

The Midi function of the external input then corresponds with the Midi function of the corresponding control knob.To the **Drehbank** it is irrelevant whether the control value is supplied by the control knob at the front panel or by the external control voltage (also the 64 control knobs generate internally a control voltage with a range from 0...+5V).

For the external inputs there are 2 operational modes

- "real" control voltage inputs (CV mode)
- foot controller inputs (FC mode)
-

Control voltage operation (CV mode)

In this case the external input plug needs to be supplied with a „real" control voltage within a range of 0...+5V. An example of this could be the conversion of the control voltage from an analog modular system (e.g. the Doepfer A 100) into Midi data. You could use the voltage output from a Theremin module (A-178), a light-to-CV converter (A-179), sequencer (A-155), S&H (A-148) or any other control voltage source of the A-100 system to generate the corresponding Midi data using the external inputs of the **Drehbank**. You can even generate speech controlled Midi data with the analysis section of the Doepfer Vocoder (A 129/1).

> **Warning**
>
> The voltage supplied to an external input should always stay within a range from 0...+5V. The **Drehbank** has built in security circuits which will protect your unit to a certain extent against minimal fluctuations, however the unit should never receive voltages above +10V and under -5V through the external inputs as it could, and probably will damage the unit.

The jack, through which the control voltage is transmitted, must be configured as follows:

Control voltage (CV)
Unused (N.C.)
Ground (GND)

Jack configuration for cv mode
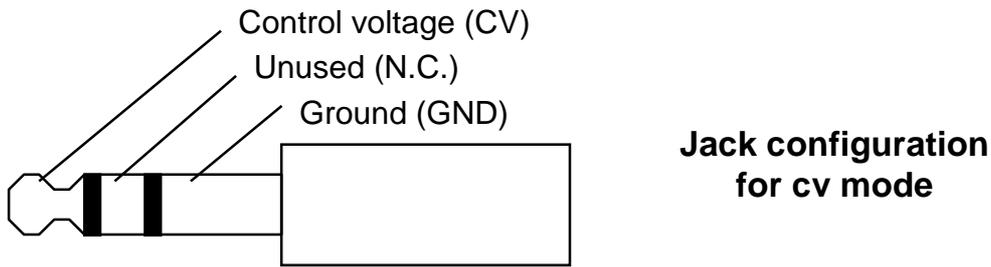
You can also use a mono jack (pin hot).

In the default settings, the external inputs 1, 2, 3, 4 correspond with the controller knobs 31, 15, 47, 63 and are set for control voltage mode.

When the supplied control voltage does not cover the complete voltage range from 0...+5V the full Midi data range is not available. In this case the range of the corresponding control knob may be adjusted by altering the settings for the lower and upper reference voltage of the ADC (analog digital converter). See →MAIN EDITOR Window (Edit Control: ADC_REF and ADC_GND)

Foot controller Operation

When a foot controller is connected to the external input it does not supply a control voltage but represents a variable resistor (voltage divisor or potentiometer). The **Drehbank** sends a fixed control voltage of +5V to the input (connected to the ring of the ¼" jack), so the potentiometer inside the foot controller can generate a variable control voltage going back to the **Drehbank** (connected to the tip of the ¼" jack, same as in CV mode). The required potentiometer needs to have 3 connections: low position, middle position (wiper), and high position. The potentiometer in the foot controller should have a total resistance within the range between 5k...25k. Some foot controllers are fitted with potentiometers that have only 2 connections, these cannot be used with **Drehbank**.

When working with a foot controller the stereo jack must be configurated as follows,

Middle position (CV)
High position (= +5V)
Low position (GND)

Jack configuration for fc mode

Be careful as to which foot controller you buy, make sure that it is compatible with the **Drehbank**. We recommend the Doepfer FP5/DB foot controller (special version for the **Drehbank**, the FP5 version used with our keyboards is not compatible as the jack connection is different !).

In the default settings of the **Drehbank** the external inputs 5, 6, 7, 8 corresponding with the controller knobs 32, 48, 16, 64 are set for foot controller mode.
When a foot controller does not supply a control voltage covering the complete control voltage range from 0...+5V the full MIDI data range is not available. In this case the range of the corresponding control knob must be adjusted (same as for CV mode).

If desired the operation modes of the 8 external inputs can be redefined (e.g. all 8 inputs redefined as foot controllers or CV inputs). This should only be done by a authorised Service-dealer or directly by Doepfer, so as not to loose your warranty. The same goes for the installation of the CV option, i.e. if the **Drehbank** does not contain the CV option and this option has to be installed later.

If you then still want to modify the unit yourself in any way despite our warning we will send you the **Drehbank** service manual for a small fee. The correct procedures are listed in this manual. Simply send us DM 20 (or 10 Euro) with the serial number of the **Drehbank** or a copy of your purchase receipt.

The Address is Doepfer Musikelektronik GmbH, Geigerstr.13,   D-82166, Graefelfing, Germany. The manual will also be available on our internet site http://www.doepfer.com.

Bibliography

This bibliography is subjective, and not guaranteed 100% accurate !

The most-up-to-date printed specs for General MIDI, MIDI, and the MIDI file format can be obtained for a few bucks from:

International MIDI Association
23634 Emelita Street
Woodland Hills, California 91367 USA

Steve De Furia & Joe Scacciaferro,
"MIDI Programmer's Handbook"
M&T Books
ISBN 1-55851-068-0

Michael Cxelperger: ***"Introducing Standard MIDI File"***.
Electronic Musican,
April 1989, S. 50ff

Title: ***"Computer music in C"*** / Phil Winsor & Gene DeLisa.
Publisher: Blue Ridge Summit, PA : TAB Books (Windcrest label), c1991.
Subjects:
Computer sound processing.
Computer composition.
C (Computer program language)
Midi programming
ISBN: 0-8306-3637-4 (p) : $22.95
It has a C source disk for the PC available for $25.

Title: ***"Mind over MIDI"*** / edited by Dominic Milano by the editors of Keyboard magazine.
Publisher: Milwaukee, WI : H. Leonard Books, c1987.
Series Name: The Keyboard magazine basic library
Other Series Names: Keyboard synthesizer library.
Subjects:
MIDI (Standard)
Computer sound processing.
ISBN: 0-88188-551-7 (pbk.) : $12.95
The book consists mostly of reprints of KEYBOARD magazine articles
from the early-mid '80s plus several appendixes containing the
MIDI 1.0 specification, a list of references, a glossary, etc.

"Atari ST Introduction to MIDI Programming"
Len Dorfman and Dennis Young
ISBN 0-916439-77-1
Bantam Books,Inc.
666 5th Avenue
New York,New York
10103

Title:***"Music through MIDI : using MIDI to create your own electronic music system"*** / Michael Boom.
Publisher: Redmond, Wash. : Microsoft Press, c1987.
Subjects:
MIDI (Standard)
Musical instruments, Electronic.
Electronic music--Instruction and study.
Computer sound processing.
ISBN: 1-55615-026-1 (pbk.) : $19.95

Title:***"The MIDI drummer : by a drummer for a drummer"*** / by David Crigger.
Publisher: Newbury Park, CA : Alexander Pub., c1987.
Subjects:
Electronic percussion instruments--Instruction and study.
MIDI (Standard)

Title: ***"MIDI for musicians"*** / by Craig Anderton.
Publisher: New York : Amsco Publications, c1986.
Subjects:
MIDI (Standard)
Computer sound processing.
ISBN: 0-8256-1050-8 (pbk.)
ISBN: 0-8256-2214-X (pbk. : cover)

Title: ***"The MIDI manual"*** / David Miles Huber.
Publisher: Carmel, Ind., USA : Howard W. Sams, c1991.
ISBN: 0-672-22757-6, 250pp.

Title: ***"The MIDI programmer's handbook"*** / Steve De Furia and Joe
Scacciaferro, Ferro Technologies.
Publisher: Redwood City, Calif. : M&T Pub., c1989.
ISBN: 1-55851-068-0, 250 pp. Paperback. $24.95 Mix Bookshelf part # 3539C

Title: ***"C Programming for MIDI"*** / Jim Conger.
Publisher: Redwood City, Calif. : M&T Books, 1989.
501 Galveston Drive Redwood City, CA 94063
Subjects: MIDI, C, sequencing
This book shows how to use the basic features of an MPU-401 interface.
Includes a disk with MS-DOS code.

Title: ***"MIDI sequencing in C"*** / Jim Conger.
Publisher: Redwood City, Calif. : M&T Books, 1989. 501 Galveston Drive Redwood
City, CA 94063
Subjects:
MIDI (Standard)
C (Computer program language)
Sequential processing (Computer science)
ISBN: 1-55851-045-1 (book) : $24.95
ISBN: 1-55851-047-8 (disk) : $20.00
ISBN: 1-55851-046-X (set) : $39.95This book continues where the provious one
lefts off.