

1 Foreword

- You will have received your REGELWERK 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 REGELWERK 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. Please read the instructions in chapter 3 carefully.
- 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.

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Preliminary English language edition, May 1998

1) first edition 13.10.00

During 1998, we will be expanding our internet software information and update service on the web site we started in 1997:

<http://www.doepfer.de>

- Since May 1998 we provide a software update information and downloading service on our web sites:

<http://www.doepfer.de>

on **www.doepfer.de/pub/download.htm**

you will be able to inform and download the latest version, and re-program your EPROM.

- But for this, the customer must be able to burn an EPROM.

- Further for the actual english manual you can look on
www.doepfer.de/seq/rwme_0_3.htm

- The main site for REGELWERK is
www.doepfer.de/rw_e.htm

Here you can find all important links to other sites belonging to REGELWERK.

- If you have questions or you found bugs or you have suggestions please contact

regelwerk@doepfer.de

2 Registration form

DOEPFER REGELWERK

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**Doepfer Musikelektronik GmbH
Registration Regelwerk
Geigerstr.13
82166 Gräfelfing
Germany**

Belongs: Registration of REGELWERK

Date:

Name

First name, Name

Company

If you use the device in
studio/comany

Adress

Steet, Postcode, City

Email-Adress:

Number of customer

Please, if possible, this is
very **important** ¹

Only, if you own the device
direct from our company.
Otherwise the name of the
distributor

Number of the bill

Version:

Version:

Look on the versionnumber
in the display if you start the
device.

Also, this information we
badly need so that we could
made in future the right
preset for REGELWERK. If
the space is to little, please
use the back.

**Which expander or midi
devices do you use or do you
want to control with
REGELWERK ?**

- a new software version ? a new manual ? new preset ?

We want to inform you current:

Please fill this form and send it to us.

¹ Now we have a mailinglist for REGELWERK. If you're interested to get the hottest and brand new infos, then please send us this form with your email adress and we put you on the list.

You will only get REGELWERK infos, no other publicity, and you could delete your name from the list every time you want.

Which expander or midi devices do you use or do you want to control with REGELWERK ?

3 How do I use this manual ?

- You are omniscient and so you don't have to read this manual.

Congratulations! But then please apply for our next translation job!

Otherwise:

- You have unpack your device and you want to know, if it works in your bath and what happens, if you do this:

Please look to 'General and safety notes' page 10

- Now you want to begin at last, but then you remark all the jacks on the rear of the unit.

Chapter 'Making connections' page 12

- You know something about midi and you want to brush up your knowledge.

Chapter 'MIDI 1.0 Specification:' page 42 and 'Bibliography' page 45

- You want to get info about the principles of REGELWERK

Chapter 'What is REGELWERK ?' page 15

- After understanding the principles you're now asking, how can I do all these things? Which menus should I use therefore?

Chapter '

Short Operating instructions' page 21

- Although your're now a real 'REGELWERK-Freak' you have many questions and problems...

Chapter 'Troubleshooting' page 37 and 'Appendices' page 36

- No one will inform you about updates, new versions of the manual and new presets ?

You forget the 'Registration form' page 3

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5 General and safety notes

5.1 Product liability and guarantee

- Please follow the following advice exactly, to ensure that the REGELWERK gives you many years of trouble-free use.
- Since these notes also give details of the product liability and guarantee, it's essential to read them thoroughly and follow any instructions.
- Any claim for repair or replacement will be void if any one of the following points is not adhered to.
- Failure to comply with all the advice will void the normal guarantee.

5.2 Intended use

This equipment is designed to be used only for the purpose and in the way described in this instruction manual. For safety reasons, this product must not be used for any other purpose or in any other way. If you're not sure exactly what the intended use is, please consult an expert before using it.

5.3 Correct voltage

This equipment must only be run using the voltage specified on the rear panel. It needs a specialised low voltage transformer, as explained elsewhere in this manual.

5.4 Opening the case

Before opening the case it is essential to disconnect the equipment from the mains voltage supply. Remove the mains plug from the wall socket.

5.5 Voiding the warranty

- Any modification not approved by the manufacturer will automatically void the warranty.
- Any work undertaken on the equipment by a third party will also void the warranty. Even outside the guarantee period, work must only be carried out by a qualified technician, to relevant safety standards.
- Any modification or work must only be carried out by the manufacturer, or a manufacturer-approved company, if the guarantee and Doepfer's liability are to remain in force.

5.6 Operating environment

- This equipment must only be used indoors, in a dry environment.
- Never use this equipment in damp conditions, or where there is easily inflammable material.
- Don't position this equipment in close proximity to radiation sources (e.g. monitors, power supplies, computers), as they can cause data corruption.
- Don't store this equipment at temperatures above +50 or below -10 degrees Celsius. In use, a minimum temperature of 10 degrees Celsius is recommended.
- Don't position this equipment in direct sunlight, or close to a heat source.

5.7 Care in operation

- Make sure that liquid or foreign objects don't get into the equipment. If this does happen, then immediately disconnect the mains supply, and take the equipment to a technician to be checked, cleaned, and if necessary repaired.
- Don't put anything heavy on this equipment.
- All cables should be regularly checked for faults, and replaced if faulty. If in doubt, consult a technician.

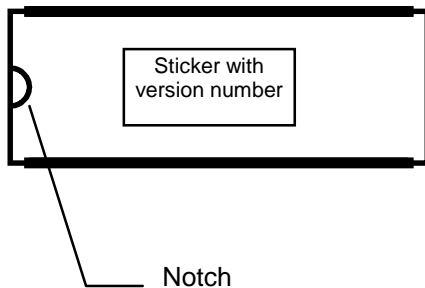
5.8 Moving the REGELWERK

In moving this equipment, don't turn it upside down, and take care not to drop it. Make sure that it is put down in a safe place, where it can't slide, fall, or be knocked onto the floor. If these precautions aren't taken, the equipment could be damaged, and someone could even be injured.

5.9 Installation and removal of parts

- To install or remove a part, (e.g. EPROMs after a software update) or optional extra (e.g. CV/Gate options) **disconnect the equipment from the mains supply.**
- Individual parts, sections, or whole circuit boards must only be connected and powered up inside the REGELWERK's case.
- It's particularly dangerous to use tools in or near a piece of equipment which has its case open and/or mains supply wiring exposed. Even after disconnecting the mains, you should allow some time for the power supply capacitors to discharge, as otherwise they can still give a serious electric shock.

- For software updates which you carry out yourself, you need to find the relevant EPROM on the main circuit-board (the one with the MIDI / SYNC connections) and exchange it with the new software EPROM.
- Before removing the old EPROM make sure to take a note of which end has a notch in it. The new EPROM must be inserted the same way round. Usually, the notch is also marked on the socket – but make sure anyway.



5.10 Shipping

If you need to send your REGELWERK anywhere, you must use the original packing. To return it for exchange, repair (whether under warranty or not), update or checking, it must be sent in its original packing, or Doepfer will not accept the delivery. Make sure that you keep the original packing materials and documentation in a safe place, in case they're ever needed.

- To remove an EPROM to make the exchange, we recommend ideally using a specialised IC tool, or if that isn't available, levering gently with two small screwdrivers, one at each end of the EPROM. Of course, if you can only find one screwdriver, lever each end in turn very gradually. Too much force, or too much haste, and you could either damage the casing on the IC, or bend one or more of the pins.
- On the new EPROM, check that the legs are all at the correct angle in relation to each other and the IC casing. As long as they are, the EPROM will be easy to insert into its socket without any undue effort, and you'll avoid the possibility of bending or snapping one of the legs, or even, at worst, damaging the IC socket.
- Before re-assembling the case, check again very carefully that
 - the EPROM is inserted the right way round (if not, it'll certainly be destroyed as soon you switch the REGELWERK back on)
 - no plug or connector has been loosened or totally disconnected.
- Now you are going to be able to use the REGELWERK again

⇒ but only after re-assembling and re-fixing the case.

6 Making connections

All the connectors described in this section are to be found at the rear of the REGELWERK.

6.1 Power supply

6.1.1 Version with external transformer

- This version of REGELWERK doesn't have an internal power supply, but is provided with an external power transformer. The power supply input socket is labelled '9V DC' and is positioned to the right of the four MIDI sockets and SYNC socket.
- REGELWERK is switched on by inserting the 9V plug in this socket, and connecting the mains transformer's plug to the mains supply. There is no on/off switch.
- Included in the REGELWERK package for European buyers is a 230V approved transformer for connecting to the mains.
- For other countries' voltages or mains sockets, you'll need to buy the appropriate mains transformer and plug for your country.
- For safety reasons, only use a transformer and/or plug which has an accredited safety mark in your country. The transformer output voltage needs to be about 9V (acceptable tolerance from 7 to 12V) and capable of delivering at least 500 mA. Polarity needs to be as follows:- the outer ring is earth / ground, the inner +7...12V. If the polarity is reversed, the REGELWERK won't work, but a protection diode should prevent it from being damaged.

6.1.2 Version with internal 230V mains supply (not available)

- In the EU, REGELWERK can't be supplied in the 230V internal power supply version. Export orders for countries with a different mains supply from 230V will only be supplied in the external power supply version.
- For anyone else.... REGELWERK (without the external power supply) is simply connected to a 230V mains supply, and switched on at the

rear.

6.2 MIDI connections

6.2.1 MIDI IN connection

- MIDI inputs MIDI IN1 and MIDI IN2 are used for controlling and synchronising REGELWERK from a source of external real-time MIDI messages, for remote control of various functions and effects over MIDI (fader parameters / special menus etc.), and for the reception of MIDI SysEx dumps.
- The MIDI inputs have a very limited MIDI merge capability, in that MIDI data present at the IN can be relayed to the OUT socket.
- This limited merge function is only really useful for internal processing purposes in the REGELWERK, because the presence of large amounts of MIDI data can otherwise badly affect timing.
- If the data which is being sent to REGELWERK to control it via the MIDI IN also needs to be sent completely unchanged to another piece of equipment, it's advisable to use a MIDI THRU box with the necessary number of outputs.
- If the data also needs to be merged with other data before being sent to another piece of MIDI equipment, then an external merge box needs to be used, such as the

⇒ DOEPFER MMR4/4

6.2.2 MIDI OUT connection

MIDI outputs MIDI OUT1 & OUT2 send MIDI data and realtime messages from the REGELWERK to the rest of your MIDI set-up.

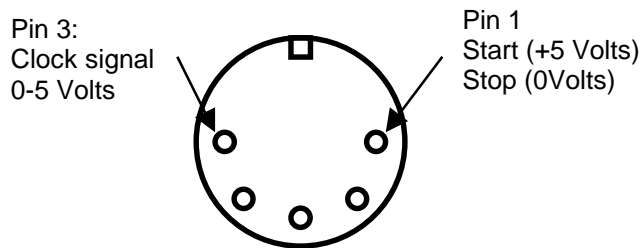
6.3 SYNC Input / Output

- For control and synchronisation with a typical 'SYNC' square wave signal.
- Depending on the mode chosen, it can be either an output or an input.
- In normal use, the REGELWERK SYNC socket is configured as an output, transmitting a square wave sync signal. The other equipment connected by the SYNC lead will need to be configured to receive sync –

so the REGELWERK will be the master.

The REGELWERK can also be set to receive

- a SYNC signal at this socket (which is now functioning as an input). In this case, the other equipment has to be set to send SYNC pulses.
- The SYNC signal is simply a bog-standard square wave, with a range from 0 to 5V.



That means that a normal LFO from an analogue synth module can be used as a clock source. That way, it's possible to relax the tight tempo of the REGELWERK SYNC signal and produce a syncopated groove.

- Note that in connecting the SYNC socket on the REGELWERK with another piece of equipment, nothing will happen if both units are set to input or both to output.

6.4 CV/Gate connection

- In the current software version, the 16 mini-jack sockets on the rear of the REGELWERK are designed purely for sequencer work
 - 8 x CV for pitch control
 - 8 x Gate

⇒ The CV/Gate option runs simultaneously and parallel to the MIDI output. Both can function at the same time. In effect it is doubling the number of voices that the REGELWERK can control, with the proviso that the CVs put out convey exactly the same information as the MIDI pitch and note-on/off data.

- The eight CV outputs are dedicated to sequencer note information, with output 1 responding to track 1, output 2 to track 2, and so on up to output 8 responding to track 8. The respective CVs cover a range from 0 to approximately 5V.
 - The response of the CVs is designed to be exactly one volt to the octave, so that they're ideal for pitch control.

- The relationship between note numbers and voltage output is:- note number 36 = 0 Volts; note number 100 = 5 Volts.
- Notes outside of this range – either below (note numbers 0-35) or above (note numbers 101 - 127) are folded back to the bottom and top octaves respectively., and so overlap the response to note numbers 36-100.
- The eight GATE outputs put out their respective gate signals whenever there is an event programmed at the particular step position on their track.
 - For Gate Off, the level drops to 0 Volts, and for Gate On rises to 5 Volts.

7 Front panel controls

16 nu
LEDs
/ Patt
Tools

Or
button
Gate
also
Paran

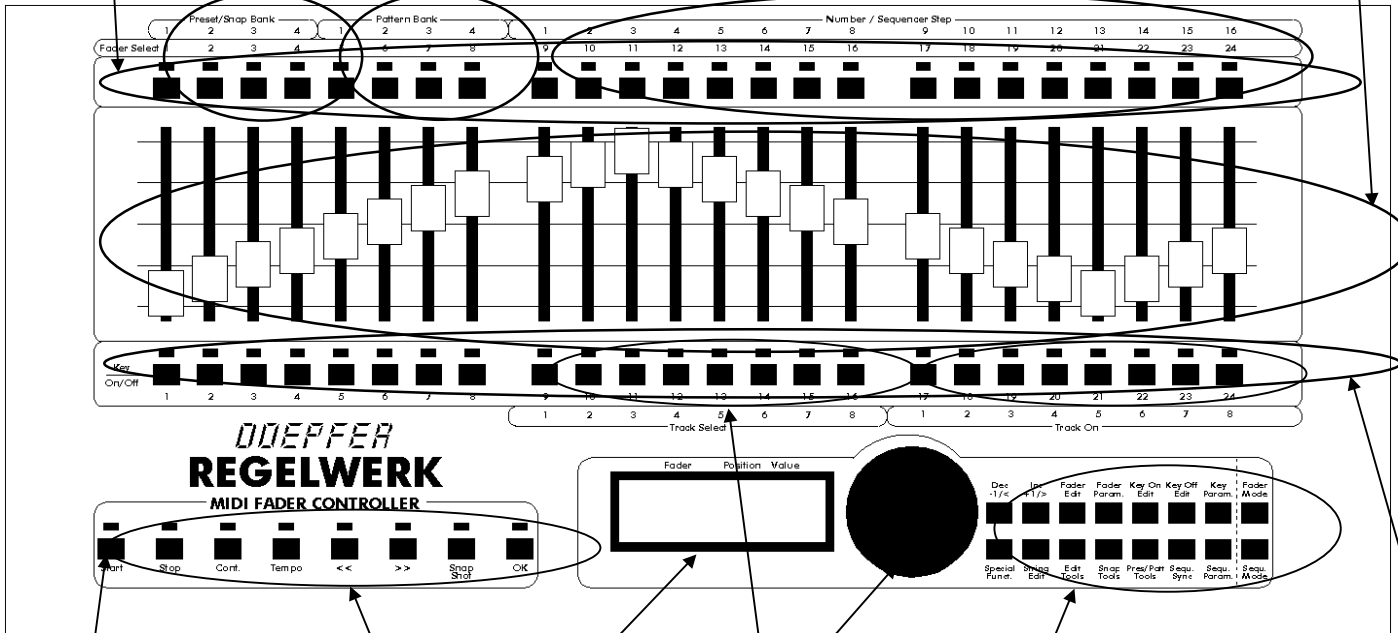
24 Fader Select buttons with LEDs for the Faders and Edit Mode.

In the Tools and Sequencer menus the buttons have different functions.

4 Bank buttons with LEDs for Presets / Snapshots in the Preset and Snap. Tools menus

4 Bank buttons with LEDs for Patterns in the Pattern Tools menu

24 slider controls, or faders



24 buttons with LEDs for Key On / Off functions and / or, in Sequencer mode, two sets of eight buttons (9-16, 17-24) with a special function in Seq.- Menus

8 buttons with LEDs for global Realtime Functions and / or user-defined tasks.

LCD readout (2x16)

Alpha Dial

8 buttons with LEDs for Track Select function in Sequencer menus

16 buttons without LEDs for menu selection

8 buttons with LEDs for Track On/Off function in Sequencer menus

8 What is REGELWERK ?

- REGELWERK is a complex piece of equipment designed to produce MIDI events.
- REGELWERK provides an easy way of generating almost any kind of MIDI event.

It can, for instance, alter or originate

- MIDI note events,
 - controller events,
 - polyphonic aftertouch,
 - monophonic aftertouch,
 - program changes, or
 - pitch bend.
- Each MIDI event is defined by bytes showing what type of event it is, what MIDI channel it refers to, and one or two values which define the amount of effect the event has.
 - For instance with note events, one byte defines the pitch (note number), and the other defines the loudness (velocity).
 - For controller messages, the controller number and the amount will be specified.
 - Polyphonic aftertouch is defined in the same way as a note value, and is connected with a particular note number.
 - Monophonic aftertouch produces a value like monophonic velocity.
 - Program change simply produces a program change number.
 - Pitch bend messages are theoretically composed of two numbers, but in practice one of them is always 0.
 - REGELWERK produces no sounds of its own, but serves solely as a complex controller for any MIDI event processing equipment – synths, samplers, sequencers, etc. - or as a master clock for any equipment with a SYNC input.
 - REGELWERK's guts are its array of front panel controls, such as the two rows of 24 buttons, the 24 faders, and so on, which, within certain limits can control almost any MIDI event you wish.
 - REGELWERK additionally offers some of the potential afforded by a software MIDI sequencer. You can't compare it exactly, because it has a much reduced and limited range of functions, but REGELWERK gains some of its special appeal exactly from this slimming-down – by offering many dedicated physical controls, and enabling immediate real-time access to a wide range of MIDI control.
 - The closest parallel to the REGELWERK's Sequencer mode is probably the drum edit page in a software sequencer.

- REGELWERK's main roles are as a MIDI fader box and a pattern sequencer:

8.1 Fader/ sequencer mode

⇒ In principle, both modes are autonomous, and work simultaneously.

- To access one or other of the modes, the buttons at the extreme right of the 16 menu access buttons (bottom right of the REGELWERK) are used.
- In **Fader Mode** all 24 faders are configured to control fader events.
- The lower 24 (Key On-Off) buttons control Key On-Off events and/or the Mute function.
- The upper 24 buttons select one fader at a time.
- In **Sequencer Mode** faders 9 - 24 control the pitch or velocity of Steps 1-16 in a similar fashion to an analogue sequencer.
- The lower buttons 9-24 control Track Select and/or Track On functions. The upper buttons 9 - 24 control Gate On / Off for Steps 1 - 16.

8.2 MIDI Fader Mode

- Press the Fader Mode button.
- In Fader Mode the display works like a little MIDI monitor, showing (in words or abbreviations) which MIDI events the current fader is controlling and/or transmitting.
- Pressing any of the Fader Select buttons selects the chosen fader, displays its current value / setting, and enables it to send MIDI data.
- You can also select a fader by using the alpha dial.

8.2.1 Fader events

- Each of the REGELWERK's 24 faders can have a sentence of three values associated with it – or in String Mode a sentence of up to 30 values (with even more in future software updates).
- These packets of data are then sent out over MIDI whenever the user performs the associated action – like moving a relevant fader. The values chosen to be affected by a fader's position can be inserted practically anywhere in the MIDI data string.
- The range of values for the fader position can go from 0 (right at the bottom of the fader's travel) to 127 (right at the top) with a normal

resolution of 1 per step.

- This depends on the resolution which has been selected for the REGELWERK faders and the various possible resolutions of the individual elements within the data string.
- The actual value produced by the fader position isn't strictly linked to the value in the data string, and is affected and governed by a wide variety of factors, so what at first might seem a rigid assignment system can actually be altered in any number of ways.

8.2.1.1 Fader position and actual value

- In addition, the value shown by the position of the fader and the stored value of the variable in a data string don't have to be identical at all.
- So it's quite possible that the fader position and the actual value can be different, if a stored value has been accessed from a preset or downloaded using the MIDI Update function.
- In this case, the individual faders' LEDs have a special function in Fader Mode: they blink whenever the two values (stored value and fader position value) are not identical.
 - To make life easier, the LED which is blinking shows you whether the stored value is higher or lower than the fader position value. The speed of blinking also tells you the relative proximity of the two values:
 - slow blink = far apart,
 - fast blink = closer.
 - When both values are identical, the LEDs blink so fast they're permanently on!
 - The other LEDs which don't blink show Mute Status – which is explained later.
- The response of these LEDs is a useful general indicator, but shouldn't be relied on as 100% accurate!

8.2.1.2 Selecting a fader

- In Fader Mode, moving a particular fader or pressing its dedicated button brings up the data onto the LCD, and enables the user to look at the values, and monitor the transmission of the current event.
- The same applies in principle to the individual Edit / Parameter Menus, except that the LCD readout is here designed to assist editing the selected data or parameter.
 - This is also shown by one of the fader select LEDs lighting up (with all the others off).
- The function of all the faders and buttons is similar in both Fader Mode and Edit / Parameter menu modes.
 - Editing data while the relevant MIDI

messages are taking place can cause problems, with events missed, hanging notes, and other malfunctions. Be on the look-out for this, and if it's a problem, take steps to avoid editing when a specific message is being transmitted.

8.2.1.3 Entering a Fader event

- This principally takes place in the Fader Edit menu.
 - When the Fader Edit button is pressed, all the 24 LEDs in the upper row go out except for one - the fader which is currently in edit mode.
- Selecting another fader to edit is simple: just press another of the fader select buttons in the upper row.
- Repeated presses of the Fader Edit button take you through all of the various pages within the Fader Edit menu. The process is circular: keep pressing and you will cycle through the pages.

8.2.1.3.1 Fader events

- A fader event consists of four data bytes, which are programmed in this menu by entering four values.

These are

 - MIDI channel
 - MIDI event
 - the first data byte is the MIDI event, which according to the type of event is followed by a description.
 - the second data byte is as a rule the value associated with the event, and is thus related to the fader position (real or stored).
- As well as the standard MIDI events, which follow normal MIDI rules, REGELWERK gives you the possibility of defining any type of data string as a Fader event, and transmitting it.
 - The maximum length of this data string is, in the current software version, 30 bytes, but is likely to be longer in future software updates.

8.2.1.3.2 Fader parameters

- Besides the definition of the fader events themselves, further parameters are needed to control the interaction between the programmed events and the faders themselves, and any messages entering at the MIDI IN socket, and finally the messages being output from the MIDI OUT socket.
- By default, the range of values is such that the response of the fader goes from value 0 (fader right down at the bottom) up to value 127 (fader right at the top). These minimum

and maximum values can be changed to whatever you want within this scale, so that the response of the fader will also be changed to any range within the maximum 0-127 scale.

- A system also has to be evolved to decide between the real and virtual position of the fader, and determine which of them is sent out with the MIDI event. This problem obviously becomes crucial whenever the actual position of the fader diverges from the virtual position at all.
 - The ideal solution for this is to have motorised faders, which automatically adjust to the programmed value and so avoid the problem, but for obvious cost reasons that's out of the question for REGELWERK.
 - Instead, the user him/herself needs to act as the motor for any fader whose actual position differs from its virtual position, and move it till it's in the right place!
 - Naturally, it's nearly always best for the events generated during this adjustment process not to be sent out via MIDI.
- Various strategies exist to deal with this, each of which has its advantages and disadvantages, but there should be one effective way of achieving it for practically every eventuality.
- In addition each fader has the option of processing any MIDI events which are sent to the chosen MIDI IN socket, and which fit the criteria in the relevant MIDI data sentence (not string), and either re-transmit them, or use them to control or transform fader events.
-> see MIDI modes

8.2.2 Key / switch events

- Each of the REGELWERK's 24 buttons underneath the faders can have a sentence of 2 x 3 values associated with it – or in String Mode a sentence of up to 2 x 30 values (with even more in future software updates).
- These packets of data are then sent out over MIDI whenever the user performs the associated action – like pressing the relevant button. The values chosen to be affected by a button-push can be inserted practically anywhere in the MIDI data string, and will produce an ON/OFF message.

8.2.2.1 Key status

- The default function of these buttons is as REGELWERK's Mute / Demute function,

whose status is shown simply by the LED above each of the buttons:

- LED on = Demute: the fader is activated, and can produce MIDI events,
- LED off = Mute: the fader is muted, and moving it doesn't transmit any MIDI events.

8.2.2.1.1 Demute function

- When the switch is changed from Mute to Demute status (LED lights up) it will depend on its position whether a Demute value and previously defined Key Off event / string is sent with the Demute value and/or Key Off event.
- In muted mode (LED off) the relevant fader's MIDI events are muted, and not output via MIDI.
 - Internally, though, the fader movements are still recognised and dealt with. These messages aren't internally muted – they are simply prevented from being transmitted via MIDI OUT.

8.2.2.1.2 Mute function

- When the switch is changed from Demute to Mute status (LED first on, then off) it will depend on its position whether a Mute value and previously defined Key On event / string is sent with the Mute value and/or Key On event.
- In Mute Mode (LED off) output of Fader events from the relevant fader is enabled.

8.2.2.2 Key event input

- In principle, the menus and functions are similar to those for Fader events.

8.2.2.2.1 Key.ON Event

- This event refers to the process of switching from Mute to Demute status (and the LED thus coming on) -> ON event.

8.2.2.2.2 Key.OFF event

- This event refers to the process of switching from Demute to Mute status (and the LED thus turning off) -> OFF event.

8.2.2.2.3 Key.ON / OFF parameters

- These events have certain parameters common to both, which determine their behaviour and that of the relevant button.
- So for instance with the button in Demute

status, a Fader event for a particular fader can be sent with your choice of any number from 0 to 127 as the Demute value.?? With the Demute value set to 'NO', on the other hand, no Fader event is transmitted.

- There are two clearly-defined ways in which the REGELWERK responds to a button-press:
 - With Momentary Switch mode selected, a button-press changes from Demute to Mute, and releasing it again changes back from Mute to Demute.
 - With Toggle Switch mode selected, the fader switches ('toggles') between Mute and Demute status and remains the same until another button-press.

8.2.3 MIDI modes

- Each fader is fundamentally a MIDI data source.
 - First of all, it's important to specify which MIDI OUT socket it will transmit MIDI events to.
- A fader can also receive MIDI data, though.
 - i.e., incoming MIDI data can interact with the fader and change or modify the fader's properties (by changing the programmed values, switching off an element of fader control, etc.)
- For this function to work, the respective incoming MIDI event must match the settings of the particular fader event, and /or must be input via the correct MIDI IN socket. ??
 - For any chosen incoming MIDI event, first of all a check is made to see if any fader is set to receive its MIDI mode.
 - For each input message, all 24 faders have to be systematically checked for MIDI events.
 - In Momentary mode, only Note On / Off, and Controller Events are taken note of.
 - The search starts at fader 1 and goes through to fader 24. As soon as a match is found, the search is called off, and the programmed function adjusted accordingly. Events which match in all respects except MIDI mode aren't recognised (v1.0).
 - Thus the intended events should be positioned as early as possible in the fader sequence, for quicker search results, and other events kept as far away as possible (to avoid the worst case scenario of 24 faders having to be searched before the correct one is found).

8.2.3.1 Normal

- Normal fader mode, with the data output on the chosen MIDI OUT/s.

8.2.3.2 Velocity Overdub One/All

- The incoming MIDI event received at the chosen MIDI input has a new velocity (MIDI data byte 2) imposed ('overdubbed') on it.
- The new event that is created is then output on the chosen MIDI output/s.
- In All mode, the event's MIDI data byte 1 is ignored, and the overdubbed value is imposed on all 128 events of this data type on this MIDI channel.
 - In One mode, one chosen MIDI event has, for instance, a new velocity imposed on it. This is mainly for the first group of controllers, sent from an external sequencer or master keyboard, etc..
 - All mode is more suited to the second group, Note Events, so that, for instance, velocity can be imparted to all the notes on a certain channel - if, e.g., the originating keyboard doesn't transmit velocity messages.

8.2.3.3 Velocity Multiplication One / All

- This is like velocity overdub, except that instead of replacing the old velocity value, it multiplies it by the fader velocity value.
 - This comes into its own when the velocity of the incoming MIDI data is generally satisfactory, but just too loud.
 - > Useful when layering sounds.
 - In software version 1.xx this only works to decrease velocity (a fader set at half-way halves it).

8.2.3.4 Update

- The actual fader values can be changed from an external MIDI source.
 - For total recall, or for simultaneous control over another computer / controller or REGELWERK with a fader page or the like, so that the data changed in the external controller is also changed in the receiving REGELWERK.
 - > Update

8.2.3.5 Hook On

- Faders set to 'hook on' in the Special Functions menu send no data at all until they are told to.
- They remain in this state until a MIDI IN message with right MIDI event is sensed and 'caught'. See Catch mode.
 - The threshold for this is adjustable in the Special Function menu.
- As soon as the relevant criteria are met, the particular fader is released, and can send events again. This is indicated by a rapid flashing of the relevant LED.

- The fader is effectively muted until an incoming MIDI message is received which matches the current position or the value programmed (as part of the Threshold).

8.2.3.6 Overdub

- This mode also has to be expressly enabled in the Special Function mode.
- When it has been enabled, all relevant messages received at MIDI IN are merged (wherever possible) and transmitted at the selected MIDI OUT.
- This applies as soon as the specified fader generates the specified event. Before then, MIDI IN messages aren't forwarded to the MIDI OUT: only the messages generated by the fader are transmitted.

8.2.4 Preset

- A Preset consists of the positions for all 24 faders, button values & parameters, and all relevant text and MIDI strings.

8.2.4.1 Presets / memories

- REGELWERK has 64 non-volatile preset memories.

8.3 Sequencer

⇒ The sequencer page is accessed by pressing the **Sequ. Mode** / **Sequ. Param.** buttons.

The sequencer function is always available in parallel to the fader page.

8.3.1 STEP

- The smallest organisational unit in the REGELWERK sequencer is called a step, and defines a MIDI event.

8.3.2 Step event

- In REGELWERK's case this is always a Note Event.
- A MIDI note event includes information about pitch (note number) and loudness (velocity).

8.3.2.1 Step duration

- As well as defining the order of the note events, Steps are responsible for setting the exact duration of a note. (N.B.: Note events have two events within them – Note On, at the start of the step, and Note Off, at the end.)

8.3.2.2 Step status

- Besides this, each MIDI note event has another important criterion – maybe the most important part of the REGELWERK sequencer's appeal – namely whether a programmed MIDI event is actually transmitted or not.
 - For each step there's a dedicated LED (labelled Sequencer Step), which indicates whether the programmed event will be sent (LED on) or not (LED off) when the sequence reaches that step.
 - To enable instant muting and un-muting of each step, there are dedicated buttons for switching on and off the programmed event for each of the 16 steps. These buttons 'toggle' between the two states, so that, for instance, an enabled step (LED on) is switched off by a button-push, and vice versa.
 - The Step LEDs have some other special functions as well – principally showing which step in turn in a sequence has been reached.

8.3.3 TRACK

- In the next organisation level up, 16 Steps together form a Track.

8.3.3.1 Global track parameters

- A Track has a set of global parameters which apply to all the steps within it. They are:-
 - MIDI channel,
 - base note number / velocity
 - Step Time / Gate Time
 - End Step.

All 16 steps in a track share the same common parameters. It's not possible to change a parameter for any individual step. On the other hand, each track can have different global parameters from any of the other tracks.

8.3.3.2 Track select buttons

- Each track has its own Track Select button, and associated LED. Pushing a button instantly selects the chosen track, indicated by the Select LED lighting up. All track editing operations apply to the track whose LED is on.

8.3.4 PATTERN

- A complete set-up for all eight tracks (that is, 8 x 16 step sequences and their associated parameters) constitutes a Pattern.

8.3.4.1 Pattern locations / memories

- REGELWERK provides 64 non-volatile pattern locations.

9 Short Operating instructions

9.1 Switching on

- Once power is applied to the REGELWERK, the display will show the following message:-

REGELWERK V x.xx
DOEPFER (c) 210397

V x.xx shows the current version's software release number, where x.xx stands for whatever version / release number has been reached. The actual date of the release will also be shown in the day / month / year format, so that, for instance, 210397 is March 23, 1997.

- at the same time, on power-up REGELWERK automatically loads Preset 1 and Pattern 1.

⇒ Preset and Pattern 1 are the default data.

9.2 Menu structure

- The 16 buttons near the alpha-dial are the main tools to access the REGELWERK menu structure.
- These buttons don't have indicator LEDs, but instead, generally, the relevant parameters are displayed in the second line of the LCD screen, in words.
- In most menus related parameters can be found one after the other, in so-called parameter groups. To access them, you simply keep pressing the menu button again until your chosen item is reached. Individual parameters are accessed one after the other, and keeping on pressing gets you back to the beginning again.

9.3 Menu overview

- Here's an overview of the various menus / parameter groups in the current version of REGELWERK.

⇒ In later software versions the menus may be enlarged by the addition of further related parameters.

- For the purposes of this manual, the two rows

of buttons near the alpha-dial are numbered from 1-8 (upper left to right) and 9-16 (lower left to right).

The various parameter groups' menu headings are as follows:-

- See chapter 5, Front Panel Controls, to the lower right corner, to the right of the alpha-dial.
 - '16 buttons dedicated to menu selection'.
- The top row of buttons (1-8) except for 1 & 2, (Dec. / Inc.), all relate to the specific track selected.
 - (1) Step Left / decrement **Dec -1/<**
To move one place to the left, or reduce a value by 1, and also, in some menus, to specify something within a menu.
 - (2) Step Right / increment **Inc +1/>**
As 1, except right instead of left, and increase instead of reduce.

– (3) Fader Edit

MIDI channel:

- The MIDI channel of the particular event

MIDI event:

- The type of MIDI event

First MIDI data byte in words:

- The first MIDI data byte – i.e. whatever event has been programmed - translated into words

Second MIDI data byte in words:

- The second MIDI data byte – i.e. whatever event has been programmed – translated into words

String editor:|_ , _ , _ , _ >

Template / editor for data strings (max. around 30 bytes in the current software version)

– (4) Fader Param.

LowerVal.:

- The lower value programmed for the fader

UpperValue:

- The higher value programmed for the fader

ActMode:

The response mode of the fader – Immediate, Relative or 'Catch'.

Threshold:

The threshold specified for the 'Catch' response mode if chosen in ActMode menu

MIDI Input Mode:

Configuring what is sent to MIDI outputs 1 and/or 2, and how this is affected by what comes in at MIDI inputs 1 and/or 2.

MasterSlave:

Programming whether each fader acts as a master or slave.

LearnMode:

'Learning' from MIDI events at the MIDI Inputs, without having to go into the individual edit menu.

– (5) Key On Edit

The same menus and functions as in Fader Edit, but now concerning the operation of the 24 on/off buttons, and their relation to Key On function.

MidiChannel:

- The MIDI channel for these MIDI events

MidiEvent:

- The type of MIDI events programmed

First MIDI data byte in words:

- The first MIDI data byte – i.e. whatever event has been programmed - translated into words

Second MIDI data byte in words:

- The second MIDI data byte – i.e. whatever event has been programmed – translated into words

String editor: |_,_,_,_>

Template / editor for data strings (max. around 30 bytes in the current software version)

– (6) Key Off Edit

The same menus and functions as in Fader Edit, but now concerning the operation of the 24 on/off buttons, and their relation to Key Off function.

MidiChannel:

- The MIDI channel for these MIDI events

MidiEvent:

- The type of MIDI events programmed

First MIDI data byte in words:

- The first MIDI data byte – i.e. whatever event has been programmed - translated into words

Second MIDI data byte in words:

- The second MIDI data byte – i.e. whatever event or value has been programmed – translated into words

String editor: |_,_,_,_>

Template / editor for data strings (max. around 30 bytes in the current software version)

– (7) **Key Param.**

MuteValue:

- The data value which enables Mute

DemuteValue::

- The data value which enables Unmute

SwitchMode:

- Selecting which of the two modes (momentary or toggling) the switches are set for.

– (8) **Fader Mode**

To switch from sequencer or edit mode into fader mode, and switch the LCD readout to a sort of MIDI event monitor

– (9) **Special Function**

HookMode: Off / On

Enable / disable 'hook mode'

Threshold

Set the threshold for 'hook mode'.

Overdup: Off / On

Enable / disable 'overdub' mode

MIDILock: Off / In1 / 2 / 1 and 2

Enable / disable either or both MIDI inputs

Sample / Sek.:

Global 'refresh' rate for all faders (from 8 to 24 samples per second).

– (10) **String Edit**

faderXXX Edit Name

NoName! Make? > OK

Editing page for giving faders names (eg VCF1 cutoff).

EditString: Pres

EditString: Start

EditString: Stop

EditString: Cont

EditString: Rew.

EditString: Forw.

Editing page for data strings for a given function or button.

– (11) **Edit Tools**

COPY Event type / value between two locations

Copying function, for duplicating the most important data and pasting wherever required.

– (12) **Snap Tools**

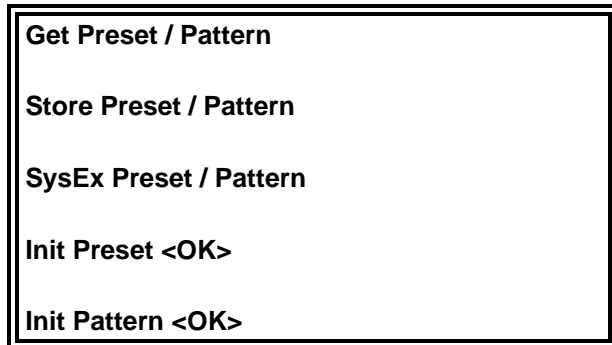
Get SnapShot

Store Snap:

Delete Snap:

Snapshot function management page

(13)Preset / Pattern Tools



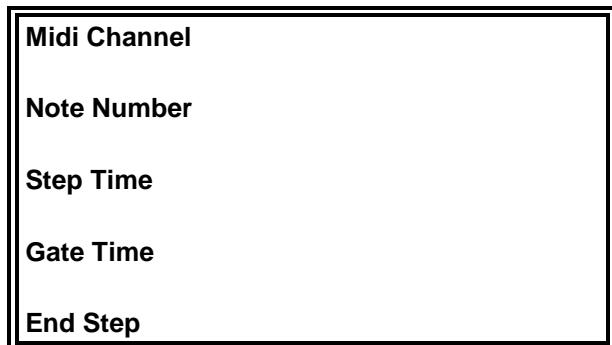
Preset / pattern management page

– (14) Sequencer Sync



MIDI / Sync synchronisation

– (15) Sequencer Parameters



Track parameters, global for each of the eight tracks.

– (16) Sequencer Mode



Note number / velocity for each of the 16 steps in a track, which can be programmed with the alpha-dial (with selection via Gate On / Off buttons) and / or directly via the sequence faders 9-24 (16 steps in total).

- The eight buttons with LEDs, for global real-time control (from left to right):

See chapter 5, Front Panel Controls diagram, page 14, to the lower left, underneath the *REGELWERK* name.

- (17) **START** button (no LCD readout): for starting *REGELWERK* from zero on the chosen track, and simultaneously sending a MIDI START realtime message – and, if programmed, a START string (StringEdit: Start).
- (18) **STOP** button (no LCD readout):
 - For stopping *REGELWERK*, and simultaneously sending a MIDI STOP realtime message – and, if programmed, a STOP string (StringEdit Stop).
 - On the first button-push, the STOP button LED blinks. This shows a sort of 'pause' mode, which can then be turned into STOP or CONTINUE by pushing the relevant button.
 - On the second push, the STOP button LED stops flashing, and stays on. Simultaneously, the *REGELWERK*'s internal buffer is cleared, and an All Notes Off message is sent on all 16 channels to MIDI OUT.
- (19) **Cont. (continue)** button (no LCD readout): for starting *REGELWERK* from the current position in a sequence, simultaneously sending out a MIDI realtime CONTINUE message, and, if programmed, sending out a CONT string (StringEdit: Cont).
- (20) **Tempo** button (with LCD readout): for setting the internal tempo of the *REGELWERK* in bpm (50 - 255 bpm). (The tempo value is stored with the pattern).
- (21) **REWIND** (no LCD readout):
 - for sending, if programmed, a REW string. (StringEdit: Rew.)
- (22) **FORWARD** (no LCD readout):
 - for sending, if programmed, a Forw. string (StringEdit: Forw.)
- (23) **Snapshot** function: for taking a 'snapshot' of current settings:
 - Sending out a full MIDI dump with all current settings. When the button is pressed, the LED blinks, to indicate that the snapshot is ready to be saved to your chosen location (using StoreSnap from the Snap Tools menu).

- A saved Snapshot can be re-loaded by going to 'GET SNAPSHOT: (in the Snap Tools menu) and entering the correct location.
- n.b.: This is NOT the way to save a Snapshot: if the LED isn't flashing, the Snapshot won't be saved.
- (24) ENTER/OK button: for functions which require confirmation. To show that confirmation is necessary, the OK button's LED flashes.

⇒ Buttons (17)-(24) and their relative functions can be enabled from anywhere in the REGELWERK's editing pages. Displaying and editing Tempo simply overwrites the current LCD message.

- (25) Alpha dial.
- To increase a value, turn clockwise. To decrease a value, turn anti-clockwise.

9.4 Menus in detail

9.4.1 Step Left / decrement

Moves one place to the left; also used in some menus; and/or decreases a value by one.

9.4.2 Step Right / increment

Moves one place to the right; also used in some menus; and/or increases a value by one.

9.4.3 Fader Edit

- For editing the MIDI events associated with each fader. The fader is selected by pressing the relevant Fader Select button (above the faders) .

Sub-menus: (selected by repeatedly pressing the Fader Edit button)

MidiChannel:

- Select the MIDI channel for the fader event.

- Select the type of event:

MidiEvent: shown in abbreviations

NoteOf	Note off
NoteEv	Note event
PolAft	Polyphonic aftertouch
Contrl	Controller
PrgChn	Program change
MonAft	Monophonic aftertouch
PitBen	Pitch bend
String	String

- **String** is a special case, in which a user-programmed string instead of a simple fader event is dealt with and output via MIDI.
- In the String menu, the editing values for MIDI data bytes 1 and 2 have a special function, for String control parameters.
- Besides this, there are also special ('meta') events.
 - These aren't necessarily related to the MIDI function of the faders, but can be used, for instance, to program the REGELWERK for real-time control.
 - For instance, various sequencer parameters can be controlled directly without having to go through a series of menus or use the alpha-dial.

MidiEvent: special (meta) events

Extens	Extensions
'Place holders' for expansions	

TrkPat Track patterns

Pattern selection for sequencer by using faders.
See appendix 10.1

TrkEnd Track end

Selects the last ('reset') step of a sequence track using the faders (in the range from 1-16)

TrkVel Track velocity

Selects the global Track Velocity for a sequence by using the faders.

TrkNot Track note

Selects the global base note for a sequence by using the faders.

StpVel Step velocity
Selects individual step velocity by using the faders (changing the MIDI channel changes the instrument playing this step).

StpNot Step note
Selects individual step note number by using the faders (changing the MIDI channel changes the instrument playing this step)

NoStat No status
Selects no event to be sent – if for instance the fader is being used just as a master controller.

⇒ To some extent, the parameters which are controllable by meta-events can also be controlled by other means (in the sequencer menus).
Using meta-events for control has the main advantage that almost all fader control features and functions can also be controlled by meta-events.
The disadvantage is that if meta-events are being used, the faders can only be used for sequencer, not Fader events.

For

MidiEvent: StpVel, StpNot

there's also a display for

StepNumber

since it's essential, when dealing with a fader as controller, to know which step number is being programmed.

For

MidiEvent: Extens, TrkPat, TrkRun, TrkVel, TrkNot

there's also a display for

'Not used Par.:'

since for sequencer fader events the MIDI channel is selected in the Sequencer Parameter menu.

First MIDI data byte in words, plus Note Off note: , Note Number: , Pol Aft Number: , Contrl Number: , Prg Chn Number: , Mon Aft Number: , Pitch Be Val.1: , String-Xpos: .

Range 0..127.

.....:Slid

This is the location where the fader's actual value is entered. 'Slid' is short for 'slider'.

If the 'String' event type shows this display:

String-Xpos:

then the desired variable value for the fader should be input. This can go from 0-127.

For

MidiEvent: Extens, TrkPat, TrkRun, TrkVel, TrkNot, StpVel, StpNot

there's also a display

TrackNumber:

since for sequencer fader events it's necessary to specify which track is being referred to.

**Second MIDI data byte in words:
NoteOfVeloci: , NotenVelocit: ,
PolAftVeloci: , ContrlValue: , No sec. Byte:.**

With regard to the adjustment range as above, normally the Slid (slider) value will be set here.

When this value is irrelevant or invalid for a particular type of event, the following message appears:

No sec.Byte , PitchBeVal.2: , String.....: .

In the String- Editor window, a template appears, which starts off looking like this:-

000|_,_,_,_>

XXX<,aa,bb,cc,dd>

- At any one time you can see the hex-strings for four bytes, in hexadecimal notation.
- Position XXX = aa, XXX+1 = bb, XXX+2 = cc, XXX+3 = dd.
- Use the </> (Inc/Dec.) buttons to scroll backwards and forwards within the template. The symbols </> appear, to show if there are further positions available to the left or right. When the end is reached, the symbol '|' replaces < or >.
- The byte in position 'aa' is always the one which can be edited.

⇒ At present the maximum length is 30 bytes. (In future software versions it could be higher)

- In all cases, to enter a string, the length must first be defined.
- Any positions which lie outside this defined length are shown as either _ or 00.

For example:

If the string is going to be three bytes long :

- Scroll to position 3
- Turn the alpha dial until

'...'

appears. The OK LED should blink.

- Press OK.
- This causes you to leave the fader edit menu, and you need to re-enter to produce the correct string!
- The value that has been chosen for editing can now be scrolled to, using the </> buttons, and when it is in the 'aa' position, it can be edited using the alpha dial.
- Some bytes which aren't part of standard MIDI are reserved for internal REGELWERK functions, and are shown by the symbols '...;' or '>>'.
• The first MIDI data byte 'XX' is entered into the incomplete string, to set the fader value.

⇒ To enter strings in the editor, it is advisable first of all to write the string out on paper, and then to enter it carefully, with reference to your notes. Otherwise it's very easy to lose one's place. The current software version doesn't have any insert or delete function, so it can be extremely time-consuming to correct a mistake in a string.

9.4.4 Fader Parameters

As well as the basic fader event information, some further parameters often need to be set.

LowerVal: 0-127

UpperVal: 0-127

- The standard fader response goes from a minimum value of 0 (with the fader right down) to a maximum value of 127 (with the fader right up).
- These values can be changed if required, to produce any other fader response characteristic you might want – reversed, if you feel like it.

⇒ These related values 0,127 are accessed separately, so that no conversion is needed, and the proces is actually faster. There's no need to change the default value of either, unless you have a specific need to.

Actmode:Immediate/Relative/Catch

- This determines the way the actual fader position relates to the value output by it...
- ... and / or the difference between the fader position and the actual value.
- Immediate: -> The fader position = value.
- Relative: -> The fader position is added to the existing value to create the output value.
- Catch: -> A new value is only output once the fader has been moved so that it goes through ('catches') the existing value.

Threshold:

Window / capture area for Catch mode.

MIDI Input-Mode: (n.b.: not directly visible in the display)

- Each fader can be programmed to send MIDI data to different combinations of MIDI Out -> O12 = Output 1 & 2,
O1 = Output 1,
O2 = Output 2,
XXX = no value output.
- A fader can also act as a MIDI data receiver - incoming MIDI data are altered or 'worked on' by the fader, and/or themselves change the fader response – altering the output value, switching the fader on, etc..
- For these functions to work, the incoming MIDI event must match the event the fader is programmed for, and must be input at the specified MIDI input - I1 (Input 1) or I2 (Input 2) - both inputs can't work simultaneously in this mode.
- When a MIDI event arrives at one of the inputs, REGELWERK scans to see if any of the faders is programmed to the MIDI mode.
 - Even with just one MIDI event input, all 24 faders are scanned (momentarily for Note-On /Off, and Controller Events).
 - Scanning begins at fader 1 and proceeds towards fader 24. If a match is found, the relevant MIDI message is sent to that fader, and the scan stops. In the current version of software, therefore, you can't send the one message to several different faders at once.

⇒ Bearing the scanning system in mind, it's best (fastest) to use the faders as close as possible to the left-hand side (low numbers) for receiving data – and definitely worth avoiding sending irrelevant data which doesn't match any of the faders' settings. In this worst case scenario, all 24 faders will be abortively scanned – a serious and unnecessary drain on processing ability.

- Generally, the following algorithm shows the logical path from left to right:
 - from input I (1/2) (from MIDI In1 or 2)
 - via data processing
 - to destination O(1)(2) (to MIDI Out 1 and/or 2).

FaderEvent>O(1)(2)

- Normal fader mode, with data output on MIDI Out 1, 2 or both.

n.b. The following modes' status can be accessed by moving the alpha dial clockwise

from Fader Event mode, not by pressing the Fader Parameter button again.

I1/2> VelOvpOne> O(1)(2)

- Velocity Overdub (one fader)
 - A MIDI Event input at a MIDI overwrites its velocity (MIDI data byte 2) on the first fader event which matches it.
 - This new value is output instead of the original (fader) value from the selected MIDI Out socket/s.

I1/2> VelOvpAll> O(1)(2)

- Velocity Overdub All
 - the same as 'one' (see above) except that MIDI data byte 1 is ignored, so that the velocity message affects all 128 possible events of this type on this MIDI channel.

I1/2>VelMulOne>O(1)(2)

I1/2>VelMulAll>O(1)(2)

- Velocity Multiply One/All
 - Like Overdub (see above), except that the old velocity value isn't overwritten. Instead the fader velocity value and new MIDI value are 'multiplied' together – they interact.

I1/2> UpdateFad> O(1)(2)

- The actual fader value can be changed by remote control – used for the Regelwerk's version of Total Recall, etc.

I1/2> HookOnFad> O(1)(2)

- Hook Mode: If this mode is activated (as shown in the Special Funct. menu) any fader set to it doesn't send any data out at all, until a matching MIDI event present at a MIDI In hits its actual value.
- (The threshold for this 'hook' can be set in Special Funct.) As soon as these criteria are met, the fader is released, and can send data. This is shown by fast blinking on the relevant LED.

I1/2> Ovdup/Fad> O(1)(2)

- Overdub Mode: This mode also needs to be set in the Special Funct. menu.
- Until this mode is cancelled, the output on this fader is taken over by the MIDI input assigned to it.
- As soon as the relevant fader is used to generate an event, it takes back control of what is sent to the MIDI output, and MIDI In data is ignored until this mode is reset.

The following modes are accessed by pressing the Fader Parameter button.

Master/Slave- Mode:

- Slider = Master: self-explanatory: this fader is working as a master fader.
- Slave/Master: fader no. X works as a slave to master fader no. X.
- The Master/Slave system works by multiplication. If the master value is 100%, the slave value is as it stands. If the master value is less than 100%, the value of the slave reduces proportionally.

Learn - Mode:

- The process of fader editing for each fader can be undertaken not just by hand, but also by MIDI events, chains or strings input at the relevant MIDI in socket. This is called Learn Mode.
- What happens is that MIDI data (events or strings) are simply stored in the relevant memory.
- Learn Mode has to be explicitly switched on and off.

Event:

Only the first MIDI event received is stored in the relevant memory location.

Ev>Str:

A succession of MIDI events is stored in the relevant memory location, until it's full (currently a maximum of about 30 bytes).

Sx>Str:

The same as Ev>Str, except that it will only

recognise and store SysEx strings.

- For all three of the above sections in this menu, the OK LED blinks.
- By pressing OK, the cursor is able to be reset to the beginning of the string, so that in Learn mode only the required data is recorded – and it's not, e.g., added to the end of another string.

9.4.5 Key On Edit

- This is a sub-set of functions virtually identical to the 'Fader Edit' menu, except that these are related solely to Key On events.

MIDI channel:

MIDI Event: (n.b. not Meta Events)

First MIDI data byte

Second MIDI data byte

String:

- When a Key On event occurs, a switch signal is sent, which, depending on the setting in the Key Parameter menu, can either be momentary, or toggled (i.e. it stays in that state until the next switch).
- The condition of the LED for each button will act as a reliable indicator of the status of the button in all modes when there is a...
- Key On- Event: Before the button-press the LED is on, and after the button-press it's off, showing that the control is now in mute mode – that is, not sending any fader events at all.

9.4.6 Key Off Edit

- In principal identical to the Key On functions, except that the momentary switching produces a 'release' function, and the function of the toggle switching is reversed.

MIDI channel:

MIDI Event: (n.b. not Meta Events)

First MIDI data byte

Second MIDI data byte

String:

- When a Key Off (i.e. Note Off) event occurs, a switch signal is sent, which, depending on

the setting in the Key Parameter menu, can be either momentary, or toggled (i.e. it stays in that state until the next switch).

- The condition of the LED for each button will act as a reliable indicator of the status of the button in all modes when there is a...
- Key Off Event: Before the button-press the LED is off, and after the button-press it's on, showing that the control is now in un-mute mode – that is, sending fader events as normal.

9.4.7 Key Param.

MuteValue: (0..127 / Send NO Muteval)

DemuteValue: (0..127 / Send NO Demuteval)

SwitchM: Toggle / Momentary

- These three parameters control the behaviour of the relevant button and any functions triggered by it, in relation to programmed MIDI events (controlled via the Key On/Off Edit page).
- The main distinction is between Toggle (held till next button-press) and Momentary (on/off, like a keyboard key).
 - Toggle = Each button-press alternately triggers Key On and/or Key Off functions. Releasing the button has no effect.
 - Momentary = Pressing the button triggers Key On, and releasing it triggers Key Off.
- The Key On function is closely linked to the switching on of Mute status.
 - The associated LED goes out, and the relevant fader automatically sends a final Fader Event, not with the fader position, but with the Mute value (or with nothing at all if No Mute Value has been programmed).
 - From that moment, the fader is muted, and won't transmit any more fader events until the mute status is changed.
- The Key Off function is closely linked to the switching off of Mute status.
 - The associated LED comes on, and the relevant fader automatically sends a fader event, not with the fader position, but with the Demute value (or with nothing at all if No Demute Value has been programmed).
 - From that moment, the fader is un-muted, and will transmit fader events as normal until the mute status is changed.
- Through the Key On and Key Off functions,

the MIDI events programmed in Key On Edit and Key Off Edit modes are also transmitted.

- By pressing and/or releasing a button, it's possible, if you've configured it like this, to send a maximum of two complete MIDI events.
 - One is transmitted by the relevant fader with a pre-programmed (De-)Mute value.
 - The other Event is directly associated with the Key On / Off function.

9.4.8 Fader Mode

- In fader mode the display turns into a sort of mini-MIDI monitor, indicating in words or abbreviations the MIDI events associated with the relevant fader, or transmitted by it.

Data is shown as follows. On the top line of the display: fader name, then the actual fader position in brackets, then the variable value:-

faderXXX[Pos]Val

Contrl , 1 ,Val

And on the bottom line (see above):- programmed MIDI Event, then the first MIDI data byte, then the second MIDI data byte.

- Pressing a fader select button causes the current reading/s of the fader to be called up in the LCD, and the actual value to be transmitted.

⇒ Faders can also be selected by using the alpha-dial.

9.4.9 Special Functions

HookMode:Off/On

- All faders which are programmed in hook mode are indicated by the 'fader select' LEDs – the top row of LEDs.
 - The OK LED blinks when hook mode is entered.
 - Pressing the OK button confirms hook mode. When it is no longer required, it has to be turned off with the HookMode:Off function.

Threshold:

Threshold value for hook mode.

Overdup: Off/On

Same system as for hook mode, but this time for overdub mode.

MIDILock: Off / In1 / In2 / In12

- To relieve the REGELWERK of un-necessary processing of MIDI information that isn't relevant to it, it's possible to switch the MIDI inputs on and off independently.
 - MIDI real-time data will be received and processed. All other MIDI events present at the inputs will be ignored.
 - That means, for instance, that it's possible to synchronise the REGELWERK sequencer to an external MIDI clock, without burdening the REGELWERK's processor with all the other MIDI data on this channel.

Sample/Sek.: 24 - 8

- This is where the scanning / sample-per-second rate for the faders can be altered.
 - The rate applies globally, to all faders.
 - There could theoretically be a maximum of 24 x 24 fader events per second -> 576 fader events (and if each had three bytes, that would approach 50% of the maximum possible MIDI data flow rate).

⇒ Because of frequent difficulties in the past with MIDI instruments which couldn't cope with the highest theoretically possible speeds of MIDI data transmission, it was decided to limit the maximum resolution to these amounts, and to allow a lower sample rate to be chosen if necessary.

9.4.10 String Edit

- If a fader hasn't been specifically labelled by the user, the software automatically calls it FADERXXX (where XXX stands for the number of the fader).
 - The advantage of this: no hassle having to label a fader, and no need to use up memory for a name when saving the preset.
 - The disadvantage: just by looking, it's impossible to tell what the fader is programmed to do.
- So it's also possible to enter a user-chosen label for each fader (in current software, up to eight letters long).

When no name has been given to a fader, this default message comes up in the LCD:

faderXXEditName

NoName! Make?> OK

- Now to label a fader, the default mode must be switched off by responding to the question

NoName Make?> OK ,

and giving the anonymous fader a label.

⇒ Once you press OK to confirm this question, you automatically leave the page, and have to re-enter it.

Then the LCD shows:

ABCDEFG EditName

ABCDEFG Delete?

ABCDEFG is the default name, which can now be edited with the aid of the cursor keys and alpha dial.

- Should you ever want to return to the default name (for instance to save memory), you need to confirm

'Delete?'

- by pressing OK, and thus deleting the user name once more.

- Also in this menu, it's possible to enter a string which is transmitted if any of the following events occur:-

EditString:Pres

EditString:Start

EditString:Stop

EditString:Cont

EditString:Rew.

EditString:Forw.

- a preset is called up
- the Start button is pressed (or a real-time start message is received)
- the Stop button is pressed (or a real-time stop message is received)
- the Cont button is pressed (or a real-time continue message is received)
- the <<- rewind button is pressed
- the ->> fast forward button is pressed

- These settings are available for each of the presets, and are ideal for, e.g., MMC (MIDI machine control).

9.4.11 Edit Tools

For the time being, a fairly limited 'copy and paste' type of editing is all that's available .

Copy: Event type x from source fader a

to Event type x at destination fader b

Types of event can be:

FaderEvt, - Fader Event
 KeyOnEvt, - Key On Event
 KeyOffEvt, - Key Off Event
 FaderStr, - Fader String
 KeyOnStr, - Key On String
 KeyOffstr - Key Off String

- Using the alpha dial you can scroll through

all the possible combinations of compatible source and destination event types.

- Using the fader select buttons 1-24, choose the respective source and destination faders.
- The data entry point always swaps between source and destination faders.

9.4.12 SnapTools

GetSnapShot:

StoreSnap:

DeleteSnap:

- Select the preset number by using either the alpha-dial or a combination of the eight top left hand buttons (labelled Preset/Snap Bank / Pattern Bank) and the 16 right-hand top buttons. To select, e.g., snapshot 17, press Bank 2, number 1.
- A maximum of 128 snapshots are available.
- Snapshots, like Event Strings, are stored in a dynamically managed memory location.
- That means that the maximum number of snapshots available does depend on how much space is left in this location.
- The amount of memory used up is shown by a percentage readout.

PresSnapMem: XXX%

⇒ If there's not enough space left, memory can be re-used by using the individual delete function.

9.4.13 Preset / Pattern Tools

- To select the 64 Presets & 64 Patterns you use the same 8 bank buttons as for the snapshots, again in combination with the 16 Preset/ Pattern buttons. The first four bank buttons are for presets, and the second four for patterns.
- All the functions work in an identical way to the snapshot functions.
- 64 Presets / 64 Patterns (all fully compatible with the Doepfer Schaltwerk).

Select as with snapshots (Preset/Pattern Bank), using the GetPreset page:-

GetPreset / Pattern:

StorePreset / Pattern:

- Presets / Patterns accessed by the GetPreset function are (unlike in the SCHALTWERK) not automatically sync-ed to a master track.
- The time it takes to access a preset from memory depends, among other things, on how full the dynamic memory is.
- It's normally better to stop any ongoing sequence to load a new preset. It's quicker, and because of the lack of synchronisation, there's no advantage in having the sequence running. Stopping it avoids any chance of problems with notes hanging, etc.

SysEx Preset / Pattern:

- Transmit a preset / pattern via SysEx.
- The SysEx format of REGELWERK patterns is compatible with the Doepfer SCHALTWERK.
- A SCHALTWERK connected via MIDI could therefore read REGELWERK patterns, and store them in its memory locations and re-transmit them to the REGELWERK.
- REGELWERK SysEx strings are in two sections.
- The first block contains all the static parameters – the fader events and parameters for all the 24 faders and buttons. (This block is the same size as a pattern memory.)
- The second block, which is of variable length, contains all the dynamically variable data in a preset – the faders themselves, key strings, and user-defined fader names / labels.
- REGELWERK reacts automatically to any SysEx string received.
- When receiving the dynamically variable part of the SysEx string, it is possible that an error message will be generated, if the available storage space in the dynamic memory location isn't sufficient for the amount of data being transmitted.

⇒ In this case, enough memory must be freed up in this section (by deleting old and unwanted strings and snapshots) and the SysEx transmission then repeated.

⇒ In the 'Delete Preset' function, the actual preset itself isn't deleted first time round: just the dynamic memory containing the string, name, etc.. If there's still not enough space, then the rest of the memory for this preset can be cleared.

- The Preset itself remains intact.

InitPreset?<OK>

InitPattern?<OK>

- Use this function to set the preset or pattern in the edit buffer to its default values.

⇒ The individual presets / patterns remain intact.

9.4.14 Sync Menu

- In general, REGELWERK's tempo is controlled by its own internal clock:-

SYNC- INTERN / EXT.

Mode: Intern

- REGELWERK can also be controlled by an external MIDI Clock
- at MIDI input socket 1:-

Mode: Ext. MCL1

- or at MIDI input socket 2:-

Mode: Ext. MCL2

- or by an external DIN sync signal:-

Mode: Din Sync

- received at the DIN sync socket.
- In **internal sync mode**, the REGELWERK sends Realtime MIDI Messages:-
- Start (\$FA),
- Continue (\$FB),
- Stop (\$FC), and also
- MIDIClock (\$F8)
- from both MIDI output sockets.
- At the DIN sync socket, a synchronised

square-wave signal is transmitted.

- In **external MIDI sync** modes, the REGELWERK tempo is controlled by MIDI Realtime Messages at MIDI In 1 and / or MIDI In 2.
- At the DIN sync socket, a synchronised square-wave signal is again transmitted.
- In **external DIN Sync** Mode the DIN sync socket turns into an input, and the REGELWERK is controlled by any square-wave signal or start / stop messages received at the socket.
- Further sync parameters can be altered when using MIDI clock sync, to change the response of the REGELWERK to Continue commands.

Setting the mode to the following:-

Mode: Start; Cont

- makes REGELWERK tracks reset to the first step after a Start message (or in normal cycling mode)
- A Continue message starts the sequence from the last step reached.

Setting the mode to the following:-

Mode: Start = Cont

- means that all tracks will start afresh from step one, whether a Start or a Continue message is received.
- As standard, MIDI Realtime messages are transmitted from both MIDI Out 1 and MIDI Out 2. There may be some MIDI configurations, though, where this could be undesirable, or cause problems. Accordingly, REGELWERK gives you the option of sending Realtime Messages just from one or other of the MIDI Outs, or from neither.

Mode: Mcl1

sends Realtime Messages out only from MIDI Out 1;

Mcl2 sends only from MIDI Out 2;

Mcl1 & Mcl2 sends from both MIDI Outs (the default setting at power-up);

No Mcl-Out sends no Realtime Messages from either of the two MIDI Outs.

⇒ All Sync Menu settings are only stored in volatile memory, so will be lost when power is

switched off, and will need to be re-entered if required on power-up.

9.4.15 Sequencer Parameters

Editing Track Parameters :

MIDI Channel,

Note Number,

Step Time

Gate Time

End Step.

- A Track is chosen for editing by pressing one of the Track Select buttons.
- Tracks are turned on and off with the Track On buttons.
- Gate On / Off is controlled by the Sequencer Step buttons.
- The MIDI Channel page is used to select the MIDI channel for each track.
- The Note Number page defines a note offset for the track as a whole, adding the programmed number of semi-tones to all the notes of a track. This is always a positive offset – negative offsets aren't possible.
- The Step Time page sets the number of MIDI clocks or DIN sync pulses between each event in the track. The result is whole-number division of MIDI clock and / or the internal tempo.
- The Gate Time page enables you to adjust the relative length of the notes (and spaces, of course).
- Gate Time is the time between identical repeated events – like two Note Ons.

Step Time is shown in the display like this:-:

Step Time:006 = 1/16

- The '006' means that 6 MIDI Clock pulses must elapse before the next event is produced, and / or a track moves to the next step.
- The reference to the musical terminology '1/16' stems from the fact that, as there are 96 MIDI clocks in a beat, each clock is 1/96. Six clocks are therefore 1/16 (6/96).
- The End Step page is used to select the last step in a track. After reaching this step, the track jumps back ('resets') to the first step in

the track and continues playing from there.

9.4.16 Sequencer Mode

- A Track is chosen for editing by pressing one of the Track Select buttons.
- Tracks are turned on and off with the Track On buttons.
- Gate On / Off is controlled by the Sequencer Step buttons.

- In addition faders 9 - 24 are dedicated to steps 1 - 16, and are used to set note number and note velocity.
- In Sequencer Mode, the normal Fader Mode output from faders 9-24 is switched off, and only faders 1-8 retain their usual fader mode function.

- Which function is being dealt with can be seen from the LCD, and is switchable from one function to the other by the menu buttons.

- In Sequencer Mode, the sixteen dedicated faders (9-24) behave like the sliders or knobs on a quantised analogue sequencer.
- That is, once the fader is moved, the respective parameter will immediately jump to the value (note number or velocity) the fader is outputting .

⇒ That means that editing with a fader is 'destructive': the old value can no longer be recalled once a fader has been moved. As soon as a new fader position registers, the old value is over-written.

- The old value remains intact, so long as it is not deliberately over-written, and if you want to make a small adjustment to it, relative to its current position, select it with its respective gate button and adjust it using the alpha dial.

- Which of the eight Tracks' data is being adjusted is controlled by the Track Select buttons.

10 Appendices

10.1 LCD readouts during the reception of MIDI SysEx data:

- If a SysEx Pattern is successfully received by REGELWERK without any errors, and is written into the relevant pattern memory, the following message appears in the LCD readout:-

Receive Pat.: xxx

- If a SysEx dump has a problem, and produces an error, this message appears:-

**MIDI Receive Error
SysEx Dump**

- The cause of an error like this can either be a problem with the actual MIDI dump format, or too large an amount of data for REGELWERK to handle. When sending a SysEx dump, short pauses should be inserted between the packets of MIDI information.
- Errors are most likely to happen if the sequencer is running at a high tempo, with short step times, large numbers of simultaneous events, and a SysEx dump all happening at the same time. With further stress placed on the system by having to process large amounts of data at the MIDI Inputs, the internal buffer could sometimes overflow, and cause errors.
- These messages are only temporarily displayed. As soon as a new event occurs, the message will be over-written.
- FOR CONTROL PURPOSES:
 - a Preset Dump is sandwiched between two SysEx strings. The entire first string is composed of 1035 bytes.
 - If that's not the case, something's gone wrong with the dump!

10.2 Complete Initialisation

- REGELWERK can be completely initialised (hard reset).
 - This might be necessary or desirable

because..

- you want to erase all a previous owner's data
- there's been a crash or electrical fault of some description, and REGELWERK contains some spurious data in its memory which it can't process.
- To perform a hard reset, hold down the Start button while switching on power to the unit.

The following message appears:-

INIT MENUE! <OK>

FORMAT PRESET RAM

- After pressing the OK button (note that in this mode, unlike others, the LED doesn't blink), the next message appears:-

Format total RAM

and the entire set of memory locations is erased and initialised.

- This can take quite a few seconds, as each of the 128 locations is re-set in turn ..

Init Ram 1-128

- and then REGELWERK returns to its usual mode of operation.

⇒ This process irrevocably deletes all the user data in the REGELWERK's memory locations. It's recommended only for service purposes, or as a quick way to return REGELWERK to its factory settings. It's vital to remember to use a MIDI SysEx dump to save all data that you might regret losing.

11 Troubleshooting

- If any problems do come up with your REGELWERK use the following check-list for fault-finding.
- It often happens that what look like faults are actually a product of the operating system design, which can be avoided or worked around by knowing the REGELWERK thoroughly.
- If despite careful analysis of what's happening, the problem can't be overcome, then there may be a fault in the hard- or software.
- Please in that case approach us or your local distributor. We will do whatever we can to help solve the problem as quickly as possible.

11.1 Connection problems

- REGELWERK is not receiving or transmitting any MIDI data.
 - Check that the MIDI cables between REGELWERK and other MIDI equipment are correctly connected.
 - Check that proper MIDI-compatible cables are being used. Problems may arise from using hi-fi or other non-standard cables.
 - Check that there isn't a fault with the MIDI cables, by substituting cables between different pieces of equipment. Common problems are invisible internal breaks in one of the conductors, or, in the case of home-made cables, dry or defective solder connections in the plugs.
- REGELWERK is not receiving or transmitting any DIN sync data.
 - Specialist MIDI cables shouldn't be used for DIN sync, because although the sockets are identical in appearance, the pin allocation is different, and pure MIDI cables won't necessarily work for DIN sync.
 - Also check the DIN sync settings on the various instruments: if both are set to the same mode (input, or output) then no communication is possible. One has to be configured as an output, one as an input.

11.2 Reception problems

- Data is being received by the MIDI instrument, but it's not turning into the music you're expecting!

- The receiving instrument is not actually set to receive MIDI data.
- The receiving instrument is set to a different MIDI channel from the one on which REGELWERK is transmitting the data.
- The receiving instrument has been effectively muted by a previous MIDI message (for instance turning the MIDI volume to 0), etc..
- MIDI data is being received by the REGELWERK, but is not being re-transmitted properly.
 - A different MIDI channel has been selected for the chosen REGELWERK function.
 - The chosen REGELWERK function isn't activated, and is set to 'OFF', or is set to respond to the wrong MIDI input.
- MIDI Events received at the MIDI Ins are altered before being transmitted at the MIDI Outs.
 - The MIDI Inputs don't have any built-in merge function – so incoming data isn't merged with the REGELWERK's internal MIDI data, and thus isn't available at the output/s. If all that's needed is to have the data input to the REGELWERK also available to other devices, then a MIDI Thru box placed before the REGELWERK will do the trick.
 - If you want this and other MIDI data to be merged before being sent to the relevant instrument, then an external MIDI merge box like the

⇒ DOEPFER MMR4/4

is needed.

11.3 The Start / Stop / Continue buttons 'don't work'.

- Perhaps all steps are muted, so that although the sequencer is running, no data is being transmitted.
- Perhaps the end step on the selected Track is set to step 1, so there's no movement from the Sequencer Step LEDs, and, even with the Track switched on, no sound, because the sequence stops moving.
- Perhaps some parameters (for instance Step Time, Gate Time, MIDI channel, Note or Velocity values) are set to extremes, which can't be recognised by some MIDI equipment.
- Electrical storms, power cuts and surges, and so on, can corrupt the non-volatile memory

locations in the REGELWERK and produce bizarre data in the Presets. Preset 1, the default start-up preset, is particularly prone to this, and problems will naturally follow. This is loaded automatically at the start, and if it's been corrupted, will send spurious information and quite probably crash the REGELWERK.

- If a problem is suspected, it's advisable to check and correct corrupted data BEFORE starting a sequence. Running a sequence with corrupted or bizarre parameters is asking for trouble!
- In this case, if the REGELWERK crashes, a hard reset (initialisation) may well be the only answer. !!! First save the uncorrupted presets via a SysEx dump.

11.4 Changes made to a pattern are not stored in memory

- Perhaps you've forgotten that REGELWERK has to be explicitly told to store pattern data along with the other data in a preset.

11.5 Problems editing parameters within menus

- Editing parameters with the alpha dial and buttons is slow and laborious.
- While editing values with the sequencer running, it's possible that the editing process can become a little sporadic and slow to respond, because the internal processor gives priority to the sequence, and only deals with editing functions when there is processing power available. This is going to be particularly noticeable with very fast or complex sequences.

- The Step LEDs (showing the sequence running) aren't responding 100% accurately, or as expected; for instance, interference patterns may sometimes occur.
- This is again caused by deliberate software design policy, which gives indicators and displays a lower priority than the processing of 'higher level' events, such as real-time control: MIDI data output, reception and transmission, sequencer tempo, and anything that is crucial to the tightness and accuracy of the musical output.

11.6 Individual buttons have slightly different responses

- Due to the large quantity of buttons used in the REGELWERK, and the variability of mass production, it's possible that different buttons will have slightly different response characteristics. This will be particularly noticeable if two buttons that are next to each other behave differently.
- We hope you'll agree that it's not a serious problem, as long as the difference is only slight, and that it's the right decision to use these reasonably-priced buttons considering the large cost implications of any alternative.

12 Appendices

12.1 Appendix A - Preset track patterns

Step	1234	5678	1111	111			
			9012	3456			
0:	X		X	X	A-1	BD1	Rock 8Beat1
1:	X		X		A-2	BD1	Rock 8Beat2
2:	X		X		A-3	BD1	Rock 8Beat3
3:	X	X	X		A-4	BD1	Rock 8Beat4
4:	X	X	X	X	A-5	BD1	Rock16Beat1
5:	X		X	X	A-6	BD1	Rock16Beat2
6:	X	X	X	X	A-7	BD1	Disco 1
7:	X	X	X	X	A-8	BD1	Disco 2
8:	X		X	X	A-11	BD1	Funky 1
9:	X		X	X	A-12	BD1	Funky 2
10:	X				A-13	BD1	RockFillIn1
11:		XX		XX	A-16	BD1	RockFillIn3
12:	X		X	X	B-3	BD2	Bossanova1
13:	X		X		B-5	BD2	Mambo
14:	X		X	X	B-6	BD2	Merengue
15:	X		X	X	B-7	BD2	Rumba
16:	X	X	X	X	B-9	BD2	Samba 1
17:			X		B-13	BD2	SwingFillIn
18:	X		X		B-14	BD2	LatinFillIn
19:				X	B-16	BD2	SambaFillIn
20:	X		X	X	C-3	BD2	Oldies R&B
21:	X	X	X	X	C-4	BD1	Reggae 1
22:	X		X		C-5	BD1	Reggae 2
23:	X	X	X	X	C-6	BD1	Rap
24:	X	X		XXX	C-7	BD1	HipHop
25:	XXXX		XX	X	C-8	BD1	ElectricFunc
26:	X	XX	X	X	C-9	BD1	Metal 1
27:	X	X	X	XX	C-10	BD1	Metal 2
28:	X		XX	X	C-11	BD1	RocVar.1
29:		XX	XX	XXXX	C-14	BD1	ElectricFill
30:		X		X	A-1	SD1	Rock 8Beat1
31:		X	X	XX	A-13	SD1	RockFillIn1
32:	XXXX				A-14	SD1	RockFillIn2
33:	XX				A-16	SD1	RockFillIn3
34:	X	X	X	XX	B-12	SD3	Marching
35:		X	X	X	C-1	SD3	Oldies
36:		X	X	X	C-1	SD3	Oldies
37:		X	X	X	C-3	SD3	Oldies R&B
38:		X	X	X	C-3	SD3	Oldies R&B
39:	X	X	X	X	C-9	SD1	Metal
40:		X		X	C-11	SD1	RockVar1
41:				X	C-14	SD2	ElectricFil
42:	X			X	C-15	SD2	MetalFillIn
44:	XXXX	XXXX	XXXX	XXXX	A-5	CCH	Rock16Beat1
45:	X	X	X		A-13	CCH	RockFillIn1
46:		X	X	X	A-14	CCH	RockFillIn2
47:	X	X	X	X	B-4	CCH	Bossanova 2
48:	X	XX	X	XX	B-6	CCH	Merengue
49:	X	XX	X	XX	B-7	CCH	Rumba
50:	X		X	X	B-8	CCH	Beguine
51:	X	X	X	X	B-10	CCH	Samba 2
52:		X	X		B-15	CCH	Latin Break
53:	X	X	X	X	C-2	CCH	Oldies 2
54:	X	X	XX	X	C-6	CCH	Rap
55:	XXX		XX		C-7	CCH	HipHop

56: ____ _XX C-8 CCH ElectricFun
57: XXX_ XX_ XXX_ _X_ C-11 CCH RockVar.1

Using preset track patterns

- Among the MIDI Event parameters in the Fader Edit menu is one called 'TrkPat'. This is short for 'Track Pattern' – ready-made rhythm tracks or sequences for a track.
 - By moving the relevant fader, these patterns are instantly transferred into the chosen Track, ready for action.
 - Although the patterns are designed principally for drum tracks, they can often work just as well as the basis of a pitched note sequence.
- In the table on the previous page, all the originally available Track Patterns are listed. They can be accessed simply by setting the fader to any of the numbers from 0: - 57: .
 - An 'X' means that a Gate has been programmed, and a '_' means that there's no Gate – i.e. the step for that pattern is silent.
 - Each pattern has been given a very basic name, along with the drum sound (BD = Base Drum, SD = Snare etc.) with which it was programmed. It's surprising how similar the individual tracks for totally different rhythms can be – it's often how the constituent parts are combined that makes rhythms unique.
- You might like to try controlling TrkPat events not just on one Track and with one fader at a time, but with more than one.
 - The results can be interesting: instant craziness.

⇒ Please note that when saving Patterns it's only the gate information which is stored, not the settings of the 'TrkPat' fader/s.

- If a really good combination emerges, which is too good to lose on switching off, then the only thing to do is to write the settings down.
- Up till the time of compilig the table, only 58 (0...57) Track Patterns have been programmed. The rest of the locations (up to 127) may well be full of random code, which can occasionally produce amusing or useful results by pure chance.

⇒ If any of these patterns happens to be really good, it's worth saving them on paper, so that you can still recall them even if another software version is loaded into the REGELWERK, and the original random patterns are over-written.

- We'll fill spare locations in future with any good patterns sent in by REGELWERK users.

12.2 Appendix B – User settings and configuration examples

- In future, this space will be reserved for settings, tips and suggestions sent in by users.

⇒ This is where we need the help of all REGELWERK users!

Possible material:

- REGELWERK settings for use with a particular synthesizer,
 - or settings which are more geared to sequencing functions,
 - or a combination of both ?!
- Please let other users share the benefits of your experience exploring REGELWERK.
 - Whenever resources allow, patches submitted will be made available on our internet page for download by any user.
 - Please send any written information by post, fax, or email – however's best for you.
 - Please send Patches and/or SysEx Dumps by post on floppy disk, or via email.

⇒ We'll organise free software updates for all the most helpful and successful contributions.

13 MIDI 1.0 Specification:

Status	Data byte(s)	Description
D7----D0	D7----D0	

13.1 Channel Voice Messages

- 1000cccc 0nnnnnnn Note Off event.
0vvvvvvv
 - This message is sent when a note is released (ended).
 - (nnnnnnn) is the note number.
 - (vvvvvvv) is the velocity.
- 1001cccc 0nnnnnnn Note On event.
0vvvvvvv
 - This message is sent when a note is depressed (start).
 - (nnnnnnn) is the note number.
 - (vvvvvvv) is the velocity.
- 1010cccc 0nnnnnnn Polyphonic Key
0vvvvvvv Pressure(Aftert.)
 - This message is sent when the pressure (velocity) of a previously triggered note changes.
 - (nnnnnnn) is the note number.
 - (vvvvvvv) is the new velocity.
- 1011cccc 0ccccccc Control Change.
0vvvvvvv
 - This message is sent when a controller value changes. Controllers include devices such as pedals and levers. Certain controller numbers are reserved for specific purposes. See Channel Mode Messages.
 - (ccccccc) is the controller number.
 - (vvvvvvv) is the new value.
- 1100cccc 0ppppppp Program Change.
 - This message is sent when the patch number changes.
 - (ppppppp) is the new program number.
- 1101nnnn 0ccccccc ChannelPressure(Aftert)
 - This message is sent when the channel pressure changes. Some velocity-sensing keyboards do not support polyphonic after-touch. Use this message to send the single greatest velocity (of all the currently depressed keys).
 - (ccccccc) is the pressure value.
- 1110nnnn 0lllllll Pitch Wheel Change.
0mmmmmmm
 - This message is sent to indicate a change in the pitch wheel. The pitch wheel is measured by a fourteen bit value. Center (no pitch change) is 2000H. Sensitivity is a function of the transmitter.
 - (lllllll) are the least significant 7 bits.
 - (mmmmmm) are the most significant 7 bits.

13.2 Channel Mode Messages (See also Control Change, above)

- 1011nnnn 0ccccccc Channel Mode Messages.

- 0vvvvvv This the same code as the Control Change (above), but implements Mode control by using reserved controller numbers.
- The numbers are:
 - Local Control.
 When Local Control is Off, all devices on a given channel will respond only to data received over MIDI. Played data, etc. will be ignored. Local Control On restores the functions of the normal controllers.
 - c = 122, v = 0: Local Control Off
 - c = 122, v = 127: Local Control On
 - All Notes Off.
 When an All Notes Off is received, all oscillators will turn off.
 - c = 123, v = 0: All Notes Of
 - c = 124, v = 0: Omni Mode Off
 - c = 125, v = 0: Omni Mode On
 - c = 126, v = M: Mono Mode On (Poly Off) where M is the number of channels (Omni Off) or 0 (Omni On)
 - c = 127, v = 0: Poly Mode On (Mono Off) (Note: These four messages also cause All Notes Off)

13.3 System Common Messages

- 11110000 0iiiiiii System Exclusive.
0ddddddd
 - This message makes up for all that MIDI doesn't support.
 - (iiiiiii) is a seven bit Manufacturer's I.D. code. If the
 - 0ddddddd synthesizer recognizes the I.D. code as 11110111 its own, it will listen to the rest of the message (ddddddd). Otherwise, the message will be ignored. System Exclusive is used to send bulk dumps such as patch parameters and other non-spec data. (Note: Real-Time messages ONLY may be interleaved with a System Exclusive.)
- 11110010 0IIIIIII Song Position Pointer.
0mmmmmmm
 - This is an internal 14 bit register that holds the number of MIDI beats (1 beat= six MIDI clocks) since the start of the song. I is the LSB, m the MSB.
- 11110011 0sssssss Song Select.
 - The Song Select specifies which sequence or song is to be played.
- 11110100 Undefined.
- 11110101 Undefined.
- 11110110 Tune Request.
 - Upon receiving a Tune Request, all analog sythesizers should tune their oscillators.
- 11110111 End of Exclusive.
 - Used to terminate a System Exclusive dump (see above).

13.4 System Real-Time Messages

- 11111000 Timing Clock.
 - Sent 24 times per quarter note when synchronization is required.
- 11111001 Undefined.
- 11111010 Start.

- Start the current sequence playing. (This message will be followed with Timing Clocks).
- 11111011 Continue
 - Continue at the point the sequence was Stopped.
- 11111100 Stop.
 - Stop the current sequence.
- 11111101 Undefined.
- 11111110 Active Sensing.
 - Use of this message is optional. When initially sent, the receiver will expect to receive another Active Sensing message each 300ms (max), or it will be assumed that the connection has been terminated. At termination, the receiver will turn off all voices and return to normal (nonactive sensing) operation.
- 11111111 Reset.
 - Reset all receivers in the system to power-up status. This should be used sparingly, preferably under manual control. In particular, it should not be sent on power-up.

Other information:

To get your copy of the 1.0 spec, send a \$2 check to:

International MIDI Association
 5316 West 57th Street
 Los Angeles, CA 90056
 (415) 321-MIDI

Make your checks payable to the IMA. BYW, the 1.0 spec is technically identical to the .06 spec, but the description has been re-written. Since the spec has been officially approved, there shouldn't be any problem with posting this summary of the .06 spec:

[This document is Dave Oppenheim's current version of the MIDI file specification, as sent to those who have participated in its development. The consensus seems to be to submit this to the MIDI Manufacturers' Association as version 1.0. I apologize for any loss of clarity that might have occurred in the conversion from a Microsoft Word document to this pure text file. I have removed some of the discussion about recent changes to the specification in order to keep the file size reasonable.--Doug Wyatt]

14 Bibliography

- **Articles**

Michael Cxelperger: <Introducing Standard MIDI Files>. Electronic Musican,
April 1989, p.50ff

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

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

- **Books**

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

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
There is also a C source disk for the PC available for \$25.

Mind over MIDI / edited by Dominic Milano, from the pages of Keyboard magazine.
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Series Name: The Keyboard magazine basic library
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ISBN: 0-88188-551-7 (pbk.) : \$12.95
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ISBN: 1-55851-068-0, 250 pp. Paperback. \$24.95 Mix Bookshelf part # 3539C
*** This book is now out of print ***

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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.

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) : \$39.95 This book continues where the previous one left off.

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

15 Fault report and suggestion form

Please return this form to: DOEPFER Musikelektronik GmbH
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Name:.....

Firm:.....

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Customer number:.....

Date of

purchase:.....

Serial number:.....

Errors / suggested improvements in the user manual:

REGELWERK faults / suggested improvements:

For notes: