

## Series 52

# 52/RX Mixing Console Manual

© 2010 DHD Deubner Hoffmann Digital GmbH

Version: 1.1.0



# Table of Contents

<b>1</b>	<b>Terms of Use - Legal Disclaimer</b>	<b>1</b>
<b>2</b>	<b>About this Book</b>	<b>2</b>
<b>3</b>	<b>What is new in this version of the manual?</b>	<b>4</b>
<b>4</b>	<b>General Information</b>	<b>5</b>
<b>5</b>	<b>Key Features</b>	<b>7</b>
<b>6</b>	<b>Applications</b>	<b>7</b>
<b>7</b>	<b>Examples</b>	<b>11</b>
	1 Example 1: Self Operating Desk .....	11
	2 Example 2: Network with two 52/RX Consoles .....	13
<b>8</b>	<b>Principle of Operation</b>	<b>14</b>
<b>9</b>	<b>Further Information</b>	<b>17</b>
	1 Suitable PoE Switches for DHD Devices .....	17
	<b>Index</b>	

# 1 Terms of Use - Legal Disclaimer

## Series 52

### 52/RX Mixing Console Manual

© 2010 DHD Deubner Hoffmann Digital GmbH

This manual is copyright of DHD. It might be distributed and copied as long as it is copied completely as a whole and this copyright notice is included.

No part of this document may be copied or distributed without prior written permission of DHD Deubner Hoffmann Digital GmbH.

Windows is a registered trademark of Microsoft Corp., Redmond, Wash., USA. All other trademarks are the property of their respective owners.

**Specifications and design are subject to change without notice.**

**The content of this document is for information only. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does neither convey nor imply any license under patent rights or other industrial or intellectual property rights.**

Version 1.1.0, 12.07.2010


## 2 About this Book

This book will provide you an overview about the applications of the 52/RX Mixing Console.

The content of this manual is subject to change without notice. DHD recommends to visit the DHD website once in a while to check if there is a newer version of this document available.

### How to Use this Book

#### The Navigation Tree

You can find the navigation tree on the left-hand-side of the PDF document. Via the entries of this tree you can directly reach the several chapters and sections of this document. Click onto the text or the  symbol of an entry to display its content.

If a chapter includes further sections, you will find a plus-symbol in front of the entry in the navigation tree. Either you can click onto this plus-sign or you double click the text or the symbol of the entry to make the sub-branches of the further sections visible.



#### Search

You can find an alphabetical ordered list of keywords at the end of the document. Please see the page numbers in this index to find the respective keywords in the document.

Moreover, you can use the search function of your PDF reader to seek for any words.







#### Links

Links are underlined to separate them from the rest of the text. These links can be a connection to other chapters or sections in the same document or to an URL (internet address).

- Same document: The hand symbol  appears if you move the mouse over the link.
- URL: The hand symbol with an additional  appears if you move the mouse over the link.

Please notice, that you need an active internet connection to be able to execute a link to an URL.

### The Meaning of Advices in the Text

<p><b>Warning</b></p> 	<p>The demands and advices in this fields should be followed <b>unconditional</b>, because otherwise hardware and software products, data bases, as well as persons may suffer a loss.</p>
<p><b>Important</b></p> 	<p>The demands and advices in this fields should be followed, because these contents are necessary for the proper operation of the DHD systems.</p>
<p><b>Note</b></p> 	<p>Recommendations and further information are marked as notes. Sometimes you will also find off-topic content in this field, which is related to the actual topic.</p>
<p><b>Tip</b></p> 	<p>Tips are helpful advices, which should make work with DHD systems easier.</p>
<p><b>Weblink</b></p> 	<p>In this fields you can find links to websites, which include for example an other manual or the possibility to download a driver for the respective DHD system.</p> <p>Please notice, that you need an active internet connection to be able to execute a link to an URL.</p>
<p><b>Download</b></p> 	<p>You can directly open and download a file if the respective link is marked as download link (file link).</p>

### 3 What is new in this version of the manual?

All sections that had been added, deleted or changed are listed below. Click on the entries to reach the respective sections directly.

**Initial version (1.1.0):**

Chapter / Section	State	Note
All sections.	added	Information added.

## 4 General Information

### Safety Instructions

**Ignoring the following safety instructions may lead to accidents with severe, life-threatening injuries, caused by fire or electric shocks.**

Always act according to the directions of this manual.

Fix the device well in a rack or studio furniture with the mounting orientation given by DHD.

Only connect the power cable of the device to a socket, which carries the voltage stated on the specification plate.



#### Important

Make sure that the ventilation openings of the device are not covered and that the environmental temperature is ok to assure sufficient heat flow. (See Installation Guide)

Do not place heavy objects on the device.



#### Important

Do not place drinking vessels or any other vessels with liquids on the device or close to it.

The device or parts of the device can get very warm during the usage. Please be careful when touching the device after a longer operating time.



#### Important

Changes according to hardware configuration may only be done by qualified personnel (e.g. exchanging modules).

## Care Instructions



### Important

The cleaning of a device should be done in Off-Air mode as possible. That means the device does not handle relevant audio and/or logic signals that are integrated in the current broadcasting process.

To clean your DHD device, in general a soft, lint-free and dry cloth is sufficient. In case of severe soiling, you can use a damp cloth and household detergent.



### Important

If a damp cloth is used for cleaning, you have to switch off the DHD device and to disconnect all hot cables from it.



### Warning

Never use a dripping wet cloth. **In no case** water and/or cleaner may enter the device, since this could lead to electric shocks and fires!



### Warning

**Never** use solvent or thinner for cleaning the surfaces. Furthermore, **do not** use abrasive as well as sharp objects for cleaning. You will damage the surface of the device.



## 5 Key Features

The 52/RX Mixing Console, with its 4 to 48 faders, resembles the layout of its predecessor models RM4200D and RM3200D. At the same time, it features prominent advantages of the Series 52, e.g. linking via Ethernet, operation of up to 4 independent mixers with one DSP Frame, and the freely configurable TFT Views. Due to module sizes similar to the mentioned systems, existing RM4200D systems can easily be extended to be a Series 52 mixer by replacing the control modules and upgrading to the Toolbox5 software and the RM420-852/853 Communication Controller, while keeping DSP Frame, I/O modules, table installation frames and studio furniture unchanged.

The Series 52 Mixing Console 52/RX has been designed to be an easy-to-use tool for a broad range of TV and radio broadcasting applications.

It can also be used for:

- On-Air and continuity studios
- Pre or post production, recording, editing, dubbing
- OB Vans and other field applications

The 52/RX uses a special real-time operation system running in the DSP frame. There is no PC-based system inside and it works completely without any PC.

The configuration software runs on standard Windows(TM) based PCs. However, this PC is not needed to run the 52/RX from day to day – it is only needed for setting it up.

A Series 52 Mixing Console 52/RX remotely controls the processing power of a DSP core via TCP/IP. The combination of the proved and reliable DSP power of an RM4200D DSP Frame together with the Series 52 RM420-852/853 Communication Controller provides you with a great variety of features.

With the completely redeveloped Toolbox5 configuration software, you can flexibly adjust the available audio and logic resources of your mixing system to meet your individual requirements. Providing a complex range of configuration options, the software still stays intuitive and easy to use.

## 6 Applications

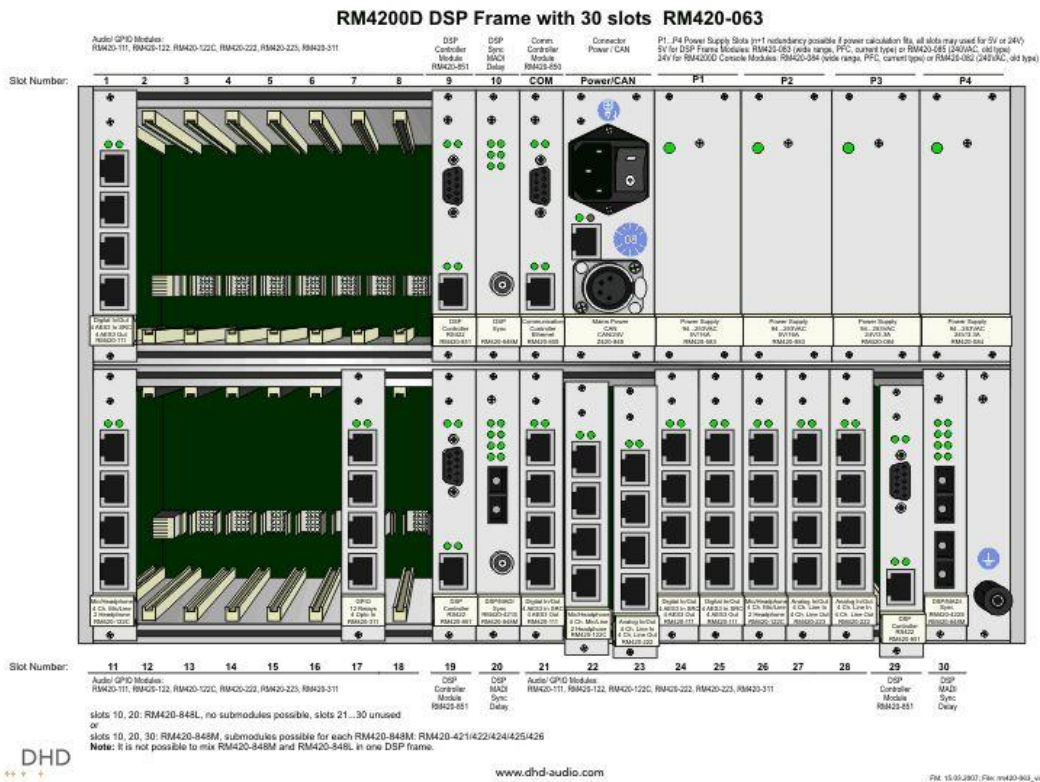


### Note

You need an RM4200D DSP Frame equipped with the RM420-852/853 Communication Controller to operate an 52/RX Mixing Console.

The mixing system consists of two main parts, which are coupled via an industry standard Ethernet connection. These parts are:

- **The DSP Frame.** This unit includes all input and output modules, the DSP Audio Engine and the Control Engine.

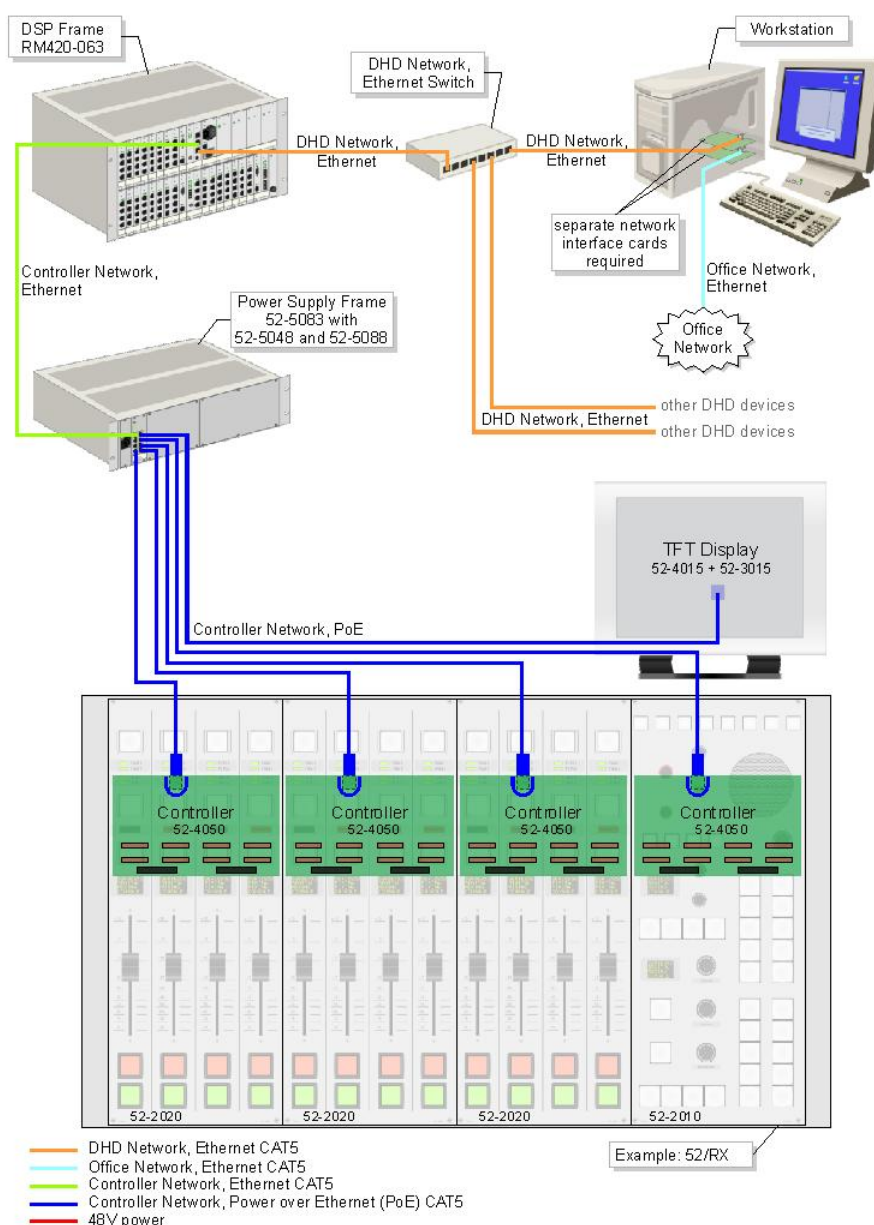


The RM4200 DSP frame.

- **The Mixing Console.** This is the user interface of the mixer with all faders, control knobs, push buttons, displays and TFT screens.

**Note**

To power the modules of the mixing console, you need the necessary number of PoE-Switches (Power over Ethernet) and a 48V power supply. The PoE switch must be a DHD type.



DSP frame and control desk coupled via Ethernet.

The mixing console has a modular design, which allows to combine different modules for different applications. All fader and control modules and TFT displays are linked to PoE switches and finally to the DSP frame via CAT5/6 cables. Modules can be located apart from each other, as long as the specifications for cable length and power supply are met. The cable lengths between the control panels and the DSP Frame can be up to 100 m with CAT6-cables. Even larger distances can be realized with a conversion to fibre-optic cables.

There are two basic kinds of control modules – those containing faders and those without faders. Up to 12 fader modules (48 faders) can be used together in one single mixing console.

Because the parts of the system are coupled by CAT5/6 cables, you can install them in your furniture at will instead of having the furniture built around a more traditional mixing desk. The installation depth for the desk-mounted modules is only 56 mm.

The mechanical construction of all modules is designed to withstand 24/7 use. Sturdy components like EAO Lunitas and NKK keys, Penny & Giles faders and Lexan foil covers on all front panels let the 52/RX perform for a long time.

Some typical functions controlled by an 52/RX Mixing Console are:

- Input routing, input processing, microphone processing and bus assignment.
- Monitoring, talkback, signalling and On Air switching.
- Providing clean feed/mix-minus signals and output routing.
- Recalling and saving user-defined setup data for single channels and overall mixer snapshots.

## 7 Examples

The following examples illustrate some typical applications of the 52/RX Mixing Console. Of course, more combinations of modules and functions are possible. If you need help to define your requirements for an 52/RX, please contact your local DHD partner.

This examples should show the following possibilities:

- external PoE switches (example 1)
- PoE switches inside a power supply frame (example 2)

You can find general information on Ethernet wiring in the first example, which is also valid for all other examples.

### 7.1 Example 1: Self Operating Desk

The following example shows a possible combination of modules for a self operating desk and it should explain the Ethernet wiring of this application. Please use CAT5 cables continuous for wiring. But DHD recommends to use CAT6 cables for longer distances.

Connect the bottom RJ45 jack of the RM420-852/853 Communication Controller of your RM4200D DSP Frame to the configuration PC or to the DHD Ethernet network, where the PC with the configuration software is located. To establish the connection to the office network, you should use a server PC with a second network interface card to avoid slowing the communication in the DHD network and to block non-authorized access to the connected DHD systems.

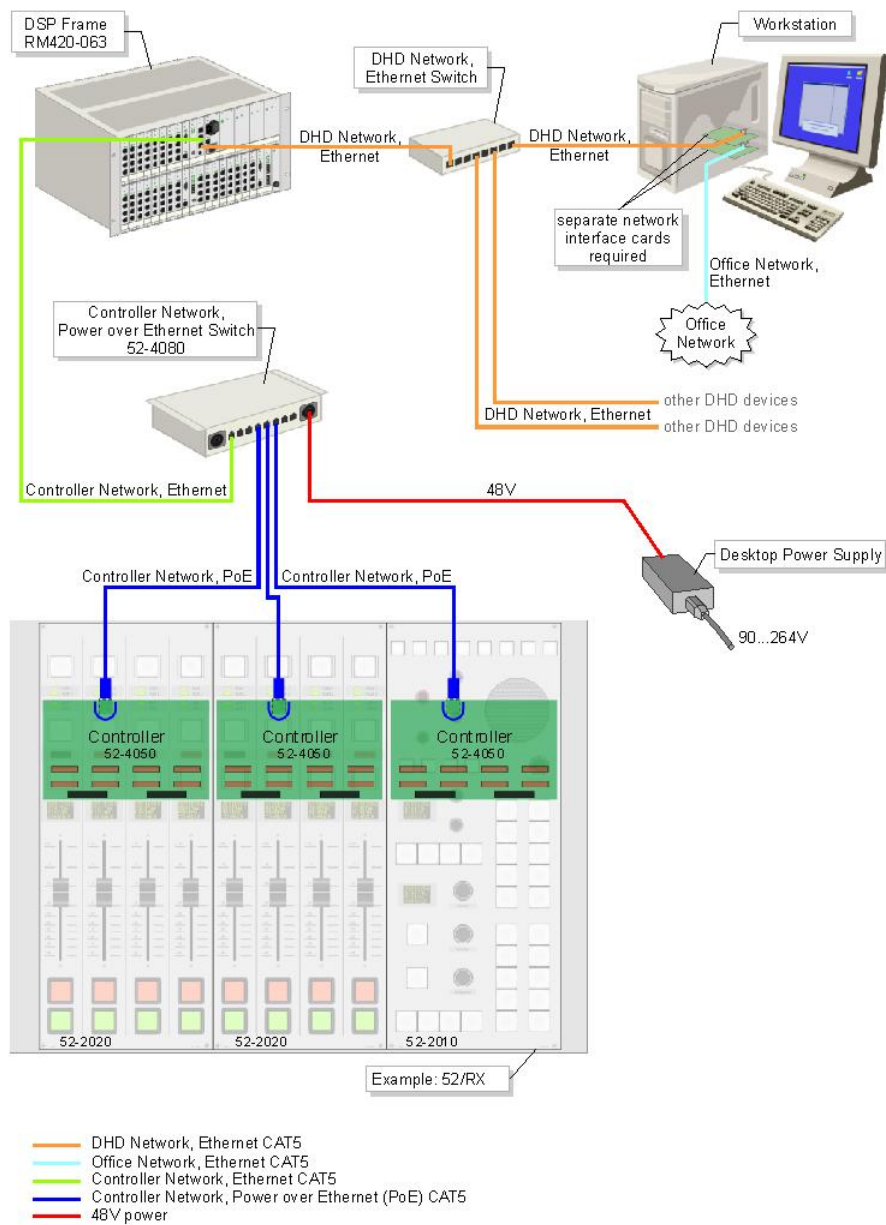
The middle connector of the three RJ45 jacks needs to be connected to a switch of the DHD network. Because the controllers and the control modules are power supplied by the Ethernet connection (Power over Ethernet), you have to integrate at least one power over Ethernet switch (PoE switch) into the controller network. The total number of needed PoE switches depends on the number of connected control modules (each module is equipped with a 52-4050 controller) and TFT displays. Use only switches in the DHD network and the controller network, which are shipped and/or recommended by DHD for the usage in these networks. Especially the switches must be **Unmanaged Switches** working with a speed of **100 Mbit/s**.

The following non-PoE switches are tested by DHD and are recommended for the usage in DHD Ethernet networks and controller networks:

Manufacturer	Type
3com	Superstack 3, Baseline Switch 16 Port 10/100 Ref. 3C16470
3com	Superstack 3, Baseline Switch 24 Port 10/100 Ref. 3C16471
Allied Telesyn	AT-FS713FC/SC 12x RJ45 1x SC <a href="http://www.alliedtelesyn.de">http://www.alliedtelesyn.de</a>
Allied Telesyn	AT-FS708 8x RJ45 <a href="http://www.alliedtelesyn.de">http://www.alliedtelesyn.de</a>

Please see the section [Suitable PoE Switches for DHD Devices](#) for information on PoE switches.

All the modules are also connected with the PoE switch via CAT5 cables.



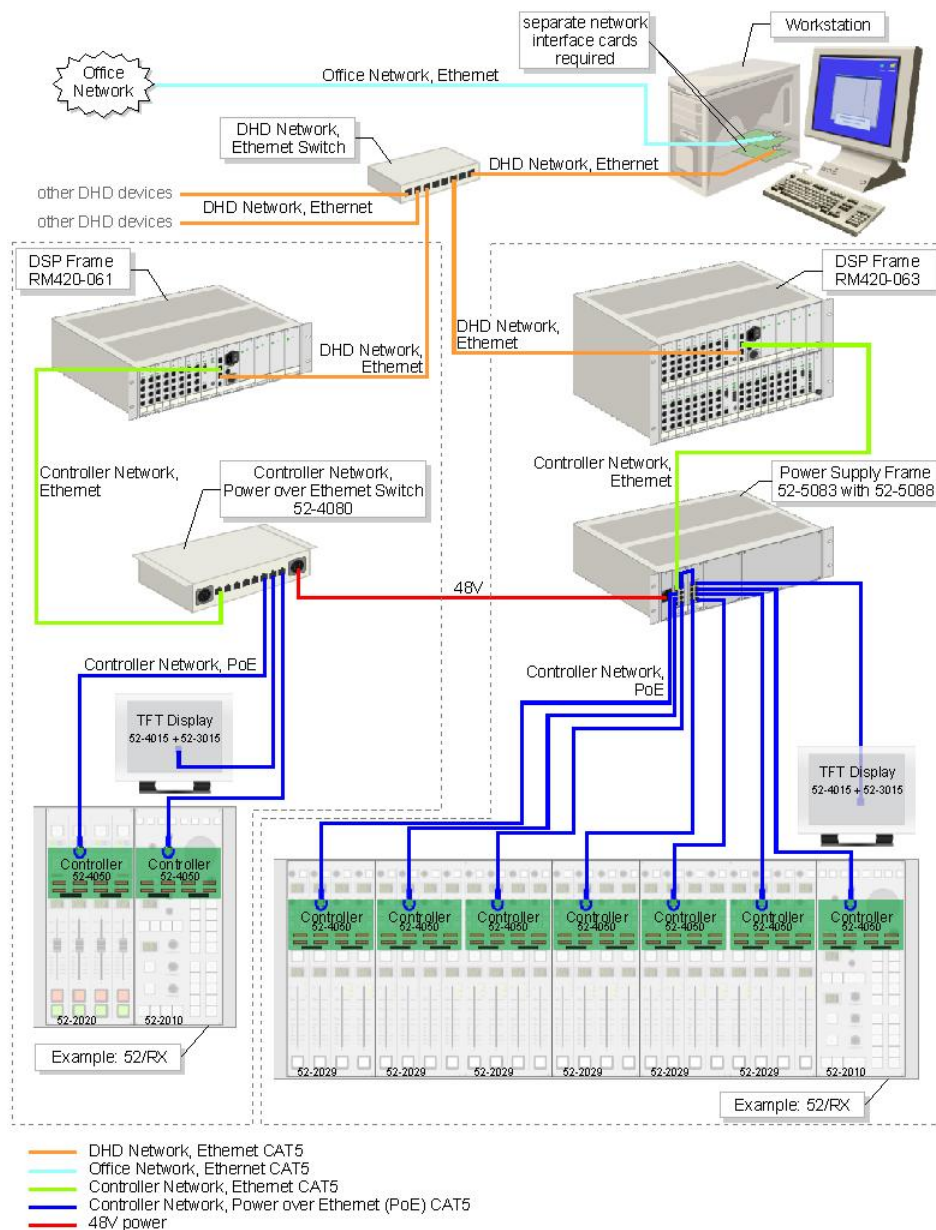
Example of a self operating desk with TFT screen.

## 7.2 Example 2: Network with two 52/RX Consoles

The following example shows a possible combination of modules for a network with two 52/RX consoles and it should explain the Ethernet wiring of this application. Please use CAT5 cables continuous for wiring. But DHD recommends to use CAT6 cables for longer distances.

In general the assembly is similar to the application in [example 1](#). But in this example two independent mixing systems, each consisting of an RM4200D DSP Frame and an associated 52/RX console, are working in the same DHD Ethernet network. Both systems are configured by the same PC in this example.

You can insert 52-5088 PoE switches into the Power Supply Frame 52-5083, like it is shown on the right-hand side of this example.



Example of a network with two 52/RX consoles.

## 8 Principle of Operation

The 52/RX is based on a simple philosophy: The hardware modules provide a stable and powerful foundation for a special software, which in turn implements all the available functions of the system. At first this concept might be difficult to grasp, but once you understand it, a lot of things will become clear.

Basically you connect a number of modules together and afterwards a software is used to configure the way the system works. This approach is the key element to the versatility of the system, because the configuration is by no means final. It can be changed anytime, by anyone who knows how to do it. That way, the system can be adapted to changing requirements during its whole life cycle. If you are refurbishing your studio and need to change its configuration – just do it. If you are buying more modules to extend your system, the software will easily integrate this new hardware. Of course you will always need a DSP frame and certain modules for signal input and output as well as for controlling the system. But how these modules work together can be changed anytime by software.

The 52/RX Mixing Console itself is controlled by the RM4200D DSP Frame and has no own intelligence.

When the hardware of an RM4200D DSP Frame is assembled at the factory, it is „blank“. A configuration file needs to be uploaded to the system to let it perform its tasks. What a such configuration looks like and what it does is determined by the requirements of the prospective users of a certain system. DHD and its partners assist in designing a matching configuration for the customers application. If desired, an RM4200D DSP Frame can be delivered without any configuration and the customer can use the included configuration software to adapt it to his requirements himself.



### Note

Please see the RM4200D manual to get more information on the RM4200D DSP Frame.

The configuration of the 52/RX Mixing Console and the RM4200D DSP Frame is described in the Toolbox5 configuration software manual.

Please keep in mind, that configuring an RM4200D DSP Frame and its connected 52/RX Mixing Console is a step-by-step process. A configuration is designed using the configuration software and is then uploaded to the system. After that, the system stays in the currently configured state until the upload process is repeated. The configuration software and the PC it is running on are not needed during normal operation of the system. This implies that the configuration can not be changed „on the fly“ during normal operation of the system.

Another consequence of the configuration process is the fact, that the system only does what it is told to do by the current configuration. If the system shall perform a certain function, it must be configured to do so. During the configuration process there are already many high-level functions available to choose from. Additionally, more complex functions can be build with the configuration software for special applications.

Since there are so many configuration options available to choose from, it pays off to invest some time into thinking about the requirements of the desired application. If these requirements are clear, it is a good idea to discuss them with your DHD partner. He will help you to find the matching solution for your application.

If you are planning to purchase an Series 52 mixing system for the first time, you might be uncertain about the right configuration for your requirements. As a start, think about the following things:

- The number and kind (analog, microphone, digital, MADI) of the desired inputs and outputs.
- The number and kind of faders and control modules you need.
- The special functions you require for monitoring, talk-back, routing and On Air switching.
- The number of buses and clean feeds.
- How are you planning to install the modules mechanically?

Furthermore, for the configuration of the DSP frame you need to know:

- The functions you need for signalling and integration with other systems.
- Will you need more than one mixing system? If yes, how will they be networked with each other?

With the help of this list DHD and its partners will be able to select the right hardware modules and the matching software configuration for your application. In case your requirements should change later on, the system can easily be adapted –



during its full life cycle.

With a 52/RX there is no need to design customer-specific firmware. However, DHD values the feedback of its partners and customers on its products. If there is growing demand for a special feature or function, DHD will of course consider this during its ongoing development efforts.

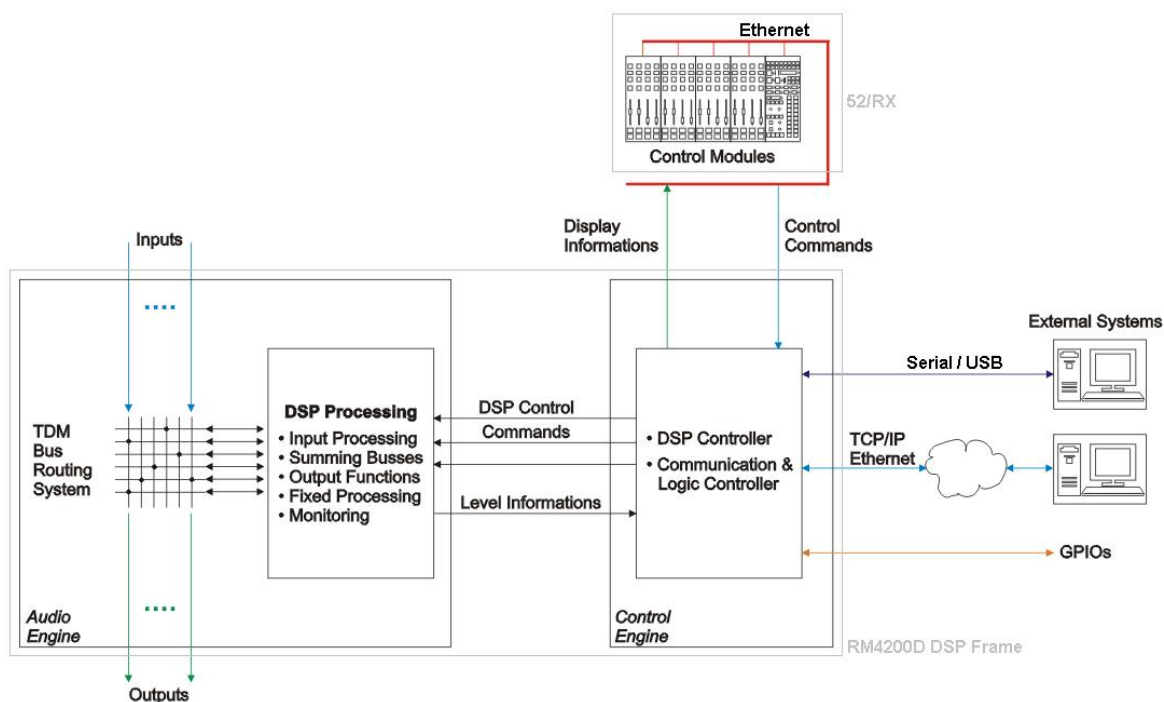
The basic structure of a mixing system with a 52/RX and an RM4200D DSP Frame is shown in the figure below. There are three main function units: the Audio Engine and the Control Engine in the RM4200D DSP Frame as well as the Control Modules in the 52/RX Mixing Console. Additionally, external systems can be connected to the Control Engine.

Basically, the system works like this:

The Audio Engine provides the signal processing for all audio signals. It is connected to the audio inputs and outputs – no matter if they are analog, digital or multi channel MADI ports. The audio processing itself is done by several DSPs, which in turn are controlled by the Control Engine. It consists of several micro controllers, which handle all communication to and from the control modules and external systems. The Control Engine constantly reads all incoming data on its inputs. Depending on the configuration, it acts on these events.

As an example, if a fader is moved on a control module, it transmits this event to the Control Engine. This engine reads the configuration and determines, which audio channel should be affected. After that, a control command is sent to the corresponding DSP processing unit. The signal gain is changed accordingly.

Of course this is a very simple example, in reality much more complex combinations of control functions and audio processing are used.



Basic structure of a mixing system with a 52/RX and an RM4200D DSP Frame.



#### Note

Detailed information on the Audio Engine and the Control Engine of the RM4200D DSP Frame as well as the connection of external elements can be found in the RM4200D manual.

## Control Modules (52/RX)

The control modules are the interface between the user and the functions of the mixing system. Different control modules are available, each of them providing its own set of features. Moreover, you can integrate TFT screens into your setup. These TFT displays are not only able to show information. Due to they are sensitive to touch, you can design views with buttons to control functions via the TFT screens.



### Weblink

For a comprehensive list of all available modules, please see the [52/RX List of Modules](#).

All control modules have in common that they consist of control elements – such as faders, buttons, rotary knobs – and status indicators. These are LEDs inside the buttons, alphanumeric displays for text, defined parts of TFT views and so on. Some typical applications for displaying information to the user are:

- LEDs showing the active bus assignment for a given channel.
- An alphanumeric display in the fader modules shows, which input signal is selected for a given channel and shows a channel timer.
- Alphanumeric displays on the main modules give several feedback to the user and offer menus for different selections.
- LEDs inside the push buttons are switched on or off to indicate the state of the button.

All control modules are tightly integrated with the Control Engine. It collects all events from the faders, rotary knobs and buttons and sends back the information into the status indicators and displays. Using the configuration software, the functions of all control elements and status displays can be defined according to the given application of the mixing system. As with the Audio Engine, this configuration can be changed anytime, if desired.

To make configuration easier, the software allows to print out labels for the buttons of the control modules. These labels are slid under the key caps. If necessary, they can be changed again later to reflect changes in the configuration of the system.

## 9 Further Information

### 9.1 Suitable PoE Switches for DHD Devices

The available PoE switches of the computer distribution business are often not suitable for the use with DHD devices, because there are different sub versions of the PoE standard "IEEE 802.3af". Hence, not all devices are able to work together. Indeed, it is only possible to test the interaction, but DHD strongly advises against doing that. Only the DHD components 52-5088 and 52-4080 are recommended.

#### Disadvantages of non-DHD PoE switches:

- The interaction with DHD components can not be guaranteed by DHD. Hence, in case of fault, DHD declines any warranty and support for such systems.
- Mostly, devices without cooling fans are not available. The usage of devices with cooling fans within studios and other recording rooms is only restricted possible.
- The needed power of the DHD components from 10W to 15W per port that is connected with a PoE end device, is often not provided for a larger number of ports. That especially applies to low cost devices.
- At this time, there are only a few devices with redundant power supply available.
- More significant devices are often managed switches, that are not recommended in general according to the DHD network specifications.
- With some of the by DHD tested devices (power source), problems occur after switching-on. In some cases this procedure had to be repeated to recognize the standard compliant DHD end devices and to switch on the 48V supply voltage.

Pin out for the DHD PoE end devices (controller 52-4050 and TFT displays 52-4015/52-4017):

- 1 Ethernet TX+
- 2 Ethernet TX-
- 3 Ethernet RX+
- 4 PoE +48V
- 5 PoE +48V
- 6 Ethernet RX-
- 7 PoE -48V
- 8 PoE -48V



#### Note

-48V means not GND, Chassis or Cable Shield!



#### Note

The controllers 52-4050 and the TFT displays 52-4015/52-4017 do not use Auto Crossing.

**Note**

The controllers 52-4050 and the TFT displays 52-4015/52-4017 are working with IEEE 802.3af Compliant PD (powered device) Detection with 22kOhm signature resistance.

Pin out for the DHD PoE switches 52-5088, 52-4080 and 52-4088:

- 1** Ethernet RX+
- 2** Ethernet RX-
- 3** Ethernet TX+
- 4** PoE +48V
- 5** PoE +48V
- 6** Ethernet TX-
- 7** PoE -48V
- 8** PoE -48V

**Note**

-48V means not GND, Chassis or Cable Shield!

**Note**

The PoE switches 52-5088, 52-4080 and 52-4088 are working with Auto Crossing.

# Index

## 5

- 52-4080 17
- 52-5083 Power Supply Frame 13
- 52-5088 17
- 52-5088 PoE Switch 13

## A

- About this Book 2
- Applications 7
- Audio Engine 14
- audio processing 14

## B

- basic structure 14

## C

- configuration 14
- Control Engine 14
- Control Modules 14

## D

- DSP Frame 7

## E

- ethernet network 11
- Example 1: Self Operating Desk 11
- Example 2: Network with two 52/RX Consoles 13
- Examples 11

- external systems 14

## K

- Key Features 7

## M

- Mixing Console 7
- modularity 7

## P

- PoE switch 11
- PoE Switches 17
- power over ethernet 11
- Principle of Operation 14

## R

- RM4200D DSP Frame 7, 14
- RM420-852/853 Communication Controller 7

## S

- sensitive to touch 14
- Suitable PoE Switches for DHD Devices 17

## T

- Terms of Use 1
- TFT screen 14