DYNAUDIO
Professional

Dynaudio Professional AIR

Reference manual

2014-09-28

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Important safety instructions

The lightning flash with an arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Install in accordance with the manufacturer’s instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Warning!

- To reduce the risk of fire or electrical shock, do not expose this equipment to dripping or splashing and ensure that no objects filled with liquids, such as vases, are placed on the equipment.
- This apparatus must be earthed.
- Use a three wire grounding type line cord like the one supplied with the product.
- Be advised that different operating voltages require the use of different types of line cord and attachment plugs.
- Check the voltage in your area and use the correct type. See table below:

Voltage	Line plug according to standard
110-125V	UL817 and CSA C22.2 no 42.
220-230V	CEE 7 page VII, SR section 107-2-D1/IEC 83 page C4.
240V	BS 1363 of 1984. Specification for 13A fused plugs and switched and unswitched socket outlets.

- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- To completely disconnect from AC mains, disconnect the power supply cord from the AC receptacle.
- The mains plug of the power supply shall remain readily operable.
- Do not install in a confined space.
- Do not open the unit – risk of electric shock inside.
- For use at altitude 2000 m or lower

- Mains ground must be connected.
- *Norwegian:*
  Apparatet må tilkoples jordet stikkontakt.
- *Swedish:*
  Apparaten skall anslutas till jordat uttag.
- *Finnish:*
  Laite on liitettävä suojakoskettimilla varus-tettuun pistorasiaan.

Caution

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

Service

- There are no user-serviceable parts inside.
- All service must be performed by qualified personnel.

EMC/EMI

This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off an on, the user is encouraged to try to correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

For customers in Canada:
This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

Before you begin

Your new Dynaudio Professional AIR monitors

Congratulations on your purchase of the Dynaudio Professional AIR active monitor system. With the right care and attention, it will provide many years of excellent and trouble-free audio reproduction.

Care

Components of the highest quality are used in your Dynaudio Professional AIR speakers. This assures years of trouble-free operation. Following precautions should still be made though.

- Avoid running the system into severe clipping. Although there is an advanced protection system, you may be able to destroy your speakers by severely overpowering them. The limiter works over a certain range, but exceeding this level may send a severely clipped signal to your drivers. When a noticeable distortion occurs, please turn down the level to your speakers.
- Avoid hot-plugging the equipment connected to the monitors. Always turn off the speaker and other equipment when plugging or unplugging signals, or switching equipment on or off.
- Do not touch the drive units by hand.

Break-in time

The transducers of your Dynaudio Professional AIR monitor will achieve better sound quality after breaking in. Especially after the first hours of use you may notice a significant advance in sound quality, and further subtle improvements in subsequent hours of use.

Downloading test tone sets

To set up, configure and calibrate your Dynaudio Professional monitors, we have created two sets of test tones in WAV format – a stereo set and a multichannel set. Throughout this manual, we will refer to these test tones by their numbers.

You can download both sets of test tones from this page:

dynaudioprofessional.com/pages/choosing-by-ear/

Service

There are no user serviceable parts inside the monitor.

Getting support

If you still have questions about the product after reading this manual, please get in touch with Dynaudio Professional Support:

dynaudioprofessional.com/support/

About this manual

Read this manual to learn how to set up and operate your Dynaudio Professional AIR monitors.

To get the most from this manual, please read it from start to finish, or you may miss important information.

This manual is available as a PDF download from the Dynaudio Professional website.

Of course, you can print this manual, but we encourage you to use the PDF version, which has both internal and external hyperlinks. For example, clicking the logo in the upper left corner of each page will take you back to the table of contents.

To download the most current version of this manual, visit

dynaudioprofessional.com/support/

The AIR concept

Introduction

Dynaudio and TC Electronic are proud to present the AIR monitor system.

The AIR monitor systems take a giant step forward in near-field monitoring. They include switch-mode amplification and power-supply. With the addition of DSP and CPU, new possibilities are opened for easy, convenient and precise central control of both audio and setup. The AIR monitor system's networking possibilities will fit nicely into today's applications and can be taken far into the future studio.

A brief overview of the advantages offered by the AIR concept:

- System integration and networking: total recall, central control
- Flexibility/adjustment possibilities: to the room, personal liking etc.
- Extreme precision: precise alignment of individual monitors at the factory
- Improved audio quality: from intelligent algorithms and precision filters
- Direct Digital Reference (Digital Input)

Both AIR 6 and AIR 15 are professional audio rear-ported near-field monitors and are excellent for both stereo and surround setups in applications such as music recording/mixing, post production, film, broadcast, video-editing etc.

Extreme precision

The frequency response and timing of the woofer and tweeter signals of AIR monitors is controlled to a level of precision only practically obtainable with DSP. Furthermore, the sensitivity of each individual loudspeaker driver is measured in the line of production, and deviations are compensated in the DSP software to 0.1 dB steps.

Perfectly aligned monitors also give the so far unseen advantage of interchangeability. In the unlikely case of a monitor breakdown, a perfectly matching monitor can be added instantly.

As most productions do end up in a digital format these days, the AIR series allow monitoring of the "pure" digital signal. Simply feed the monitors directly with an AES/EBU signal.

Having said that, many studios today are still working with analog signals for monitoring – therefore, an analog input option is also provided.

The following section is an introduction to the basic AIR system components and concepts. You will find detailed parameter explanations, setup guides and calibration info in later sections of this manual.

The master/ slave concept

The networking feature allows all monitors in a setup – no matter if it is stereo or surround, digital or analog – to always be aligned. This provides great possibilities in terms of general control of the entire system.

Two physically different units exist for each AIR model: a **Master unit** and a **Slave unit**.

AIR Master units

An AIR **Master unit** is able to:

- receive digital audio on AES connections
- receive analog audio (if an analog card is installed)
- send and receive audio and control data via the proprietary TC LINK connection.

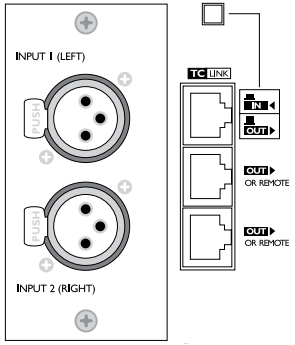

Fig. 1: AIR Master monitor – rear

Audio signals from your studio are fed to the Master monitors only, and the signals are distributed from here to the connected Slave units through a proprietary networking protocol. **Please note that a Master monitor acts exactly as a Slave monitor when its TC LINK button is set to the in "IN" position.**

Master monitor as System Controller

Setting up an AIR system is done from the **System Controller monitor.**

You set up, set tasks and calibrate all connected monitors in the entire system either using AIR control software or from a Master monitor that acts as the System Controller monitor.

One – and **only one** – of the Master monitors must be set up as the System Controller. This is done by setting the TC LINK button on the rear panel to the "Out" position.

Air Slave units

A **Slave unit** is able to receive and distribute audio and control data via the proprietary TC LINK connection.

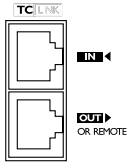

Fig. 2: Slave monitor – rear

The Master unit

The Master unit distributes audio and control data to the connected Slave units.

System Controller, Master or Slave

To set up a Master unit to be either the System Controller or a regular Master or Slave unit, the LINK switch on the rear panel must be set up correctly.

LINK switch on AIR Master Unit set to "Out":

The monitor operates as a System Controller.

LINK switch on AIR Master Unit set to "In":

The monitor operates as either:

- a regular Master with digital Inputs (analog Inputs are only with the optional analog I/O card installed) or
- as a Slave unit.

Inputs and outputs

An AIR Master unit is equipped with

- AES/EBU Input connectors and
- three Link connectors carrying both audio and control data to connected Slave units.

Connectors

- 1* AES/EBU – XLR
- 2* Link RJ45 connectors
- 1* Link/Input RJ45 connector
- 1* Word Clock BNC sync

Option slot

Two card types are currently available.

- An **analog input module** allowing you to feed a Master unit with two analog input signals.
- An **AES Digital Input card** (TC Electronic item number 995285001) giving you the option of sending all six channels in a 5.1 setup to one single Master monitor. This card will also support inputs at 192 kHz.
  From there, the signal is distributed to four slave monitors and a subwoofer via the TC LINK RJ-45 connections, creating a fully digital 5.1 setup.

The Slave and subwoofer units

The Slave and Sub units contain one RJ45 Input connector and one Link connector.

Audio and control data are sent from the Master unit to the Slave units via the **RJ45 Input** connector. The **RJ45 Link** connector can be used for data transmission to additional monitors.

Initializing the network

When the setup is powered up for the first time, the Master unit scans the setup in order to determine the number of monitors connected. Each monitor is recognized via a unique serial number, but can be renamed according to its task.

After the initial scanning of the setup, the Master unit will be re-scanning the setup every five seconds in order to determine any change.

Additional AIR Control units

Additional control units – such as a computer running the AIR Control software or the AIR Remote – can be connected to **any** free “Link” connector in the system.

Control data is transmitted via the System Controller, and distributed to other monitors in the network.

Remote control using AIR Remote or AIR Control software

You can set up and control AIR monitor systems …

1. locally via the Master monitor's user interface (the display and the buttons surrounding it)
2. via the optional AIR Remote or
3. from a computer running the free AIR Control software.

AIR Remote

AIR Remote is a dedicated hardware remote control that ensures convenient daily operation. AIR Remote provides instant access to all significant operation parameters such as global volume, reference levels, preset recall as well as solo and mute status for each monitor. The AIR Remote is powered through a TC Link cable which can be connected to any AIR monitor.

To learn more about AIR Remote, go to dynaudioprofessional.com/air-series/monitors/air-remote/

AIR Control software

AIR Control software allows you to carry out advanced calibration and alignment of your AIR monitoring system. The software provides access to advanced tools and features inside AIR monitors and subwoofers, including timing and SPL calibration and parametric EQs for each monitor. AIR Control lets you define and store custom setups and presets with selective parameter locking, and a special measurement mode provides EQ line signal out from selected monitors.

To download AIR Control software, go to dynaudioprofessional.com/air-series/monitors/air-control/

For more information about AIR Control software, see "AIR Control software" on page 66.

Common features for both the Master and Slave units

Advanced Condition Monitoring

For both the Master and the Slave units, several protection systems are included in the AIR monitors. They insure both short term protection against large dynamic pulse signals and long term protection against overheating, which could permanently damage the drivers.

Long term thermal protection

Inside the amplifier module, the temperature of the heat sink is constantly monitored so any dangerous over-temperature situations can be avoided, protecting the entire electronic module. Furthermore, the temperature of the tweeter voice coil is calculated with behavioral modeling of the tweeter's thermal characteristics.

Standby, Power Save mode and powering down your AIR system

The amplifier in an AIR monitor can detect whether or not there is a signal on the analog or digital inputs.

If no input has been detected for more than half an hour (this is the default value), all monitors in a network will go to *Standby mode*. They will recover from Standby mode automatically when a signal is received. The power up time from Standby is a few hundred milliseconds.

If no input signal is detected for 2.5 hours (again, this is a default value), the system will go into *Power Save mode*. Any user intervention – such as touching the Master Volume dial on the AIR Remote or touching the Master monitor display – will recover the system from Standby mode.

You can change the Standby mode and Power Save mode activation times using the Utility menu on an AIR Master unit or using the AIR Control software – see “Preferences page” on page 76.

Activating Power Save mode manually
In general, you should activate Power Save mode instead of powering your AIR system down using the main switches.

- To activate Power Save mode manually, press and hold the Exit button on the System controller.
- To wake your AIR system from Power Save mode, press any button on the System controller.

Your AIR system will automatically go into Power Save mode after 2.5 hours by default.

Powering down
If you need to switch the system off using the mains switches on the rear panels of your AIR monitors, make sure to turn down the global volume first.

Switch Slave monitors off before switching of Master monitors.

Other AIR features

High-efficiency compact switched-mode power supply (SMPS)
For saving overhead power consumption and to insure optimal performance, every AIR monitor is equipped with a high-efficiency compact switched-mode Power Supply (SMPS). Using switched technology both in amplifiers and power supply can reduce the heat sink size to about a third of the size it would be with regular power supply and class AB amplifiers.

Rear panel controls and connections

AIR Master unit with analog inputs – rear panel

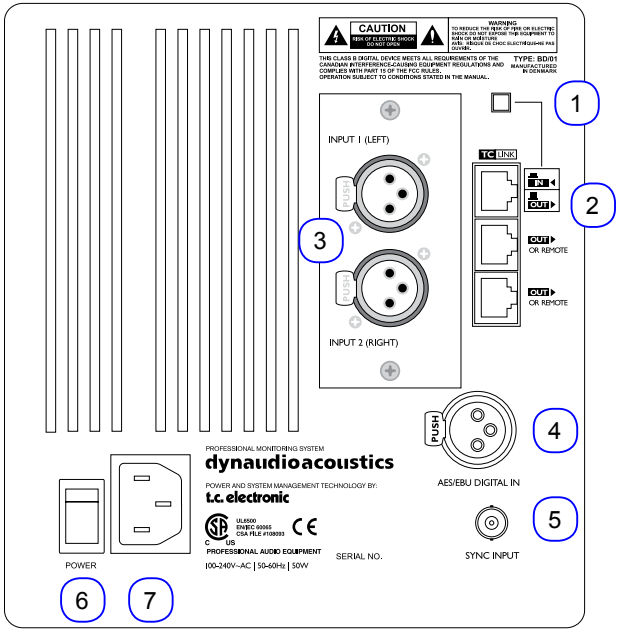

Fig. 3: AIR Master unit with analog inputs – rear panel

1. System Controller/Slave switch
   Out position: The monitor operates as a System Controller. There can be only one System Controller in a setup.
   In position: The monitor operates as either a regular Master or a Slave unit.
2. RJ45 Link connections for downstream Slave units
3. Option slot with analog I/O card installed (optional)
4. AES/EBU digital Input
5. Word Clock BNC sync input
6. Power input – 100 to 240 V
7. Power On/Off switch

Slave/Sub – rear panel

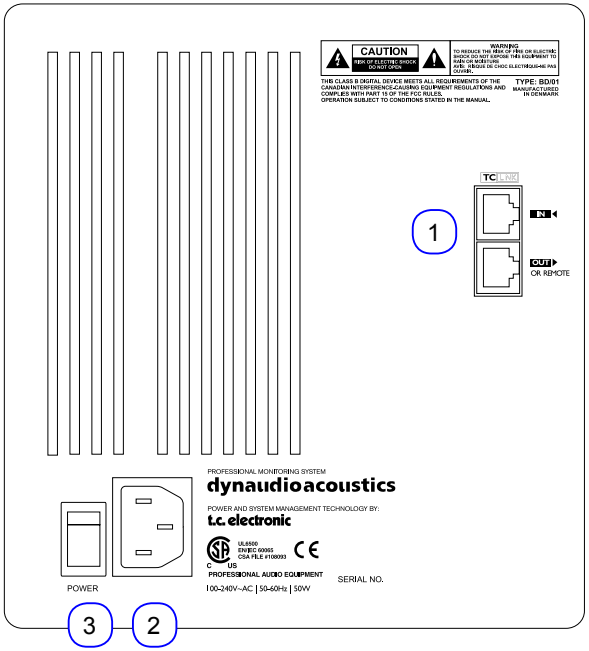

Fig. 4: Slave/Sub – rear panel

1. RJ45 Link connections for downstream Slave units
2. Power input – 100 to 240 V
3. Power On/Off switch

Digital I/O card (optional)

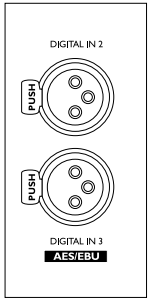

Fig. 5: Digital I/O card (optional)

With this card installed in the option slot of the Master unit, a 5.1 Digital/6 Master setup becomes an option. Three AES/EBU connections (6 channels) can then be fed to one Master monitor and distributed downstream.

For more information, see “Setups”.

Operating your AIR monitors

The AIR display and keys

Use the four keys to the left and the right of the display to navigate the menus of your AIR Master unit.

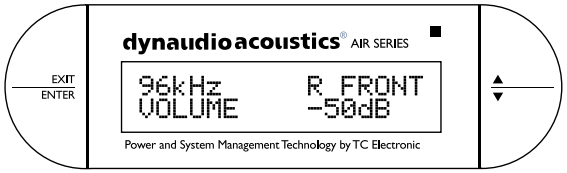

Fig. 6: The display and keys of an AIR master unit

ENTER key

The ENTER key has two main functions:

- To enter the menus currently displayed.
- To set the displayed parameter in Edit mode.

When a parameter can be edited using the arrow keys to the right of the display, a “*” is set as the first character in front of the parameter.

EXIT key

The EXIT key is used to exit the current display and go to previous menu level.

Arrow (up and down) keys

These keys are used for navigating and adjusting parameter values.

A parameter can be edited when it has been selected using the ENTER key. Editable parameters are indicated by an asterisk (“*”).

Once you have set a parameter (e.g. a monitor task), you do not need to confirm it. Changes are applied immediately. However, if you later want to recall a given configuration, you need to store it as a preset first – see “Storing presets” on page 47.

Overload Indication LED

When this LED flashes, the monitor’s built-in amp is driven beyond maximum performance. A continuous overload will activate the amp protection circuit and the monitor will be shut down. The monitor can be reactivated after a short period of cooling down.

This situation will NOT damage the monitor in any way.

Basic navigation/ operation

- Use the two arrow keys to select a value for a parameter or a submenu. When a parameter namer is preceded by an asterisk (“ * “), it can be altered using the arrow keys.
- Use the ENTER key to enter a menu or to confirm an operation.
- Use the EXIT key to move up one level in the menu hierarchy or to discard (cancel) an operation.

Navigating the setup menu

- From the home screen, press the ENTER key. “Bass Management” is displayed.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key again.
- Press the UP and DOWN keys to select the desired submenu (for example “Setup” or “Set monitor tasks”).
- Press the ENTER key to open the desired submenu.
- An asterisk will be shown in front of the menu name (for example “*Select clock”), indicating that you can select an option.
- Press the UP and DOWN keys to select the desired setting.
- After making settings, press the EXIT key (repeatedly, if required) to close the menu and return to the home screen.

AIR menu structure

This overview shows the AIR parameter structure accessible via the AIR monitor set as System Controller. Default values are highlighted.

[Serial No.] [Monitor task] **Volume -50.0 dB**	*Home screen* – *see* “Home screen” on page 20.	Press the Enter key to navigate the menus structure shown below.
Bass Management X-over	*Select Mode: **Off** / X-over 50Hz / X-over 80Hz / X-over Ext 50Hz / X-over Ext 80Hz / X-over THX 80Hz / X-over SC 120Hz	
Setup Menu	Setup “xxxx”	*Select setup: **Empty** / Custom / Stereo analog / Stereo digital / 5.1 analog / 5.1 digital / 6.1 analog / 6.1 digital / 5.3 analog / 5.3 digital / 5.1 digital/6 Master
	Set monitor tasks – *Select AIR Master “xxxx”	*Select task: **No task** / L Front / R Front / Center / (C) SUB / L Sur / R Sur / C Sur / L SUB / R SUB / L Chain / R Chain / L Inner / Custom 1-4
	External clock BNC Sync “xxx”	*Select clock: **BNC Input Off** / BNC Input On
	Input Sensitivity A-Input Gain	*Sensitivity A-Input: +9 dBu / **+15 dBu** / +21 dBu / +27 dBu
	Calibrate monitor – *Select AIR Master “xxxx”	*For AIR monitors:*
		Pink Noise: Off/On
		Calib: 0.0 dB
		Rel. Lev: -5.0 dB
		Position: Neutral / Wall / Corner / Console C. / Wall C. / Corn
		Bass: 0.0 dB
		Treble: 0.0 dB
		For AIR BASE subwoofers:
		Pink Noise: Off / On
		Calib: 0.0 dB
		Rel. Lev: -5.0 dB
		LFE LP: Off / On
		LFE Gain: 0 to 14 dB
		Polarity: 0/180 degrees
		Phase: 0 to 180 degrees
Recall Preset	*Select preset 1 User	Preset locations: User presets (1 to 15) and factory presets (16 to 32)
Store Preset	*Select preset 1 User	Storage locations for user presets: 1 to 15
Utility Menu	Duration before Standby: 15 min / **30 min** / 1 h / 1.5 h / off	
	Powersave: 1 h / 1.5 h / 2.5 h / **3 h** / 5 h / off	
	Backlight: **on** / auto / off	
	Autosave volume: on / **off**	

AIR Menu structure and parameters

In this chapter, you will learn how to navigate the menu structure of your AIR monitors, access and change parameters such as system setup, bass management and monitor tasks.

Once you know how to navigate the AIR Menu structure, you can configure and calibrate your system. All standard setups are shown and explained in “AIR setups” on page 29.

Home screen

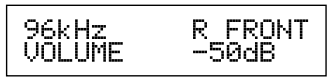

Fig. 7: AIR monitor home screen, showing the sample rate, the monitor’s task and the volume

The home screen of your AIR Master unit will show the role/position of the monitor (once it has been set up) and the set volume for this unit.

A “+” in the upper right corner indicates that this specific Master Unit has been set up to act as the System Controller – see “System Controller, Master or Slave” on page 9.

When the home screen is shown, you can use the arrow keys to the right of the display to set the volume. Tap the buttons to change volume in 0.5 dB steps, press and hold to change it continuously.

Configuring bass management

Bass management is available for the following setups:

- Standard Stereo with 1 subwoofer
- Standard Stereo with 2 subwoofer
- 5.1 Analog
- 5.3 Analog
- 6.1 Analog
- 6.1 Digital – at 192 kHz
- 5.3 Digital
- 5.1 Digital/6 Master
- 5.1 Digital – at 192 kHz

Notes on bass management

- Satellite monitors use 2nd order highpass filters to attenuate frequencies below the set crossover frequency.
- Subwoofers use 4th order lowpass filters to attenuate frequencies above the set crossover frequency.

Configuring bass management

- From the home screen, press the ENTER key. “Bass Management” is displayed.
- Press the ENTER key again. “*Select Mode” is displayed.
- Select the desired mode using the UP and DOWN keys.
- After setting the desired mode, press the EXIT key to close the menu.

Bass management modes and crossover frequencies

Displayed name	Bass management mode name	Satellite filter	Sub 4th order	Sub 2nd order	LFE = Sub
Off	(No bass management; only the LFE channel is distributed to the sub.)				
X-Over 50 Hz	X-Over 50 Hz	50 Hz	50 Hz	50 Hz	No
X-Over 80 Hz	X-Over 80 Hz	80 Hz	80 Hz	80 Hz	No
Ext. 50 Hz	Extension 50 Hz	Off	50 Hz	50 Hz	No
Ext. 80 Hz	Extension 80 Hz	Off	80 Hz	80 Hz	No
THX 80 Hz	THX Simulation 80 Hz	80 Hz	80 Hz	Off	Yes
SC 120 Hz	Small Consumer 120 Hz *	120 Hz	120 Hz	80 Hz	Yes

Note that the modes “Extension 50” and “Extension 80 Hz” use no bass management on satellite speaker, thus playing full range.

Bass management and AIR Control software

Via AIR Control software, you can access an advanced Bass Management mode. In this mode, all filters (Satellite, Sub 4 and Sub 2) can be controlled to suit demanding setups. See “Bass management page” on page 73.

Setup menu ► Setup selection

Use the Setup selection menu to specify how your AIR system is set up. All standard setups are shown and explained in “AIR setups” on page 29.

Selecting your AIR system setup

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
  “Setup” is displayed.
- Press the ENTER key.
  “*Select setup” is displayed.
- Press the UP and DOWN keys to select the correct setup.
- Press the ENTER key to confirm your selection.
- Press the EXIT key repeatedly to return to the home screen.

Setup name	Remarks
Empty	No selection
Custom	For custom configurations.
Stereo analog	Two monitor stereo setup with analog* inputs selected
Stereo Digital	Two monitor stereo setup with digital inputs selected
5.1 Analog	5.1 setup with analog* inputs selected
5.1 Digital	5.1 setup with digital inputs selected
6.1 Analog	5.1 Setup + Center surround on a separate channel gives the 6.1 setup.
6.1 Digital	5.1 Setup + Center surround on a separate channel gives the 6.1 setup.
5.3 Analog	Analog setup with 5 monitors and 3 subs
5.3 Digital	Digital setup with 5 monitors and 3 subs
5.1 Digital/6 Master	5.1 Setup using one Master unit with optional Digital I/O card installed, 4 slave monitors (or Masters set as slave) and 1 sub

** Analog inputs are only available with an optional analog card installed.*

Setup menu ► Monitor tasks setup

Use the Setup monitor tasks menu to assign tasks to the monitors in your AIR System.

Each monitor must be given a task indicating its function and position. The System Controller – Master unit will only be able to identify and control all monitors in your AIR system correctly if these tasks have been assigned correctly.

Selecting the task for an AIR monitor

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “Set monitor tasks” is displayed.
- Press the ENTER key.
- Press the UP and DOWN keys to select a monitor. Each monitor is identified by its serial number, which is shown on a label with a barcode on the back.
- Press the ENTER key.
- Press the UP and DOWN keys to select a monitor task.
- Press the ENTER key to confirm your selection.
- Press the EXIT key repeatedly to return to the home screen.

Displayed task name	Full monitor task name
No task	No task assigned
L Front	Left Front
R Front	Right Front
Center	Center
(C) Sub	(C) Subwoofer
L Sub	Left Subwoofer
R Sub	Right Subwoofer
L Sur	Left Surround
R Sur	Right Surround
C Sur	Center Surround
LsChain	Left Surround / Chain
RsChain	Right Surround / Chain
CsChain	Center Surround / Chain
L Inner	Left Inner
R Inner	Right Inner

Fig. 8: Available monitor tasks

Setup menu ►
External clock setup

Configuring external clock

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “External clock” is displayed.
- Press the ENTER key.
  “*Select clock” is displayed.
- Press the UP and DOWN keys to select the desired mode.
- Press the ENTER key to confirm your selection.
- Press the EXIT key repeatedly to return to the home screen.

Display clock mode name	Remarks
BNC Sync On	The monitor attempts to lock on the Word Clock BNC.
BNC Sync Off	The monitor will attempt to lock on the AES input.

Fig. 9: External clock modes

Setup menu ► Analog input sensitivity

Configuring analog input sensitivity

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “Sensitivity” is displayed.
- Press the ENTER key.
  “*Sensitivity” is displayed.
- Press the UP and DOWN keys to select the desired sensitivity.
- Press the ENTER key to confirm your selection.
- Press the EXIT key repeatedly to return to the home screen.

Analog input sensitivity settings
+9 dBu
+15 dBu
+21 dBu
+27 dBu

Fig. 10: Analog input sensitivity settings

Setup menu ► Monitor calibration

Use the calibration menu to calibrate each monitor in your AIR System.

This section only describes the basic parameters of the monitor calibration submenu. For more information regarding monitor placement and calibration, see “Placing the monitors” on page 48 and “Calibrating the main monitors” on page 57.

Calibrating monitors in your AIR system

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “Calibrate monitor” is displayed.
- Press the ENTER key.
- Press the UP and DOWN keys to select a monitor.
- Press the ENTER key.
- Press the UP and DOWN keys to select a calibration parameter.
- Press the ENTER key to activate the selected parameter for editing.
- Press the UP and DOWN keys to set the selected parameter to the desired value.
- Press the ENTER key to confirm your selection.
- Press the EXIT key to move up one level in the hierarchy and select another parameter for editing, *or*
- Press the EXIT key repeatedly to return to the home screen.

Notes regarding the LFE channel

Please note that in general the LFE channel should be mixed with +10 dB headroom.

If you are not able to boost your LFE monitor output from your console, +10 dB gain can be added on your AIR BASE input. Most format encoders / decoders take the LFE boost into account, meaning that you should leave the AIR BASE LFE gain at 0 dB when playing back a DTS or DOLBY encoded material on your AIR system. LFE gain is set at 0 dB in all factory presets, so if you need to add gain on your AIR BASE please adjust this parameter and store the new setting in a user preset location.

Parameters available for all AIR monitors

Parameter	Range / values	Explanation
Pink Noise	On/Off	
Calibrate	-6 dB to +6 dB	Level calibration of the selected monitor
Rel. Lev	-40 dB to 0 dB	Relative preset volume for the selected monitor
Room Position	Neutral / Wall / Corner / Console / C. Wall (Console Wall) / C. Corn (Console Corner)	
Bass	-6 dB to +6 dB	Bass adjustment for the selected monitor
Treble	-6 dB to +6 dB	Treble adjustment for the selected monitor

Fig. 11: Parameters available for all AIR monitors

Parameters for AIR BASE subwoofers

Parameter	Range / values	Explanation
Pink Noise	On/Off	
Calibrate	-18 dB to +6 dB	Level calibration of the selected monitor.
Rel. Lev. – (Relative Level)	-40 dB to 0 dB	Preset volume for the selected monitor relative to the calibrated and global volume.
LFE Low Pass	On/Off	Brick wall Limiter on the LFE channel attenuating frequencies above 120 Hz.
LFE Gain	-6 to +8 dB	With this parameter you can boost the acoustic gain of the LFE channel.
Polarity	0 / 180º	If the Subwoofer is correctly placed, setting the Polarity parameter to 180º should result in a full phase cancellation at the set crossover frequency. If this is not the case, the Delay parameter should be adjusted.
Phase	0 to 180°	Use this parameter to time-compensate if the subwoofer is not placed according to the ITU 775 recommendations. There are individual Phase settings for each of the Bass Management Cross-over frequencies. Once set, these are stored as Global settings.

Fig. 12: Parameters for AIR BASE subwoofers

Setup menu ► Clear setup for entire network

Use this function to clear settings for your entire AIR system. All connected monitors will be reset to default settings.

Clearing the setup for the entire network

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “Clear setup for entire network” is displayed.
- Press the ENTER key.
  “Accept to clear network setup?” is displayed.
- Press the ENTER key to clear the setup or press the EXIT key to discard.

AIR setups

The setups shown in this chapter will only operate correctly if all connections are made exactly as seen in the illustrations!

Important: Master monitor setting

- In each setup, one specific Master monitor must be set as the **System Controller**.
- To set a Master monitor as System Controller, the TC LINK button on the rear panel of this monitor must be set to the **Out** position.
- The TC LINK button on all other Master monitors must be set to the **In** position.

Reading the setup illustrations

- The AIR Remote shown in most setups is an optional hardware remote control. For more information, see “AIR Remote” on page 63.
- Audio signals are represented by solid lines:

- TC link signals are represented by dashed lines:

Stereo setup – digital or analog

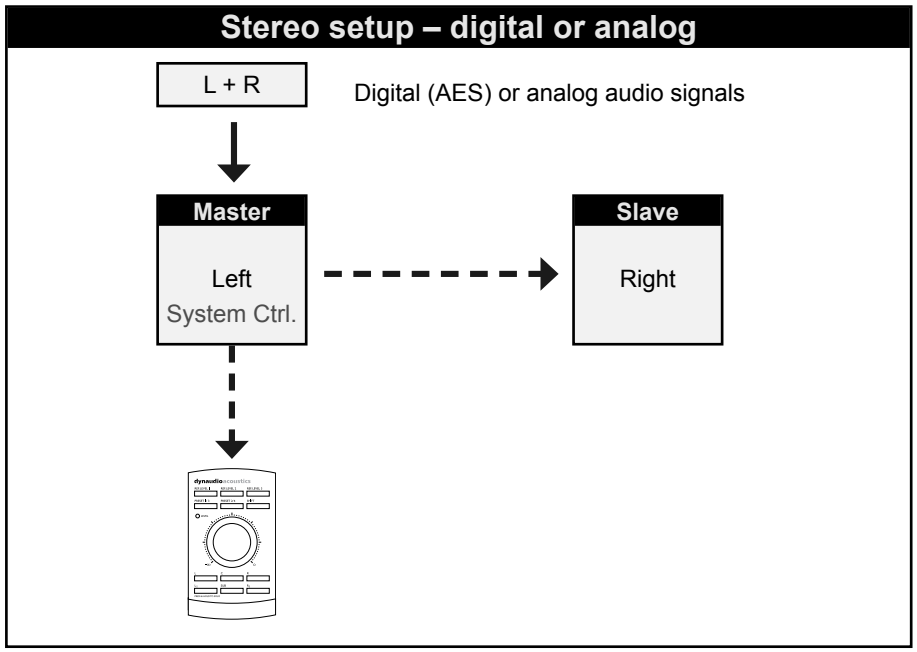

Fig. 13: This illustration shows how to connect a standard stereo setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor receives audio via the TC-LINK RJ-45 connection.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Stereo setup with mono subwoofer – digital or analog

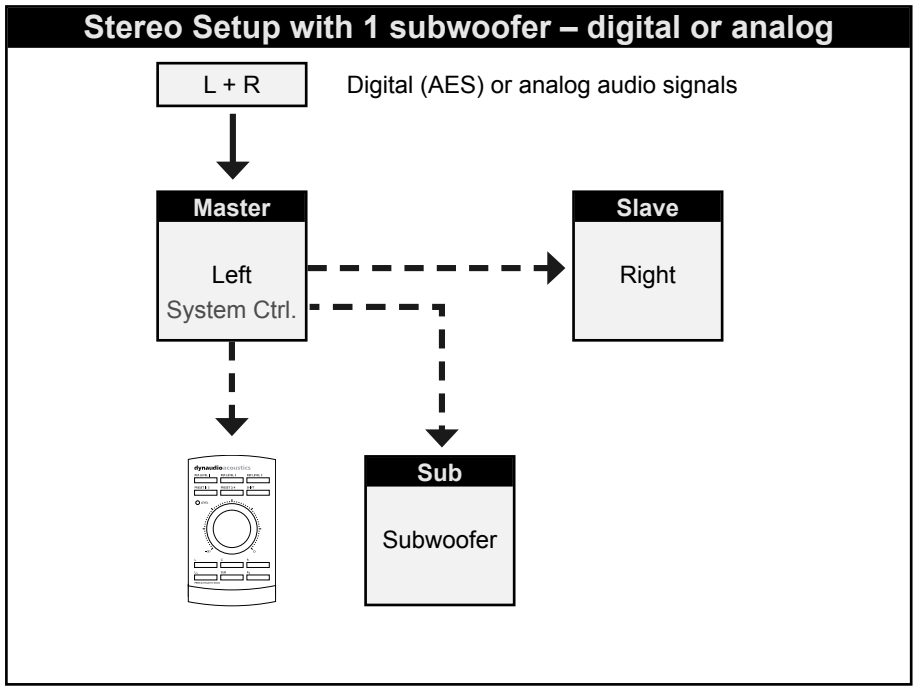

Fig. 14: This illustration shows how to connect a stereo setup with one subwoofer.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor and the subwoofer receive audio via the TC-LINK RJ-45 connection from the left monitor.
- With no bass management, no signal is sent to the subwoofer.
- With bass management activated, low-frequency information is extracted from the left and right channels below the set crossover frequency and fed to the subwoofer.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Stereo setup with two subwoofers – digital or analog

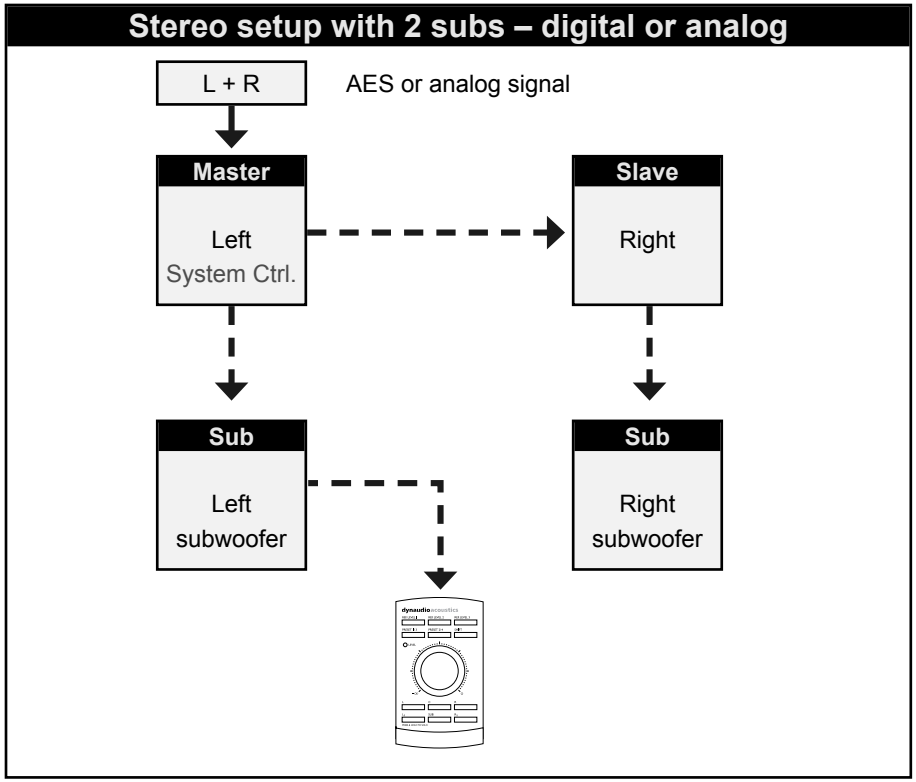

Fig. 15: This illustration shows how to connect a stereo setup with two subwoofers.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor and the subwoofers receive audio via the TC-LINK RJ-45 connection from the left monitor.
- With no bass management, no signal is sent to the subwoofers.
- With bass management activated, low-frequency information is extracted from the left and right channels below the set crossover frequency. Low-frequency information from the left channel is sent to the left subwoofer, and low-frequency information from the right channel is sent to the right subwoofer.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

5.1 setup – digital

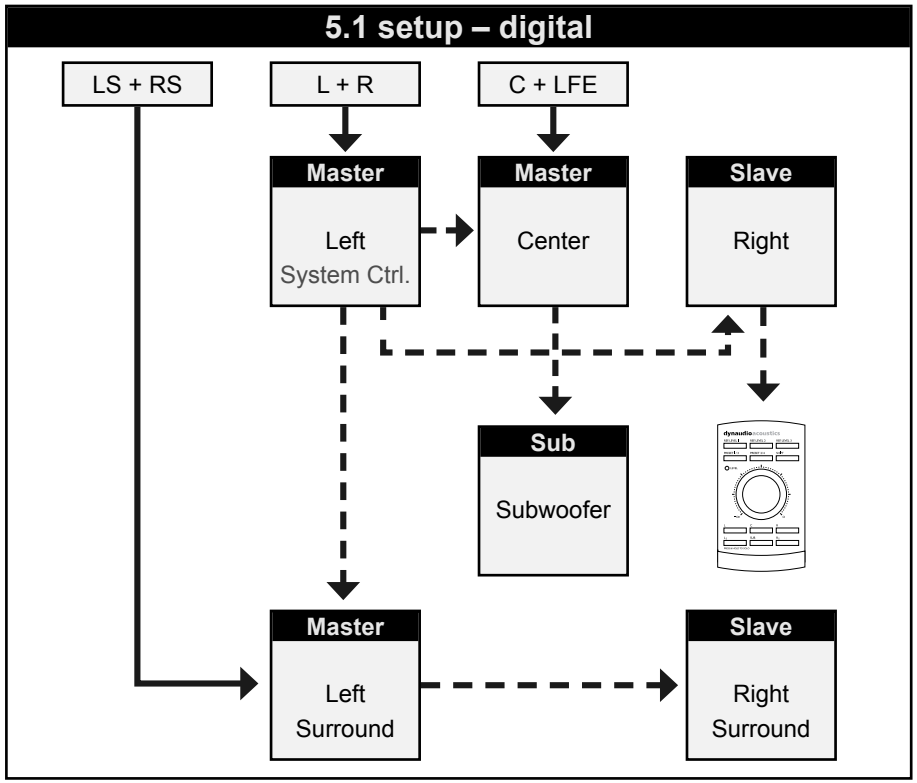

Fig. 16: This illustration shows how to connect a 5.1 digital setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor receives audio via the TC-LINK RJ-45 connection from the left monitor.
- The left surround monitor (LS) receives both the left and right surround channel signals.
- The right surround monitor receives audio via the TC-LINK RJ-45 connection from the left surround monitor.
- The center monitor (C) receives both center and LFE channels.
- The LFE monitor receives audio via the RJ-45 connection from the center monitor.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.
- Bass management is only available in this digital setup if the optional Digital input cards are installed.
- On the System controller (C), set setup to “5.1 digital/Digi 6”.

5.1 setup – analog

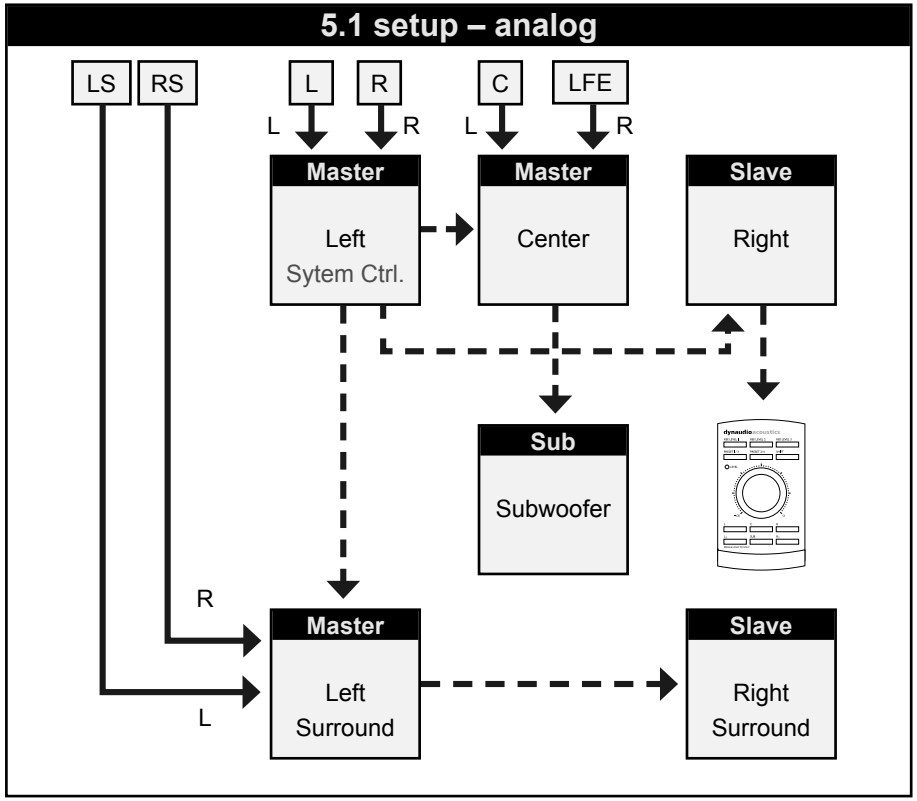

Fig. 17: This illustration shows how to connect a 5.1 analog setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor receives audio via the TC-LINK RJ-45 connection from the left monitor.
- The left surround monitor (LS) receives both the left and right surround channel signals.
- The right surround monitor receives audio via the TC-LINK RJ-45 connection from the left surround monitor.
- The center monitor (C) receives both center and LFE channels.
- The LFE monitor receives audio via the RJ-45 connection from the center monitor.
- With no bass management, the subwoofer will play only the LFE channel.
- With bass management activated, low-frequency information from the five main channels is extracted and sent to the subwoofer, where it is summed with the LFE channel.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

5.3 setup – digital

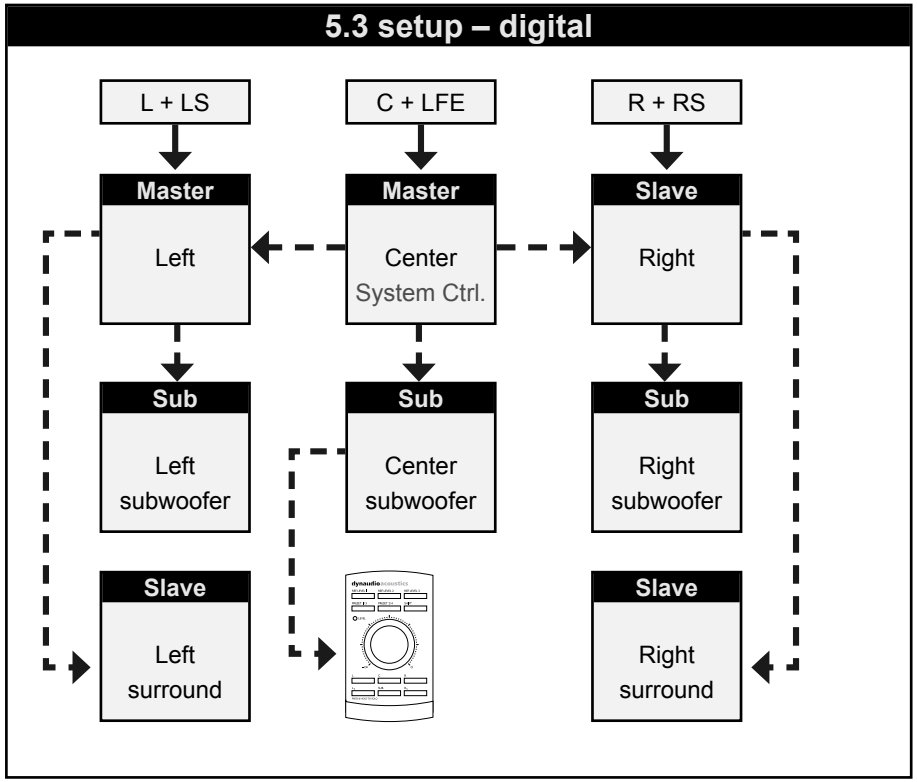

Fig. 18: This illustration shows how to connect a digital 5.3 setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The center monitor (C) is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and left surround input signals.
- The right monitor receives both the right and right surround input signals.
- The left surround monitor is fed via the TC LINK RJ-45 connection from the left monitor.
- The right surround monitor is fed via the TC LINK RJ-45 connection from the right monitor.
- The center monitor (C) receives both center and LFE channels.
- The LFE monitor receives audio via the RJ-45 connection from the center monitor.
- With bass management off, the left and right subwoofers will receive no signal.
- With bass management on, …
  - low-frequency information is extracted from the left and left surround signals and fed to the left subwoofer.
  - low-frequency information is extracted from the right and right surround signals and fed to the right subwoofer.
  - low-frequency information is extracted from the center signal, summed with the LFE channel and fed to the center subwoofer.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

5.3 setup – analog

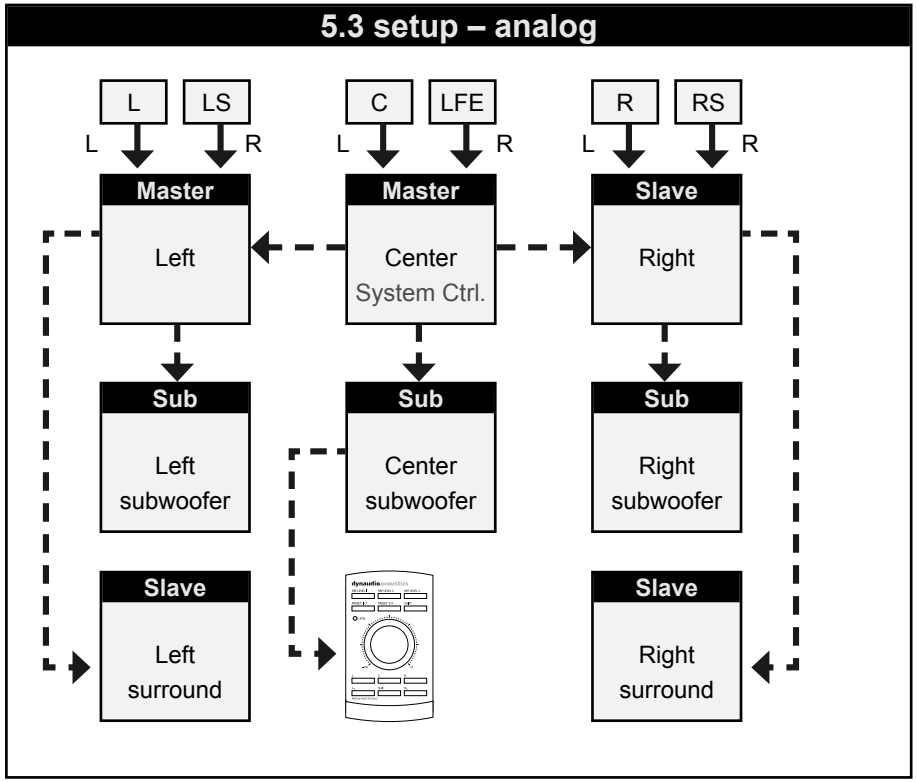

Fig. 19: This illustration shows how to connect an analog 5.3 setup.

Understanding and using this setup

Please see the description of the digital 5.3 setup regarding bass management, but make analog connections as explained in this section:

- The left input of the left monitor receives the left signal.
- The right input of the left monitor receives the left surround signal.
- The left input of the center monitor receives the center signal.
- The right input of the center monitor receives the LFE signal.
- The left input of the right monitor receives the right signal.
- The right input of the right monitor receives the right surround signal.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

6.1 setup – analog

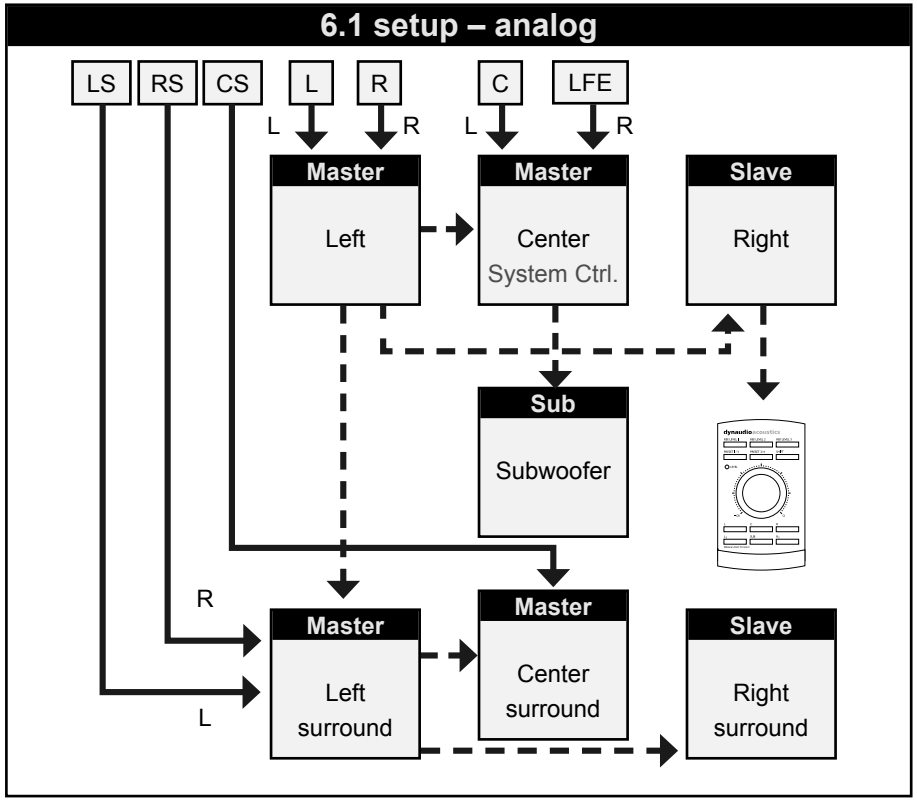

Fig. 20: This illustration shows how to connect an analog 6.1 setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor receives audio via the TC-LINK RJ-45 connection from the left monitor.
- The center monitor (C) receives both the center and LFE channels.
- The LFE monitor receives audio via the RJ-45 connection from the center monitor.
- The left surround monitor (LS) receives both the left and right surround channel signals.
- The right surround monitor receives audio via the TC-LINK RJ-45 connection from the left surround monitor.
- The center surround monitor receives only the center surround signal.
- Center Chain: Starting with AIR software version 1.10, it is possible to connect one or more Center Chain monitors.
- With no bass management, only the LFE signal is fed to the subwoofer.
- With bass management activated, low-frequency information from the five main channels is extracted below the set crossover frequency and sent to the subwoofer, where it is summed with the LFE channel.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.
- Channels must be connected as follows:
  - Left channel to the left input on the left monitor.

- Right channel to the right input on the left monitor.
- Center channel to the left input on the center monitor.
- LFE channel to the right input on the center monitor.
- Left surround channel to the left input on the left surround monitor.
- Right surround channel to the right input on the left surround monitor.

5.1 setup with Digital AES/EBU card

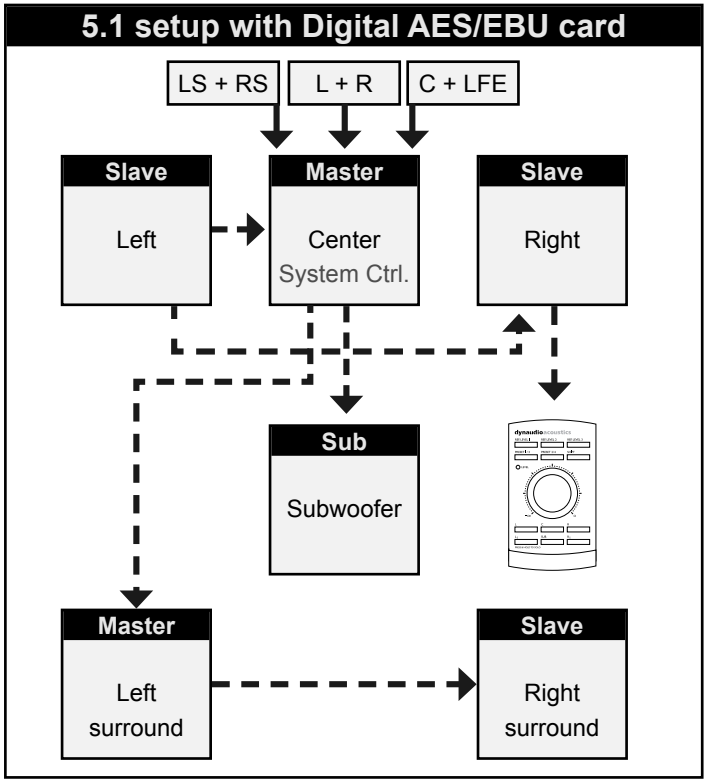

Fig. 21: This illustration shows how to connect 5.1 digital setup with optional bass management.

Understanding and using this setup

This setup requires…

- one Master monitor with the optional Digital AES/EBU Input Card installed,
- four Slave monitors (or Masters set as Slave) and
- one subwoofer.

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.
- The Center monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The Center monitor receives all six channels on its three AES/EBU connections.
- The monitor’s Digital IN connection receives the Center and LFE signals.
- The digital input No. 2 on the I/O card receives the left signal and the right signal.
- The digital input No. 3 on the I/O card receives the left surround signal and the right surround signal.
- The right, left, left surround and right surround monitor and the subwoofer receive their signal via TC LINK RJ-45 connections from the Center Master monitor.
- A clock signal must be sent over the AES connection feeding the Center/LFE channels (or via BNC).
- With no bass management, only the LFE signal is fed to the Sub.
- With bass management activated, low-frequency information is extracted from the five main channels below the set crossover frequency and fed to the subwoofer.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Stereo setup with chains on left and right

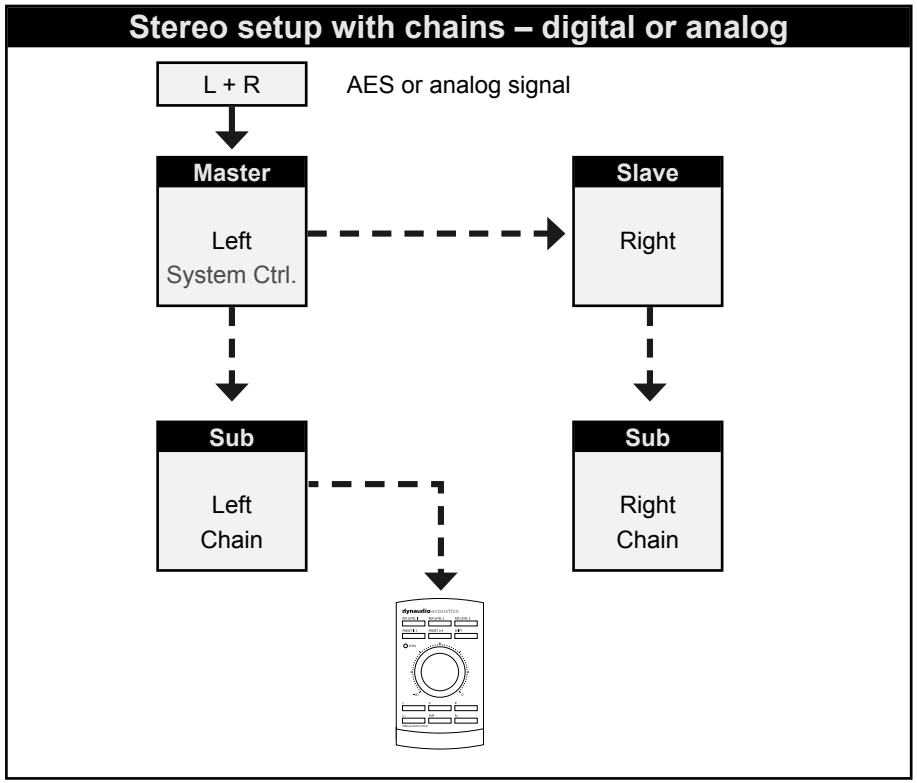

Fig. 22: This illustration shows how to connect a stereo setup with chains on Left and Right.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.

The two chained monitors are fed with the same signal as the two front monitors (left and right). This is the kind of setup you would use when you want to alternate between a set of main and nearfield monitors.

- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals.
- The right monitor receives audio via the TC-LINK RJ-45 connection from the left monitor.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Other “Chained” Setups

Starting with software version 1.10, the available setups with “chain” option are: 5.1, 6.1 and 5.3 for analog and digital as well as 5.1/6 master (digital only).

The installed option card will limit the choices of setups presented on the speakers. If the AES/EBU option card is installed, the default digital input will become Input 1 on the option card.

7.1 setup – analog or digital

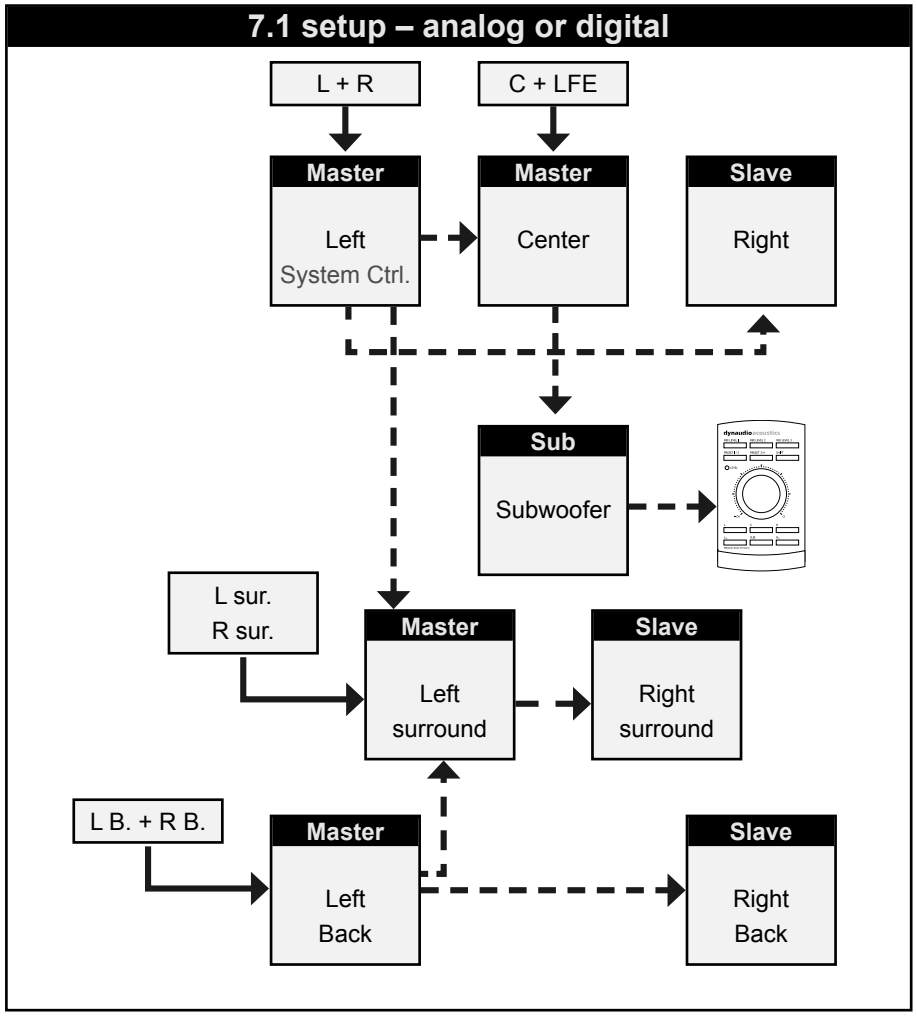

Fig. 23: This illustration shows how to connect an analog or digital 7.1 setup

Understanding and using this setup

It is not possible to choose a 7.1 setup in the setup menu. You need to choose either a 5.1 or 6.1 setup and set up the Left surround and Right surround speakers for “L Inner” and “R Inner” tasks respectively.

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.

Digital connections

- The center monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives both the left and right input signals. The right monitor is fed via the TC LINK RJ-45 connection from left to right.
- The center monitor receives both the Center and LFE signals. The LFE monitor is fed via the TC LINK RJ-45 connection from Center to LFE.
- The left surround monitor receives both the left surround and right surround signals.
- The right surround monitor is fed via the TC LINK RJ-45 connection from left surround to right surround.
- The left back monitor receives both the left back and the right back signal. The right back monitor is fed via the TC LINK RJ-45 connection from left back to right back.
- With bass management activated, low-frequency information is extracted from the five main channels and fed to the subwoofer, where it is summed with the LFE channel. With bass management activated, low-frequency information is not extracted for the left and right inner monitors.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Analog connections

- The left input of the left monitor receives the left signal.
- The right input of the left monitor receives the left surround signal.
- The left input of the center monitor receives the center signal.
- The right input of the center monitor receives the LFE signal.
- The left input of the left surround monitor receives the left surround signal.
- The right input of the left surround monitor receives the right surround signal.
- The left input of the left inner monitor receives the left inner signal.
- The right input of the left inner monitor receives the right inner signal.

5.1 setup – digital – 192 kHz

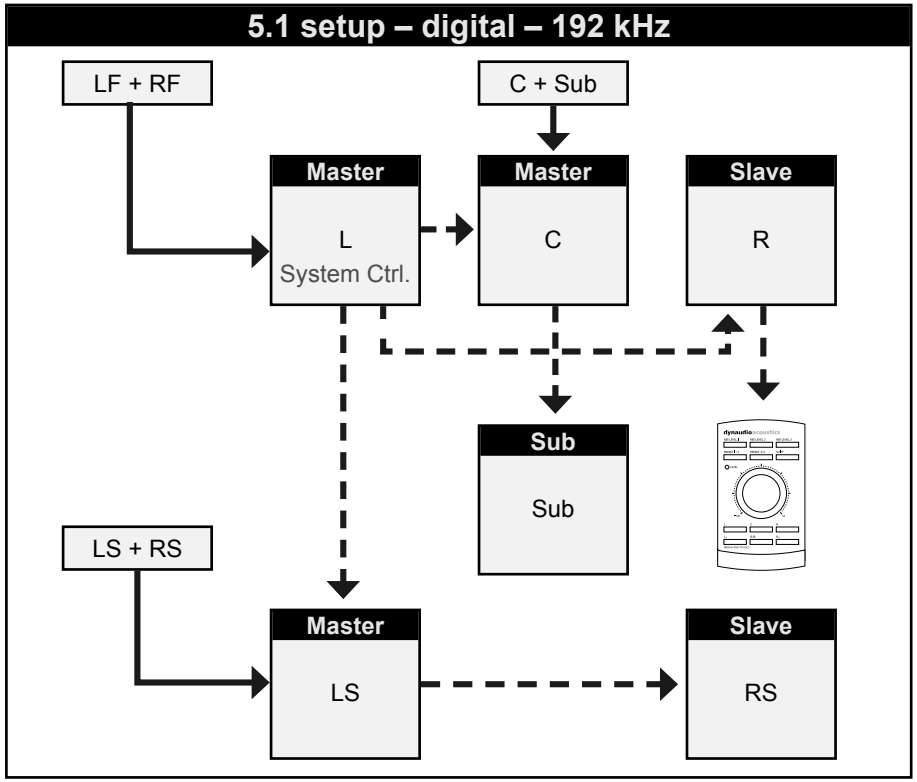

Fig. 24: This illustration shows how to connect a digital 192 kHz 5.1 setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.

This is a 5.1 digital setup at 192 kHz with optional bass management.

This setup requires…
- three Master monitors with the optional Digital I/O card installed,
- two Slave monitors and
- one subwoofer.

- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives the left and right front channel signals.
- The center monitor receives the center channel and the subwoofer signal.
- The left rear monitor receives the left surround and right surround channel signals.
- The subwoofer receives its signal via the TC LINK RJ-45 connection from the center Master monitor.
- A clock signal must be sent over the AES connection feeding the Center/LFE channels (or via BNC).
- With no bass management, only the LFE signal is fed to the Sub.
- With bass management activated, low-frequency information is extracted from the five main channels below the set crossover frequency and fed to the subwoofer, where it is summed with the LFE channel.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

6.1 setup – digital – 192 kHz

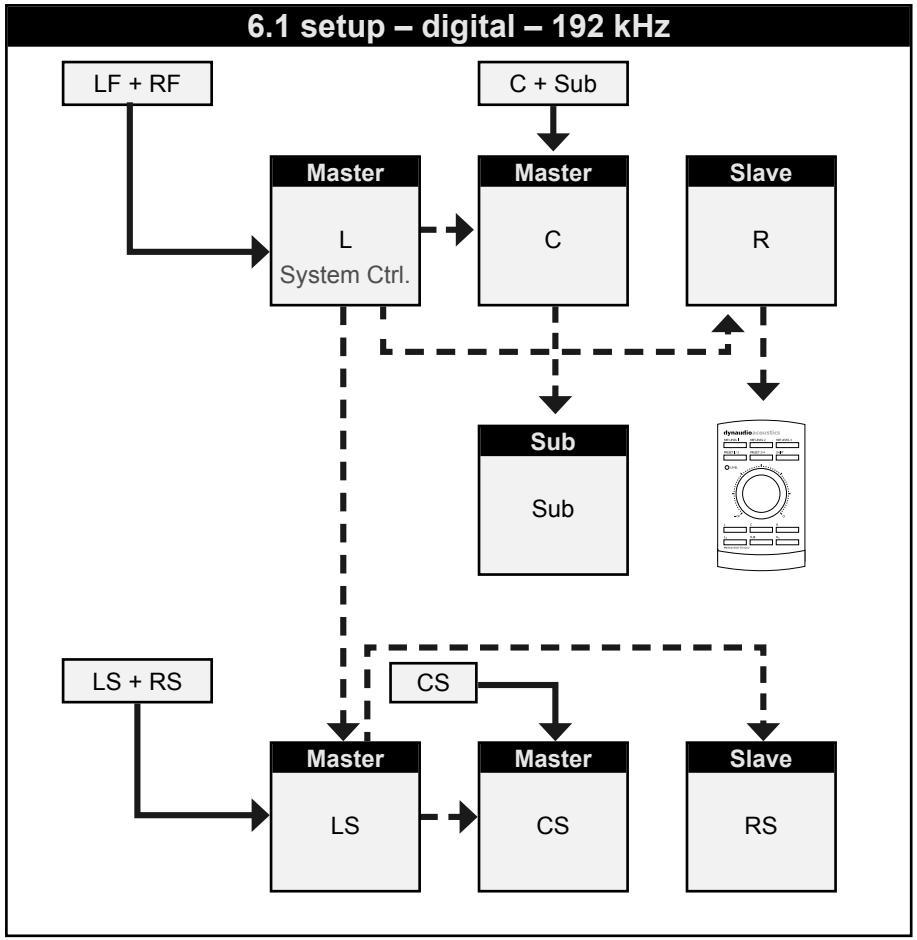

Fig. 25: This illustration shows how to connect a digital 6.1 setup.

Understanding and using this setup

- Audio signals are represented by solid lines.
- TC link signals are represented by dashed lines.

This is a 6.1 digital setup with optional bass management. This setup requires…

- four Master monitors with the optional Digital I/O card installed,
- two Slave monitors (or Masters set as slaves) and
- one subwoofer.

- The left monitor is set as the System Controller by setting the TC Link button on the rear panel to the “out” position.
- The left monitor receives the left and right front channel signals.
- The right monitor receives its signal via the TC LINK cable.
- The left surround monitor receives both the left and right surround signals.
- The center monitor receives the center channel and the subwoofer signal.
- The subwoofer receives its signal via the TC LINK RJ-45 connection from the center Master monitor.
- A clock signal must be sent over the AES connection feeding the Center/LFE channels (or via BNC).
- With no bass management, only the LFE signal is fed to the Sub.
- With bass management activated, low-frequency information is extracted from the six main channels below the set crossover frequency and fed to the subwoofer, where it is summed with the LFE channel.
- The AIR Remote or a computer running the AIR Control software (both optional) can be connected to any available TC LINK Out connection.

Recalling and storing presets

Recalling presets

- From the home screen, press the ENTER key.
- Press the DOWN key until “Recall preset” is displayed.
- Press the ENTER key.
  “*Current preset” and the name of the currently active preset is displayed.
- Press the UP and DOWN keys to browse presets. When you have found a preset you want to recall, press the ENTER key.
  The selected preset is recalled (activated), and the name of the selected preset is displayed.
- Press the EXIT key repeatedly to return to the home screen.

Storing presets

- From the home screen, press the ENTER key.
- Press the DOWN key until “Store preset” is displayed.
- Press the ENTER key.
  “*Select preset” and the number and name of a preset is displayed.
- Press the UP and DOWN keys to select a storage location. Please note that the preset currently stored at the selected location will be overwritten once you perform the Store operation.
- When you have found a storage location for your preset, press the ENTER key.
  The number of the selected Preset slot and the preset name “User” is displayed.
- Press the EXIT key repeatedly to return to the home screen.

For a complete list of presets, see ”Presets” on page 85.

Parameter storage

To use your AIR system and the preset recall feature efficiently, it is important to understand what parameters are stored with a preset.

Global Parameters
These parameters apply to *your entire AIR system.*

Global parameters that are stored with presets
- Bass management
- Mute status
- Selected setup

Global parameters that are NOT stored with presets
- Ref. Levels
- Analog Input Sensitivity
- BNC Sync

Local Parameters
These parameters apply to *individual monitors.*

Local parameters that are stored with presets
- X-Curve
- Parametric EQ setting (set via AIR PC-IP)
- LFE Gain (for subwoofers)
- LFE Low Pass (for subwoofers)
- Rel. Level

Local parameters that are NOT stored with presets
- Bass and Treble
- Delay
- Lock status
- Room position
- Calibration Level
- Tasks
- Phase (for subwoofers)
- Polarity (for subwoofers)

Placing the monitors

This section of the manual is a guide to optimizing your listening facilities to ensure optimal performance of your AIR monitor system.

To ensure optimum results, it is essential that you have connected all monitors in your AIR System properly. Please refer to “AIR setups” on page 29.

For additional information on optimizing setups, in-depth explanations and background information of various acoustic phenomena, see “Appendix: Acoustics” on page 106.

Overview

Distance from listener	Angle	
Minimum 1 m	-30°	Left front
Minimum 1 m	+30°	Right front
Same distance as L or R front [1)]	0°	Centre
Same distance as L or R front [2)]	-110° ±10°	Left surround
Same distance as L or R front [2)]	-110° ±10°	Right surround

Notes:

1.) If you want to fulfill the requirements of the ITU 775 standard, you should use one of the two approaches for position the center front monitor, along with a Delay on the center monitor in order to achieve the same time of arrival from all monitors.

2.) The delay time for each monitor can be adjusted using the AIR Control software.

General considerations: symmetry

Basically it is preferred to establish a loudspeaker layout that provides an adequate and equal left/right image. The basis for this is symmetry – meaning that the distance to the left and the right monitor should be identical and that (unless you are monitoring in the near field) the distance from the left and right monitor to the respective sidewall should be identical, and the side-walls should be identical.

The AIR System offer tools for compensation – but whenever possible, symmetry should be established.

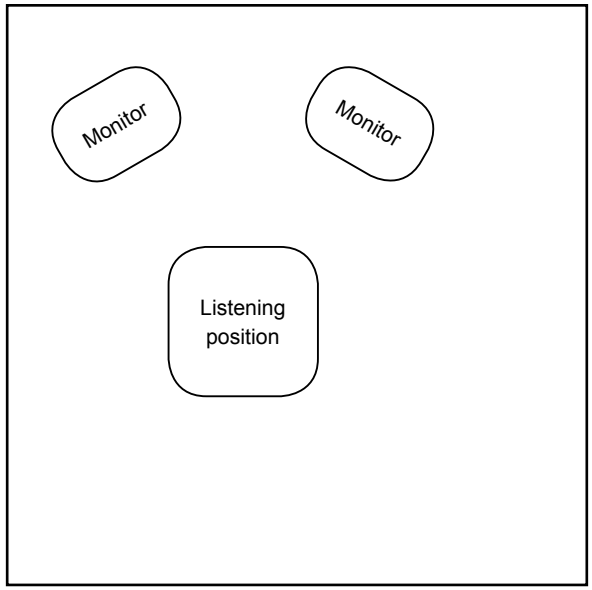

Fig. 26: Asymmetric position (should be avoided): Distances to left and right wall not identical

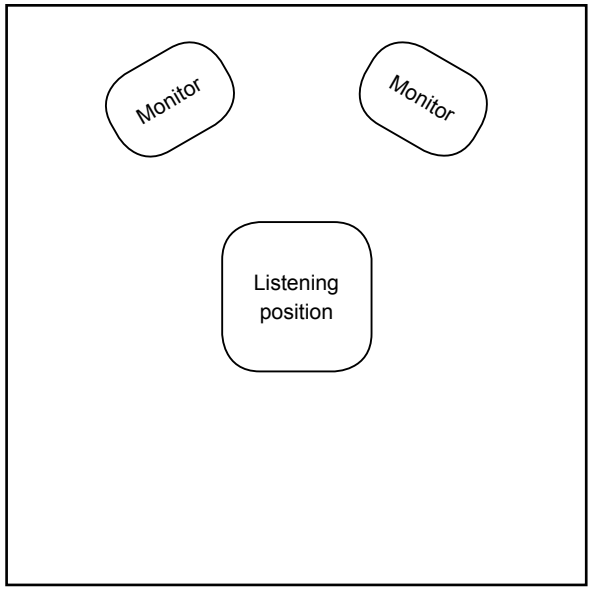

Fig. 28: Symmetric position (recommended)

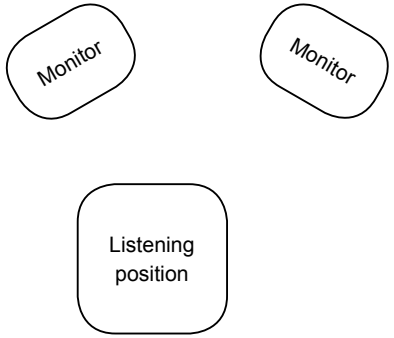

Fig. 27: Asymmetric position (should be avoided): Distance to speakers not identical

Front monitors, left and right

For proper stereo monitoring, the monitors should be placed at an angle of ±30º in front of the listening position. This goes both for a basic stereo setup and for the left and right front monitors in a four or five channel setup.

Center front monitor

The center front loudspeaker can be placed either

- in the middle and in the same distance from the listening position as the left and right front monitors or
- in the middle and on a straight line between the left and right front monitors.

Surround monitors, left and right

The surround monitors should be placed at an angle of ±110° (±10°) and at the same distance to the listening position as the left and right front monitors.

For more information, see “Monitor positions” on page 52.

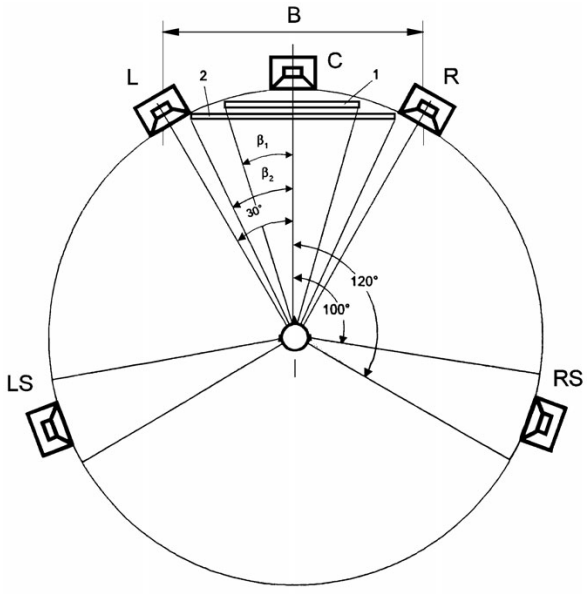

Fig. 29: ITU 775

Monitor positions

Monitor placement and acoustics have a significant influence on monitor sound. AIR series provides powerful tools to compensate for various, less than ideal placements. Below, you will find a description of the most common monitor placements and appropriate compensation. Using material from the Dynaudio Professional AIR test tone sets together with the AIR placement compensation settings will allow you to find a perfect balance between the AIR monitors and the acoustics the studio.

In general, we recommended consulting an acoustics expert for measurement and advanced adjustment and alignment. AIR Control software provides comprehensive features for EQ and Delay adjustments. For installations where flush mounting is considered, be sure to consult an expert.

Below find a list of compensation options based on the Room position settings in the Calibration submenu of the Setup menu.

For more information on navigating to the Calibration submenu and setting parameters, see "Setup menu ► Monitor calibration" on page 26.

Monitor position Free standing ("Neutral")
The monitor is placed on a stand or hung from the ceiling some distance away from walls and other surfaces.

This position requires the "Neutral" setting (which is the default in the Calibration menu). Try to place the monitor optimally with regard to reflections and standing waves.

A monitor setup this way should be your reference – you can always try to compare performance of an optimally placed freestanding AIR monitor ("Neutral" in calibration menu) with any other monitor placed in another position (Wall, Corner, Console) to determine if compensation in these positions is needed.

Monitor position Close to wall ("Wall")
When a monitor is placed close to a wall, bass response needs to be decreased. The "Wall" setting in the Calibration submenu of the Setup menu takes this and other aspects into account. Try to compare this setting with "Neutral" to determine which works better in your studio.

If the opposite wall is parallel to the wall where the monitor is placed, be aware that low frequency cancellation might occur. You should also look out for standing waves which might occur due to an uneven distribution of low frequencies.

Monitor position Corner
Here, the same considerations as in the "Wall" position apply – but in a corner position, bass response needs to be decreased even more.

Try the "Corner" setting found in the Calibration submenu of the Setup menu and then evaluate performance in comparison to a freestanding monitor in "Neutral" position. Use the Bass and Treble filters for fine adjustment.

Monitor position On the bridge / "Console"
Placing a monitor on a meter bridge of a console will result in a strong single reflection from the desk's surface, which may color the sound. This comb filtering effect sounds similar to signal modulation. In general it helps to minimize the distance between the monitor and the reflective surface.

Although it is not possible to fully eliminate comb filtering using an equalizer, try to select the "Console" setting in the Calibration submenu of the Setup menu and evaluate performance in your studio.

Other positions/configurations
In the Calibration submenu of the Setup menu, you will find additional settings which take combinations of the above into account – e.g. "Console Wall", which should be used if the monitor is placed both close to a wall and has a console reflection.

Checking and optimizing monitor placement

Overview

1. In the Setup menu, select the setup type (e.g. “5.1” or “Stereo”) matching your application.
2. Check the phase using the Dynaudio Professional AIR test tone sets available at www.dynaudioprofessional.com.
3. Check the monitor positions.
4. Equalize each monitor as required using the Bass and Treble parameters.
5. In the Setup menu of the System controller, navigate to the Calibration submenu.

Assigning monitor positions

- Select the correct position for each monitor – see “Placing the monitors” on page 48.
  Room positions can be selected via the Calibration submenu of the Setup menu – see “Setup menu ► Monitor calibration” on page 26.
- Set the volume of every monitor to -10 dB.

Phase checking

The first procedure you should carry out is checking signal phase.

A number of signals both for two-channel stereo and for multichannel reproduction are part of the Dynaudio Professional AIR test tone sets.

Phase checking – two-channel Stereo:
Use tracks 45 to 49 for Stereo phase checking. Left and right signals are presented in phase and subsequently out of phase.

Phase checking – Multichannel:
Use tracks 45 to 64 for multichannel phase checking. These are DTS-encoded signals that can be compared pairwise: Left/Right, Left/Center, Left/Left Surround, Right/Right Surround.

If you do not have a DTS decoder, you may route the stereo L/R signals to other channels using your mixing console.

If you already have a phase checking measurement system that can be used as well.

Checking by ear when listening to the signals
In phase:
You will hear more bass and the sound will appear to come from a fixed point between the monitors.

Out of phase:
You will hear the sound image lose bass, the sound image will be diffuse, and the directional information will be blurred.

Checking monitor placement

When checking the placement of your monitors, you first have to focus on the low frequencies. The signals to be used are the low-frequency sweeps (tracks 31 to 39 from the Dynaudio Professional AIR test tone sets).

Low-frequency sweeps

The tracks 31 to 38 contains the following sweep sequences:

- Track 31: 200 to 20 Hz
- Track 32: 160 to 20 Hz
- Track 33: 125 to 20 Hz
- Track 34: 100 to 20 Hz
- Track 35: 80 to 20 Hz
- Track 36: 63 to 20 Hz
- Track 37: 50 to 20 Hz
- Track 38: 40 to 20 Hz

During the sweeps you will hear short “bleeps” indicating when the signal passes one of the ISO center frequencies (see tables in the Appendix).

There are two “bleeps” every time the frequency passes a whole octave center frequency and one “bleep” every time the in-between 1/3-octave center frequencies are passed.

Play all the low-frequency sweep tracks using only one monitor at a time.

Evaluation

From your listening position, you should hear the signal smooth and even throughout all frequency sweeps (bearing in mind that the frequency response of the ear is not flat).

If you have a sound level meter, it should be set to “LIN” with no frequency weighting. If the meter does not have a LIN position, you can use the C-weighting, although the response is attenuated approximately 3 dB at 31.5 Hz and approximately 6 dB at 20 Hz.

In the Appendix, you can find instructions on how you can alternatively use a studio microphone if you do not have a sound level meter.

If the results are OK, proceed to “Calibrating the main monitors” on page 57.

If the results are not OK, you must reposition the monitors.

You have to define at what frequency the response becomes bad. Once you have located the problematic frequency, you need to set a higher frequency as the cross-over frequency between the main monitors and a subwoofer.

If it is not possible for you to find good positions for the main monitors and/or for the subwoofer(s), you should consider changing the acoustics of the room.

Equalization is a common tool for obtaining a smoother frequency response for steady-state signals (such as the sweeps). But remember that equalizing can never repair bad acoustics.

Equalizing the monitors

The AIR System menu offers a two-band shelving type equalizer. This equalizer can be configured individually for each monitor, and it is implemented for fine-adjustments of the tonal balance.

For information on navigating to the Calibration submenu and setting parameters, see “Setup menu ► Monitor calibration” on page 26.

Range	±6 dB
Adjustment step	0.5 dB
Equalizer Band I (Bass)	100 Hz to 1 kHz
Equalizer Band II (Treble)	1 kHz to 5 kHz
Filter type	Shelving

Notes considering equalization

You should be very careful using the equalizer if you are making adjustments by ear. In a room with good acoustics, equalization should not be necessary at all.

As a test signal you can use full bandwidth pink noise (tracks 2 or 13) from the Dynaudio Professional AIR test tone sets.

In a room that you feel is heavily overdamped at higher frequencies, you may wish to add some level in the high end in order to get the right balance.

In a highly reflective room, you may wish to attenuate the high frequencies.

If you have made a good job placing the monitor in a proper position you should not have to touch the low frequency band.

Once you have made adjustments using the equalizer, you should leave the room and come back about 15 minutes later, bringing some music that you know well. Play this music. *Your first impression at this point is very important for the assessment of the tonal balance of the monitor system.* Listening for a long time will change your perception of timbre. This effect is similar to the “white balance” your brain performs for what you are seeing. After a short time, you are getting used to a new tonal balance or timbre. What sounds “cool” or “fat” then is not necessarily sounding right for monitoring purposes.

Please note that additional equalizing can be done using the AIR Control software. It includes a four-band parametric EQ that will allow for more precise EQ adjustment of each monitor.

Proceed with “Calibrating the main monitors” on page 57.

Calibrating the main monitors

Calibration is required to ensure that all monitors produce the same sound pressure level in the listening position when fed with the same signal.

The level of the input signal can be locked to a specific sound pressure produced by the monitors.

Inter-channel calibration

- Navigate to the Calibration submenu as described under “Setup menu ► Monitor calibration” on page 26.
- Select the “Master L Front” monitor.
- Select the “Calib” (Calibration level) parameter and press ENTER.
- Set Calib to 0.0 dB.
- Play tracks 11/23 (two channel stereo) or track 11 (multi channel DTS) from the Dynaudio Professional AIR test tone sets. These tracks contain filtered Pink Noise (500 Hz to 2 kHz).
- Continue to the next channel and set “Calib” to the same level as the first monitor. If you are using a multichannel setup, continue to the remaining monitors.

Acoustic level calibration

In some parts of the audio industry, the monitoring system has to be related to absolute acoustic levels.

In the Dynaudio Professional AIR test tone sets, the tracks mentioned above are recorded at -20 dBFS. This level correspond to different acoustic levels depending on the kind of business you are in:

Music	Video	Film
78 to 93 dB(C)	78 dB(C)	83 dB(C)

- Select the first monitor (L).
- Play the track from the Dynaudio Professional AIR test tone sets related to this monitor.
- Set Calib to 0.0 dB.
- Adjust the global volume until the desired C-weighted level is obtained on a sound level meter in the listening position.
- Proceed to the next monitor.
- Adjust Calib until the same C-weighted level is obtained from this monitor.
- Repeat this procedure until all monitors are calibrated.
- Exit Calibration.

X-Curves

For small rooms (defined as less than 5300 cubic feet or 150 cubic meters), ANSI/SMPTE 222M calls for a modification of the X-curve with flat natural response to 2 kHz and then a 1.5 dB per octave roll off above 2 kHz.

This curve is useful when mixing in a small room and be playing back in a large room.

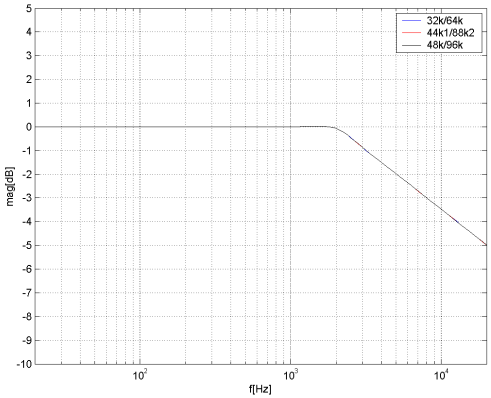

Fig. 30: X-Curve 1

Another variation is to begin the high-end roll-off at 4 kHz and roll off 3 dB per octave instead of 1.5 per octave.

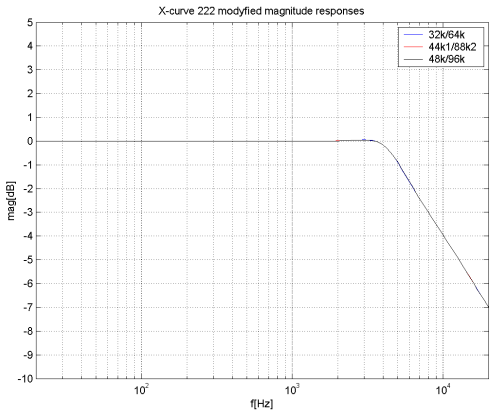

Fig. 31: X-Curve 2 – modified magnitude response

Placing the subwoofer

Overview

Placement on the floor	Advantages	Disadvantages
In the corner	Gain of bass response	Excitation of most standing waves in the room, hence very uneven sound distribution
Adjacent to wall	Gain of bass response	Excitation of several standing waves in the room, hence very uneven sound distribution
Free standing	Position can be optimized with regard to standing waves	It may take up space on the floor

Subwoofer placement on the floor
Under normal conditions, the subwoofer is placed directly on the floor. This is taken into account in the basic design and the basic settings of the AIR system.

Subwoofer placement in the corner
This is a π/2 radiation, which yields a gain of 18 dB in the frequency range where the monitor is considered to be omnidirectional.

Most standing waves have their maximum in the corners of the room.

The placement of the subwoofer in the corner may cause uneven sound distribution of the bass – especially if the room has a cubic or shoe-box shape (i.e., if all opposing walls are in parallel).

The corner position is only preferable if the opposing surfaces in the room are not in parallel.

Subwoofer placement adjacent to a wall
This is a π radiation, which yields a gain of 12 dB in the frequency range where the monitor is considered to be omnidirectional.

This position adjacent to a wall is commonly used and can lead to good results. However, the subwoofer should not be placed in the middle or in the quarter points between two side walls if these are in parallel.

Free standing subwoofer
This is a π radiation, which yields a gain of 6 dB in the frequency range where the monitor is considered to be omnidirectional.

The free standing position is highly recommended for all cubic and shoe-box shaped rooms.

In any case, avoid placing the woofer on the half or quarter lines between walls.

Checking subwoofer placement

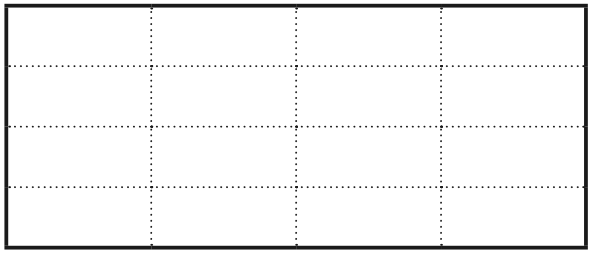

Fig. 32: Avoid placing the subwoofer on these lines quarter or halfway between walls.

- From the home screen, press the ENTER key. “Bass Management” is displayed.
- Press the ENTER key again. “Select Mode” is displayed.
- Press the DOWN key until “SC 120 Hz” is displayed.
- Check the monitor position using low-frequency sweeps as described below.

Low-frequency sweeps

The tracks 31 to 38 contains the following sweep sequences:

- Track 31: 200 to 20 Hz
- Track 32: 160 to 20 Hz
- Track 33: 125 to 20 Hz
- Track 34: 100 to 20 Hz
- Track 35: 80 to 20 Hz
- Track 36: 63 to 20 Hz
- Track 37: 50 to 20 Hz
- Track 38: 40 to 20 Hz

During the sweeps you will hear short “bleeps” indicating when the signal passes one of the ISO center frequencies (see tables in the Appendix).

There are two “bleeps” every time the frequency passes a whole octave center frequency and one “bleep” every time the in-between 1/3-octave center frequencies are passed.

Play all the low-frequency sweep tracks using only the subwoofer. Mute all other monitors.

Evaluation

From your listening position, you should hear the signal smooth and even throughout all frequency sweeps (bearing in mind that the frequency response of the ear is not flat).

If you have a sound level meter, it should be set to “LIN” with no frequency weighting. If the meter does not have a LIN position, you can use the C-weighting, although the response is attenuated approximately 3 dB at 31.5 Hz and approximately 6 dB at 20 Hz.

In the Appendix, you can find instructions on how you can alternatively use a studio microphone if you do not have a sound level meter.

If the results are OK, proceed to “Calibrating the subwoofers with the main monitors” on page 61.

If the results are not OK, you must reposition the monitors.

Calibrating the subwoofers with the main monitors

About bass management

Bass management is a very important and useful tool – and it is in general an absolute necessity if you want to work with a five channel setup in a small room. For more information, see “Bass management” on page 117.

Calibration – overview

- From the home screen, set the volume to -30 dB.
- Press the ENTER key.
  “Bass Management” is displayed.
- Press the ENTER key again.
  “Select Mode” is displayed.
- Press the UP and DOWN keys until “80 Hz” is displayed.
- Navigate to the Calibration submenu – see “Setup menu ► Monitor calibration” on page 26.
- Run tracks 40 to 42 from the Dynaudio Professional AIR test tone sets (low frequency sweeps).
- If required, adjust level or crossover frequency settings.

Calibration

Start by setting the volume on the home screen to a reasonable level – for example, -30 dB.

Set a crossover frequency for bass management – see “Configuring bass management” on page 21. If you have no other preferences, we suggest using the 80 Hz setting.

If measurements or listening to the main monitors indicate uneven level distribution or uneven frequency response at frequencies above 80 Hz, select a higher crossover frequency.

Checking the crossover frequency

- In order to confirm the selected crossover frequency, use the test Dynaudio Professional AIR test tone sets . To make sure that you are listening to one monitor at a time, select one of the main channels in the Calibrate monitor submenu of the Setup menu. For a start, select Master Left.
- Play back the test tone tracks containing the low frequency sweeps. Listen to the response or perform sound level measurements if you have a meter connected.
- If you have a spectrum analyzer, you can play the test tone tracks containing full bandwidth pink noise instead.
- Any uneven frequency response across the crossover frequency should be avoided.
- Adjust the crossover frequency in the bass management setup, if necessary.
- After adjusting one channel, the other channels should be monitored one by one. Finally, monitor all channels together.
- Your system is now calibrated.

There are four other parameters that you should consider with regards to the subwoofer. These parameters are only available in the Calibrate monitor submenu for subwoofers.

LFE Low Pass Filter (subwoofer parameter)

Settings: On /Off

When you set LFE Low Pass Filter to On, a very steep (7th order) low pass filter is activated at 120 Hz. This will filter out all content above 120 Hz. Use this filter when no media encoder is in use. Switch it off when your signal has passed through a media encoder/decoder. Most media encoders such as DTS and Dolby employ an anti-aliasing lowpass filter. Therefore, in a production environment it is important to use this filter when monitoring the LFE channel to learn how the signal will sound after encoding/decoding (i.e., in a domestic or cinema environment).

LFE Gain (subwoofer parameter)

Range: 0 to +14 dB

Use the LFE Gain parameter to boost the LFE channel by up to 18 dB.

Polarity (subwoofer parameter)

Range: 0 or 180º

If the Subwoofer is placed correctly, setting the Polarity parameter to 180º should result in a full phase cancellation at the set crossover frequency. If this is not the case , the Phase parameter described below should be adjusted.

Phase parameter (subwoofer parameter)

Range: 0 to 180º

The integration of the AIR BASE subwoofer with the AIR monitors requires on location tuning. Apart from level calibration and choosing a Bass management crossover frequency, the issue of *phase alignment* remains.

For this purpose, AIR BASE subwoofer have a 0° to 180° phase adjustment (in 5 degree steps) and a Polarity parameter. The optimum setting of these will depend on several factors:

- Room acoustics
- Placement of monitors and listening position
- Set crossover frequency
- AIR Monitor type (6 or 15)

Phase settings are automatically saved and linked to the currently selected crossover frequency.

Phase settings are *Global* settings and are not saved with individual presets.

Phase – initial setting

During calibration of the AIR BASE's DSP software, we have come up with default settings that we found optimal in our listening room. If you are placing the AIR BASE subwoofer at the same distance from your listening position as the AIR Monitors, the default phase settings can be used as initial guidelines for setting the phase. If the distances are significantly different, these values are not likely to be optimal.

Phase adjustment

- Play a low-frequency sweep signal that sweeps over the crossover frequency that you have chosen. Tracks 31 to 42 from the Dynaudio Professional AIR test tone sets may be used. Repeat as necessary.
- Between each sweep, change the Polarity setting. Note the difference.

Ideally (i.e., with the right level calibration and phase setting), the sound should cancel out and virtually disappear at or near the crossover frequency when the Polarity parameter is set to "180°".

Tune the Phase parameter to get the largest possible difference between the two Polarity settings. Then leave it in the position where no cancellation occurs.

Iteration

You may need to iterate quite a bit, maybe readjust the level calibration a bit as well. You may even want to reconsider your initial choice of crossover frequency and/or monitor placement and start the process over again. Be patient – the time spent getting this right is well spent!

AIR Remote

AIR Remote – introduction

When you have set up and calibrated your setup as good as possible, optimal performance from your AIR system monitors is achieved by controlling the levels on the monitors themselves as opposed to controlling via the mixing console. Therefore a remote control is a natural extension of your AIR monitor system.

Remote Control Features

- Instant access to three different user-defined Reference Level settings.
- Instant Preset Recall function of up to 4 presets. This way you can easily switch between different setups from your listening position.
- Mute/unmute and solo function for each monitor in the setup.
- Easy Master Level adjustment via large dial.

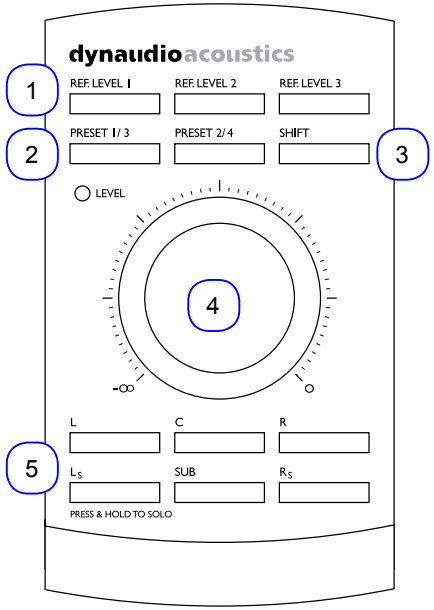

Fig. 33: AIR Remote

1. Reference Level selection keys
2. Preset selection keys
3. Shift key (for selecting presets 3 and 4)
4. Master Volume dial
5. Mute/Unmute/Solo buttons for each channel

REF LEVEL 1 to 3 keys

Use the REF LEVEL keys to recall and store reference levels.

Recalling Reference Level 1 to 3:

- Press the relevant key shortly. The key LED indicates the activated Reference Level.

Setting Reference Level 1 to 3:

- Set the level using the large VOLUME dial in the center of the remote.
- Press and hold the relevant Reference level key for approximately two seconds.
  The LED will flash three times, indicating that the new Reference level has been stored.

When you power up/connect AIR Remote, no REF LEVEL key is active – the volume is defined by the position of the Master Volume dial.

PRESET 1/3, PRESET 2/4 and SHIFT keys

Use the PRESET 1/3 and PRESET 2/4 keys in combination with the SHIFT key to recall AIR monitor presets.

- To recall Preset 1, press the PRESET 1/3 key.
- To recall Preset 2, press the PRESET 2/4 key.
- To recall Preset 3, press and hold the SHIFT key and press the PRESET 1/3 key.
- To recall Preset 4, press and hold the SHIFT key and press the PRESET 2/4 key.

When you power up/connect AIR Remote, no presets are recalled.

For more information on presets, see “Recalling and storing presets” on page 46.

L / C / R / Ls / SUB / Rs – Mute/Unmute/Solo keys
Use these six keys to mute, unmute and solo channels:

- L: Left
- C: Center
- R: Right
- Ls: Left surround
- SUB: Subwoofer
- Rs: Right surround

The LEDs of these keys indicate the current state for a channel as follows:

- LED on: Speaker on
- LED off: Speaker muted
- LED flashing: Speaker solo

Muting and unmuting a speaker

- To mute a speaker/channel, press the respective key.
- To unmute a speaker/channel, press the respective key again.

Solo Function

- To activate the Solo function for a speaker/channel, *press and hold* the respective key.
- To deactivate the Solo function, press (but do not hold) the respective key again. This will return the speaker to the previous state (active or muted).

You can set one or multiple monitors to Solo mode.

When you power up/connect AIR Remote, every channel is active.

Setups with more speakers
When you are operating a system with more channels (i.e., 6.1, 7.1 or higher), the Ls and Rs buttons will define the states (Mute/Solo) for the additional speakers. If you are using more than one subwoofer, the SUB button will mute or solo these additional subwoofers.

Master Volume dial

- If none of the REF LEVEL keys is active, the Master Volume dial sets the Master volume on all channels in your AIR system.
- If a REF LEVEL keys is active, it will define the reference level.
- When a REF LEVEL key is deactivated, the Master volume returns to the level defined by the position of the Master Volume dial.

When you power up/connect AIR Remote, the Master Volume setting defines volume level.

Master Volume LED

- When the level is defined by the Master Volume dial setting, the LED is on.
- When the volume is set by another device, the Master Volume LED goes off.

When you power up/connect AIR Remote, the LED is on, indicating that the Master Volume dial defines the volume.

AIR Control software

AIR Control software – introduction

AIR Control software is the installation and configuration software for the Dynaudio Professional AIR series monitors.

AIR Control software allows you to carry out advanced calibration and alignment of your AIR monitoring system. The software provides access to advanced tools and features of AIR monitors and subwoofers, including timing and SPL calibration and parametric equalizers for each monitor.

AIR Control also lets you define and store custom setups and presets with selective parameter locking.

About TC PC-IP installer software (discontinued)

AIR Control replaces the *TC PC-IP installer software,* which was developed for professional installers. The new AIR Control application design is easier to use and offers an even more efficient way to fine-tune your AIR monitoring system.

AIR Control software main features

Global

- Advanced configuration, calibration and installation software for Dynaudio Professional AIR
- Reference levels control for calibrated listening
- Advanced bass management with variable crossover frequencies
- EQ link: Group your speakers using up to 3 EQ groups
- Advanced locking of parameters
- Front panel control lock
- Setups can be saved as presets
- For OS X and Windows

Per monitor controls

- Four band parametric precision EQ
- Adjustment of individual delay times and calibration levels
- Role and room position control
- Test tone generator

AIR Control software system requirements

System requirements for Mac OS X

- CPU: Intel CPU
  (min. 2 GHz recommended)
- RAM: 2 GB RAM
- Operating system: Apple OS X 10.8 or higher
- USB 2.0, USB 3.0 or serial port

System requirements for Microsoft Windows

- CPU: Intel-compatible CPU
  (min. 2 GHz recommended)
- RAM: 2 GB RAM
- Operating system: Microsoft Windows 7 or higher
- USB 2.0, USB 3.0 or serial port

Due to the touch-based user interface, AIR Control software works very well with Windows-based tablets. However, please note that AIR Control software will not run on Android or iOS tablets (iPads).

For more information on the cables/adapters required to connect your computer and your AIR system, see “Cables” on page 82.

Obtaining AIR Control software

You can download AIR Control software from tcelectronic.com/air-control/support/

Installing AIR Control software

- Run the AIR Control software installer for your operating system. You may need an administrator account name and password to run the installer.
- Read and accept the Software License Agreement presented by the installer.
- Finish the installation of the AIR Control software and quit the installer.

Setting up AIR Control software

Connecting your computer to your AIR monitor system

You need to connect the computer running AIR Control software to an AIR monitor. Depending on your computer's hardware, this may require

- only the custom *Serial to CAT 5 cable* or
- the custom *Serial to CAT 5 cable* and the *USB to COM 9 pin adapter*.

Both cables are part of the Air Cable package (item number 995282002).

Your computer and your AIR monitors should be switched off.

- Plug the RJ45 plug connector of the custom *Serial to CAT 5 cable* into a TC Link port on an AIR monitor that is labeled "Out or Remote".
- If your computer is equipped with a serial port, plug the Serial connector of the *Serial to CAT 5 cable* into your computer's serial port.
- If your computer is *not* equipped with a serial port, but has a USB (2.0 or 3.0) connector,
  - connect the Serial connector of the *Serial to CAT 5 cable* to the serial port of the *USB to COM 9 pin adapter* and
  - plug the USB connector of the *USB to COM 9 pin adapter* into the USB port on your computer.

For more information on cables and adapters, see "Cables" on page 82.

- Switch on your AIR monitors.
- Switch on your computer.
- Launch AIR Control software.

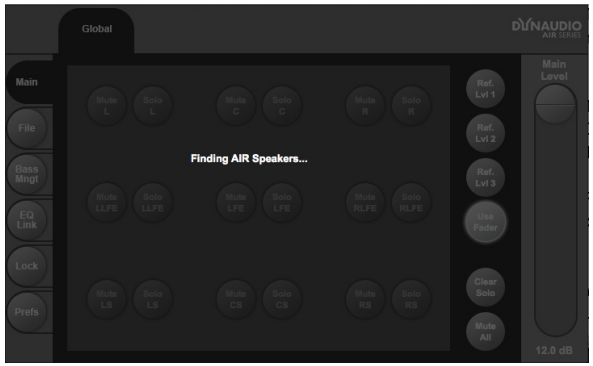

Fig. 34: AIR Control software scanning for a connected AIR system

If everything works as expected, you should be seeing the Global/Main screen of the AIR Control software user interface as described in "Global and local parameters" on page 70.

If AIR Control software cannot establish communication with AIR system, the following screen will be shown:

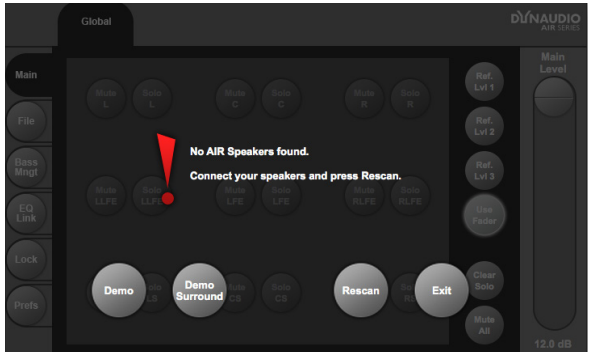

Fig. 35: AIR Control software – network not found

At this point, you can…

- try to troubleshoot the connection between your computer and the AIR monitor network as described below or
- run the software without access to the monitors in demo mode by clicking the "Demo" or "Demo Surround" button. This will allow you to become familiar with the software interface, but as no connection has been established, your changes will not be applied.

What to do when no connection can be established between AIR Control software and the AIR monitor network

- Make sure that you are using the right cable(s). See "Cables" on page 82.
- Make sure the USB or Serial port on your computer that the cable/adapter is connected to is operational – e.g. by plugging in another device and verifying that it works as expected.

Global and local parameters

AIR Control software allows you to access and set two kinds of parameters:

- **Global** parameters that apply to *all* monitors in an AIR system or define general attributes of this system, and
- **Local** parameters for *individual* monitors.

When setting up your AIR system using AIR Control software, start by setting the Global parameters and then proceed to adapt the settings for individual monitors. Descriptions of monitor-specific (local) parameters start with “Selecting monitors for configuration” on page 77.

To access the Global parameters, click the Global button on top of the AIR Control software window.

Basic editing procedures

If a parameter or function in the AIR Control software is represented by a round **button,** click this button to select/deselect it or execute the respective function.

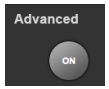

Fig. 36: Click a button to select/deselect or activate the respective feature.

Fig. 37: Click a parameter field to select it and then edit its value using the large slider on the right side of the window

If a parameter in the AIR Control software is represented by a rectangle with a parameter name, the current parameter value and a miniature fader, you can either…

- drag the miniature fader in the field with your mouse or
- select the parameter field by clicking it once and then use the large fader on the right side of the window to adjust it. You can also use the up and down keys on your computer keyboard to adjust a selected parameter. If your mouse has a scroll wheel, you can also use this scroll wheel to change the selected parameter.

AIR Control software version information

Fig. 38: AIR Control software – version information

Click the Dynaudio Professional logo in the upper right corner of the window to display a version information panel. Click into the panel to dismiss it.

Global – Main page

Use the Main page to see an overview of your AIR system, mute and solo monitors, set and access reference levels.

Fig. 39: AIR Control software – Global – Main

Mute buttons

To mute a monitor, click its Mute button. The Mute button will turn yellow. You can mute multiple monitors. To unmute a monitor, click its Mute button again.

To mute all monitors at once, click the Mute All button on the right side of the window.

To unmute *all* monitors at once, click the same button (now labeled “Unmute All”) again.

Solo buttons

To solo a monitor, click its Solo button. The Solo button will turn orange. You can switch multiple monitors to Solo mode. To remove a monitor from the Solo group, click its Solo button again.

To remove *all* monitors from the Solo group at once, click the Clear Solo button on the right side of the window.

Setting and recalling Reference levels

You can specify three Reference levels for your AIR system. Working with predefined reference levels and a well-calibrated AIR system ensures that you get predictable results.

To set a Reference level, click one of the three “Ref. Lvl” buttons. Please note that the volume will immediately jump to the level currently stored for this Reference level slot, so you should not be playing back a high level signal while doing so!

Drag the Main Level slider on the right side of the window to set the desired level. To fine-tune the level, drag the slider with the mouse while holding down the Shift key on your computer keyboard. The new Reference level is stored immediately.

You can use the optional AIR Remote to access your previously stored Reference levels – see “AIR Remote” on page 63.

To set the Master Level freely without it being stored to one of the three Reference level slots, click the User Fader button first.

File page

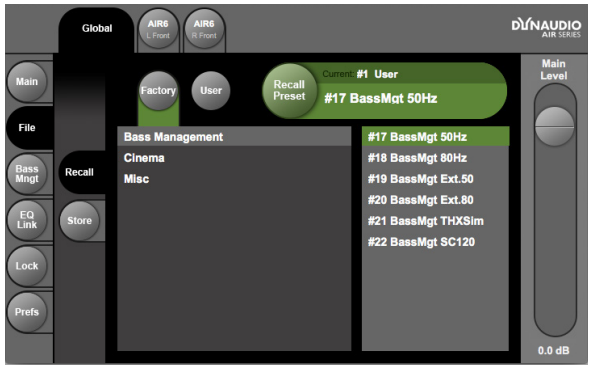

Fig. 40: AIR Control software – Global – File page – Recall section

Use the File page in the Global section of the AIR Control software to recall and store presets.

To learn what global and local parameters are stored in presets and which parameters aren’t, see “Parameter storage” on page 47.

Recalling (activating) presets

- Click the Recall tab on the left side of the window. The name of the currently selected preset is shown in the upper right corner of the window, within the green “Recall Preset” area.
- Select the *preset category* you want to access: Factory presets or User presets.
  For a list and description of factory presets, see “Presets” on page 85.
- If you have selected the Factory presets group, select the desired *preset group* (“Bass Management”, “Cinema”, “Misc(ellaneous)”) by clicking on its name in the left column.
- Select the desired preset from the column on the right.
- Press the large green Recall Preset button in the upper right corner of the window to recall the selected preset.

Storing and naming the current preset

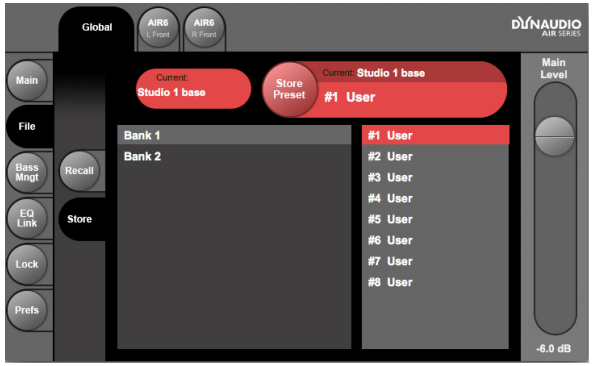

Fig. 41: AIR Control software – Global – File page – Store section

- Click the Store tab on the left side of the window. The name of the currently selected preset is shown on top of the window.
- If you want to edit the name of the preset before storing it, just click the name shown under “Current” and edit it using your computer keyboard.
- 15 User preset slots in two banks are available. Select the bank (“Bank 1” or “Bank 2”) by clicking its name in the left column.
- Select the preset slot where you want to store the preset in the column on the right.
- Click the large red Store Preset button in the upper right corner of the window to store the current preset to the selected User preset slot. This will overwrite (delete) the preset currently stored in this preset slot.

To learn what global and local parameters are stored in presets and which parameters aren’t, see “Parameter storage” on page 47.

Bass management page

Fig. 42: AIR Control software – Global – Bass management page

Use the Bass management page in the Global section of the AIR Control software to recall Bass management presets and activate Advanced bass management features.

To learn more about bass management, see “Configuring bass management” on page 21 and “Bass management” on page 117.

Recalling Bass management presets

- Click the Preset field in the Bass Management (Preset) section of the bass management page. This will assign Bass management preset selection to the large slider on the right of the window.
- Drag the slider to select the desired bass management preset.

For a description of the bass management presets, their parameters and values, see “Bass management modes and crossover frequencies” on page 21.

Advanced bass management

In bass management presets, the states of the three filters (Satellite, Sub 4 and Sub 2) are predefined. Using Advanced bass management, you can activate these filters individually for fine-grained control of demanding speaker setups.

To activate Advanced bass management, click the On button in the Advanced section of the Bass management page. This will enable the remaining buttons in this section.

- Click the field for the filter (Satellite HP, Sub 4th order or Sub 2nd order) that you want to configure. This will assign this filter to the large slider on the right of the window.
- Set the desired crossover frequency for this filter or drag the slider down to set the filter to Off.
- Click the LFE = Sub button to include the LFE channel in bass management.

EQ Link page

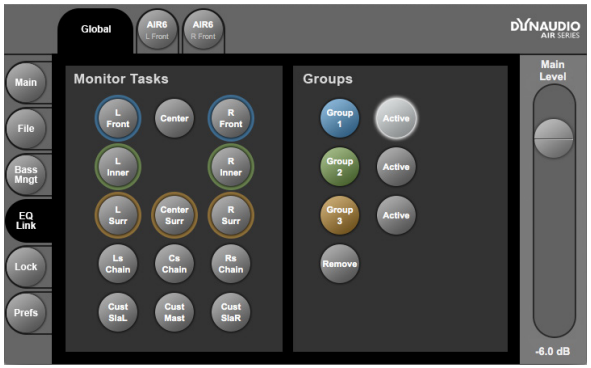

Fig. 43: AIR Control software – Global – EQ Link page. Group 1 (containing the left and right front speakers) is active.

Use the EQ Link page in the Global section of the AIR Control software to group the EQs of AIR monitors, allowing you to modify their settings more easily.

Assigning monitors to EQ Groups

Three EQ Groups (shown on the left of the window) are available.

- Click the name of one or multiple monitors in the left half of the window to select them. Selected monitors are highlighted.
- To remove a monitor from the selection, click its button again.
- To assign all selected monitors to an EQ Group, click the button for that EQ Group on the right side of the window.
  All previously selected monitor buttons will now be surrounded by a ring in the color of that EQ Group.

Removing monitors from an EQ Groups

- Click the name of one or multiple monitors in the left half of the window to select them. Selected monitors are highlighted.
- Click the Remove button in the right half of the window. The previously selected monitors will be removed from their group.

Activating an EQ Group

To use an EQ Group (i.e., have the EQ settings for all monitors in that group synced), you need to activate it.

To activate an EQ Group, click the Active button right to the respective EQ Group button (1, 2 or 3) in the right half of the EQ link window. Multiple groups can be active at the same time.

Lock page

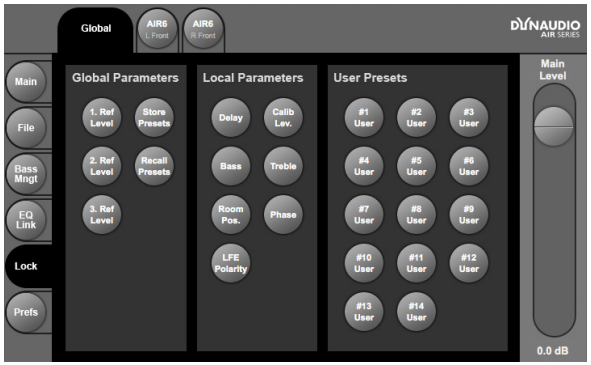

Fig. 44: AIR Control software – Global – Lock page

Use the Lock page in the Global section of the AIR Control software to lock features of your AIR monitor system, allowing you to restrict a user's access to a subset of parameters.

Instead of a simple, global "Lock" feature that would allow no user control at all, AIR Control software allows for fine-grained control of the features that a user has access to. This allows you to configure your AIR system so that an untrained user can operate it without being able to change critical parameters.

- ► To lock a feature or preset slot, click its button so it is highlighted.

Please note that even when a parameter has been locked, the user will still be able to navigate to it and see its current setting on an AIR master monitor. However, he won't be able to *change* it. Instead, the display will show the message "Locked" when an arrow key is pressed.

Preferences page

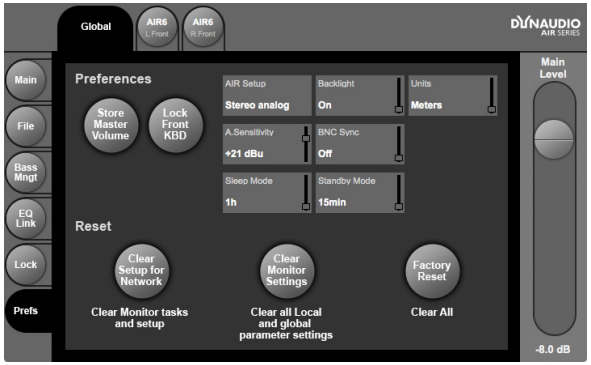

Fig. 45: AIR Control software – Global – Preferences Page

Use the Preferences page in the Global section of the AIR Control software to configure certain global features of your AIR system and access various Reset features.

Storing the Master volume
To have your AIR monitor system store and recall the last used master volume level when it is switched off and on again, click the Store Master Volume button.

Locking the front keyboards of your AIR Master monitors
To lock the front keyboards of your AIR Master monitors, click the Lock Front KBD button.

For each of the remaining functions, select the respective field. This will assign it to the large slider on the right of the window. Drag the slider to set the parameter.

AIR Setup
Use the AIR setup parameter to specify the setup for your AIR system. Clicking this parameter field will show a drop-down menu.

Make sure to have your monitors connected exactly as required for the selected setup. For more information, see “AIR setups” on page 29.

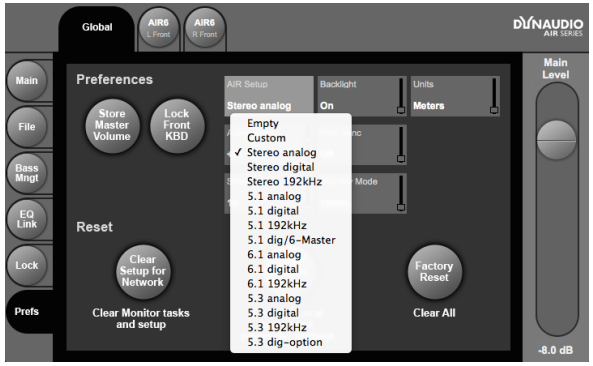

Fig. 46: AIR Setup selection

Backlight
Use the Backlight parameter to set the backlight of your AIR Master monitor(s) display(s) on or off.

Units
Use the Units parameter to set the unit for the delay parameter either to meters or inches.

Port:
If your computer has multiple Com ports, set the Port parameter to the port your are using for connection to your AIR system.

BNC Sync
Switch BNC Sync on or off. See “Setup menu ► External clock setup” on page 24.

A. Sensitivity
Use the A(nalog) Sensitivity parameter to set the input of the analog input in dB.

Sleep Mode
Use the Sleep Mode parameter to set the time until the monitors of your AIR system go into power save mode after no signal has been detected.

Standby Mode
Use the Standby Mode parameter to set the time until the monitors of your AIR system go into standby mode after no signal has been detected.

Fore more information, see “Standby, Power Save mode and powering down your AIR system” on page 12.

Reset procedures
Click one of the three buttons in the lower half of the window to execute the respective Reset procedure. please note that the Reset will occur immediately, so make sure that this is what you want.

For a description of Reset procedures, see “Reset procedures” on page 87.

Selecting monitors for configuration

- Please refer to the section “AIR setups” on page 29 of this manual to find the setup you want to use.
- Position and connect your monitors exactly as described in the section for this setup.
  After you have done this, you can use AIR Control software to access each connected monitor and configure its settings.

Selecting a monitor for configuration

Each detected monitor in an AIR system is represented by a “tab” on top of the AIR Control software window.

Fig. 47: AIR Control software window top bar – two monitors connected and detected. The left monitor (“AIR 6 L Front”) is selected for editing its settings.

Select the monitor you want to set up by clicking its tab and configure it as described on the following pages. All settings are applied immediately.

Monitor Setup page

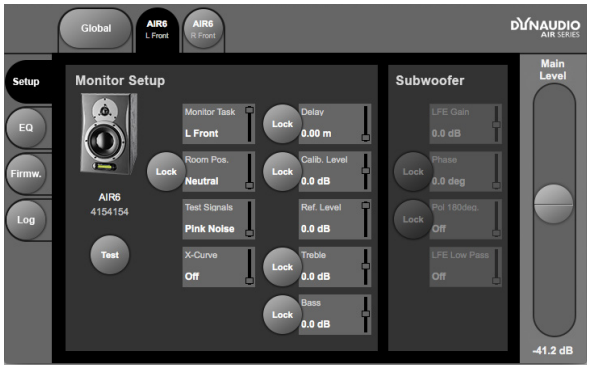

Fig. 48: AIR Control software – Monitor setup page

Use the Setup page to send test signals and configure basic parameters for the selected monitor.

The following setup parameters are available for all AIR monitors.

Test
Click the Test button to generate a test signal. To stop the test signal, click this button again.

Please note that the test signal will be generated at the currently set level.

Monitor Task
Use the Monitor Task parameter to specify the task (e.g. Left Front or Right Front) for the selected monitor in the current setup.

Room position
Use the Room position parameter to specify the room position of the selected monitor. See “Monitor positions” on page 52.

Test Signals
Use the Test Signals parameter to specify the test signal type/source for this monitor. You can choose between Pink Noise and 96 kHz EQ out.

When you set Test Signals to Pink Noise and click the Test button, the speaker will output pink noise at the currently set level.

When you set Test Signals to 96 kHz EQ out and click the Test button, the Master speaker will output an AES/EBU signal on its *TC link output.* This test signal can be used to check the EQ settings using a measuring device connected to the TC Link port using an RJ45-AES/EBU cable.

X-Curve
Use the X-Curve parameter to select the X-Curve for the selected monitor. See “X-Curves” on page 58.

Delay
Use the Delay parameter to specify a delay for the signal assigned to this monitor. See “Delaying monitors” on page 119.

Calib Level
Use the Calib Level parameter to calibrate each monitor. See “Calibrating the main monitors” on page 57 and “Calibrating the subwoofers with the main monitors” on page 61.

Ref. Level
Use the Ref. Level parameter to set the reference level for each monitor.

Treble
Use the Treble parameter to set the amplification or attenuation for the treble band of the two-band shelving EQ in each monitor

Bass
Use the Bass parameter to set the amplification or attenuation for the bass band of the two-band shelving EQ in each monitor. For more information, see “Equalizing the monitors” on page 56.

The following setup parameters are only available for AIR subwoofers:

LFE Gain
Use the LFE Gain parameter to set the LFE channel gain for the selected subwoofer. See “LFE Gain (subwoofer parameter)” on page 61 and “The LFE Channel” on page 118 for background information on LFE.

Phase
Use the Phase parameter to set the signal Phase for the selected subwoofer. See “Calibrating the subwoofers with the main monitors” on page 61.

Pol 180deg
Use the Pol 180deg parameter to reverse the polarity of the signal during calibration for the selected subwoofer. See “Polarity (subwoofer parameter)” on page 61.

LFE Low Pass

Use the LFE Low Pass parameter to activate the Low-pass filter for the LFE channel on the selected subwoofer. See “LFE Low Pass Filter (subwoofer parameter)” on page 61.

Locking parameters for individual monitors

The Lock page in the Global section of the AIR Control software allows you to lock certain features for *all* monitors in your AIR system – see “Lock page” on page 75. In addition, you can lock parameters for individual monitors on the Monitor Setup page.

To lock a parameter for a monitor, so that it cannot be changed using the System Controller’s navigation keys,

- select this monitor’s tab in the AIR Control software,
- go to the Setup page and
- click the Lock button to the left of the respective parameter.

Please note that even when a parameter has been locked, the user will still be able to navigate to it and see its current setting on an AIR master monitor. However, he won’t be able to *change* it. Instead, the display will show the message “Locked” when an arrow key is pressed.

Monitor EQ page

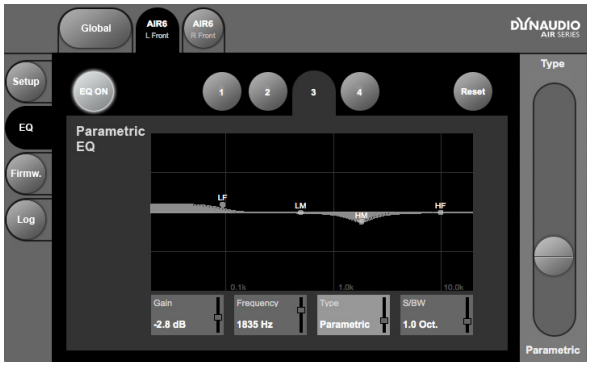

Fig. 49: AIR Control software – Monitor EQ page

Use the EQ page to configure the parametric four band equalizer built into each AIR monitor.

The parametric four band equalizer is only accessible from AIR Control software, not from the monitor itself.

Using EQ Groups

While the EQ can be configured for each monitor individually, AIR Control software allows you to combine monitors in up to three groups and control the EQ settings for all monitors in such an *EQ Group* together. See “EQ Link page” on page 74.

If the monitor you have selected is part of an EQ Group, the color of the EQ Group will be indicated by a small dot in that EQ Group’s color (blue, green or brown) in the monitor’s tab.

If the monitor you have selected is part of an EQ Group, and this EQ Group has been activated on the EQ Link page, the tabs for all monitors in that Group are highlighted when you edit the EQ settings for one monitor, indicating that your changes will be applied to all monitors in that group.

Fig. 50: AIR Control software – Monitor EQ page with two monitors assigned to an active EQ Group. Settings will be applied to all monitors in this EQ Group.

Making EQ settings

- Activate the EQ for the selected monitor (or currently active EQ Group) by clicking the EQ On button.
- Select one of the four EQ bands for editing by clicking one of the four numbered tabs in the upper half of the window.
- Use the parameter fields on the bottom of the window to configure the selected EQ band as follows:
  - **Gain:** Use this parameter to attenuate or amplify the selected frequency band by up to 6 dB.
  - **Frequency:** Use this parameter to set the cutoff/operating frequency for the selected frequency band.
  - **Type:** Use this parameter to set the filter type for the selected frequency band. Choose between Band off (EQ band inactive), Parametric, Notch, Low Shelf, High Shelf, Low Pass, High Pass
  - **S/BW:** Use this parameter to set the slope for the selected EQ band.
- Proceed to select and adjust the other EQ bands.

Resetting the EQ

To reset the parameters of all four EQ bands to their default values, click the Reset button.

EQ defaults

EQ Band	Gain	Frequency	Type	S/BW
1	0 dB	100 Hz	Low Shelf	9 Oct.
2	0 dB	500 Hz	Parametric	4 Oct.
3	0 dB	2000 Hz	Parametric	1 Oct.
4	0 dB	10000 Hz	High Shelf	3 Oct.

Fig. 51: Four-band EQ defaults

Monitor Firmware page

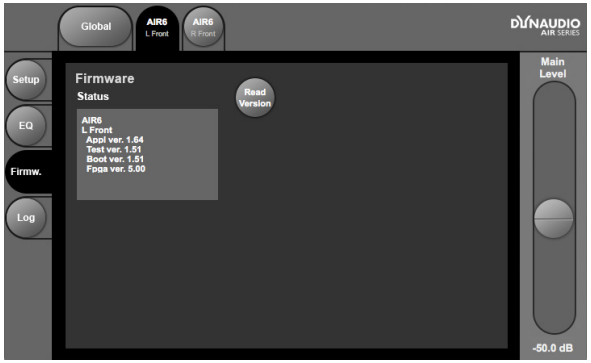

Fig. 52: AIR Control software – Monitor firmware page

Use the Firmware page to access firmware information for the currently selected monitor.

- Click the Read Version button to retrieve firmware version information from the selected monitor.

If you encounter problems with an AIR monitor and need to contact support (see “Getting support” on page 5), you should have this information ready.

Monitor Log page

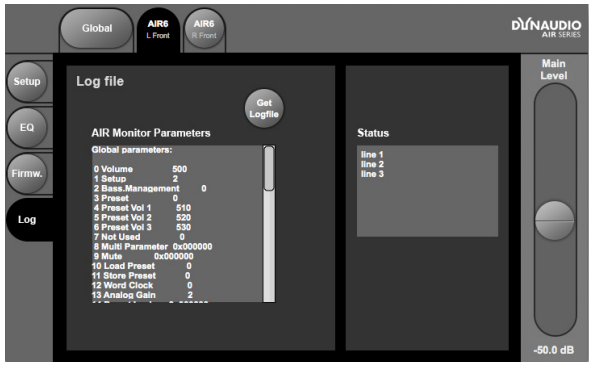

Fig. 53: AIR Control software – Monitor Log page

Use the Monitor Log page to retrieve a log file showing the current settings for the selected monitor.

- Click the Get Logfile button for a full list of all AIR Monitor parameters.

If you encounter problems with an AIR monitor and need to contact support (see “Getting support” on page 5), you should have this information ready.

Cables

Several types of cables are used for connecting the components of your AIR system.

TC LINK via standard Cat 5 cables

TC LINK connections carry digital audio (24 bit) and network control information between the monitors in your AIR system.

Fig. 54: TC LINK (standard Cat 5) cable

- Cable type: Shielded Ethernet cable – Category 5
- Connector type: RJ45
- Maximum cable length: 15 meters

Connector 1	Connector 2	Color
1	1	Brown
2	2	White/Brown
3	3	Green
4	4	White/Blue
5	5	Blue
6	6	White/Green
7	7	Orange
8	8	White/Orange

AES/EBU cables

Standard AES/EBU cables are used to connect audio sources to the inputs of the System controller monitor.

- Cable type: 110 Ohm
- Connector type: XLR
- Maximum cable length: 100 meters

Connector 1	Connector 2	
Pin 1	Pin 1	Ground
Pin 2	Pin 2	Hot
Pin 3	Pin 3	Cold

Balanced audio cables

Standard balanced audio cables are used to connect audio sources to the analog audio inputs of the System controller monitor.

- Cable type: 110 Ohm
- Connector type: XLR

Connector 1	Connector 2	
Pin 1	Pin 1	Ground
Pin 2	Pin 2	Hot
Pin 3	Pin 3	Cold

Custom serial to CAT 5 cable

The Serial to Cat-5 cable is part of the *Air Cable package*, which can be obtained from the TC Electronic Store (item number 995282002):

- store.tcelectronic.com/

This is a proprietary cable with built-in electronics for use with AIR Systems only. Use this cable to connect your computer running AIR Control software to the System controller monitor.

For more information, see “Setting up AIR Control software” on page 69.

Do *not* use an off-the-shelf Serial to CAT 5 cable/adapter for this connection as it will not work.

Fig. 55: Serial to CAT-5 cable

USB to COM 9 pin adapter

The Serial to Cat-5 cable is part of the *Air Cable package*, which can be obtained from the TC Electronic Store (item number 995282002):

- store.tcelectronic.com/

The USB to COM 9 pin adapter is part of the Air Cable package.

Use this adapter in conjunction with the Serial to CAT 5 cable described above if your computer has USB ports, but no serial port.

For more information, see “Setting up AIR Control software” on page 69.

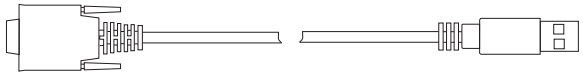

Fig. 56: USB to COM 9 adapter

Presets

			Preset level in dB						Gain in dB			
Preset no.	**Preset name**	**Preset description**	**L**	**C**	**R**	**Ls**	**Rs**	**Sub**	**LFE**	**X-Over (Hz)**	**X-Curve 1***	**X-Curve 2****
1-15	Empty / User	*Presets 1 to 15 are "empty" until you choose to store something, after which the respective preset name is "User Preset". Presets can be named using AIR Control software.*										
16	Neutral	All parameters neutral – a good starting point	0	0	0	0	0	0	0	Off	Off	Off
17	BassMgt 50Hz	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	50	Off	Off
18	BassMgt 80Hz	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	80	Off	Off
19	BassMgt Ex50Hz	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	50	Off	Off
20	BassMgt Ex80Hz	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	80	Off	Off
21	BassMgt THXSim	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	115	Off	Off
22	BassMgt SC120	Music, video and post for domestic (not Cinema) use – Stereo, 5.1, 5.3 and 6.1	0	0	0	0	0	0	0	120	Off	Off
23	Cinema Flat	Mixing for Cinema without compensation for X-curve. 5.1	0	0	0	-3	-3	0	0	Off	Off	Off
24	Cine X-curve	Mixing for Cinema in a small room – compensates for X-curve. 5.1	0	0	0	-3	-3	0	0	Off	Yes	Off
25	Cine X-curve2	Mixing for Cinema in a small room – compensates for modified X-curve. 5.1	0	0	0	-3	-3	0	0	Off	Off	Yes
26	Cinema X-50Hz	Mixing for Cinema with small room X-curve compensation and bass management	0	0	0	-3	-3	0	0	50	Yes	Off
27	Cinema X-80Hz	Mixing for Cinema with small room X-curve compensation and bass management	0	0	0	-3	-3	0	0	80	Yes	Off
28	Cine X-SC120Hz	Mixing for Cinema with small room X-curve compensation and bass management	0	0	0	-3	-3	0	0	120	Yes	Off
29	Cinema 80Hz	Mixing for Cinema with bass management but *without* compensation for X-curve	0	0	0	-3	-3	0	0	80	Off	Off
30	Cinema SC120	Mixing for Cinema with bass management but *without* compensation for X-curve	0	0	0	-3	-3	0	0	120	Off	Off
31	OB Van SC120	OB vans and very small rooms where rear channels are close to sweet spot	0	0	0	-2	-2	0	0	120	Off	Off
32	Neutral	All parameters neutral – a good starting point	0	0	0	0	0	0	0	Off	Off	Off

* X-curve #1: ANSI / SMPTE222M – 1.5 dB roll off per octave from 2 kHz. For more information, see "X-Curves" on page 58.

** X-curve #2: ANSI / SMPTE222M Mod. – 3 dB roll off per octave from 4 kHz. For more information, see "X-Curves" on page 58.

Notes on LFE Gain

Please note that the LFE channel should be mixed with +10 dB headroom. If you are not able to boost your LFE monitor output, you should add +10 dB gain on your AIR BASE subwoofer. Most format encoders/decoders take the LFE boost into account, meaning that you should leave the AIR BASE LFE gain at 0 dB when playing back DTS-encoded or DOLBY-encoded material on your AIR system.

Reset procedures

Three different Reset “levels” exist. **All Reset procedures will affect all monitors connected when they are executed.**

Clear Monitor Settings

The **Clear monitor settings** reset procedure will reset all global and local parameters for all connected monitors. Preset and network settings are not affected.

To access this Reset procedure, press and hold the ENTER key on the System Controller monitor while powering it up.

Reset All Settings

The **Reset all settings** reset procedure is a “factory reset” that will delete all global and local parameter settings as well as preset and network settings.

To access this Reset procedure, press and hold the ENTER key on the System Controller monitor while powering it up.

Clear Setup for entire network

The **Clear setup for entire network** reset procedure will clear settings for your entire AIR system. All connected monitors will be reset to default settings.

To access this Reset procedure, proceed as follows:

- From the home screen, press the ENTER key.
- Press the DOWN key until “Setup menu” is displayed.
- Press the ENTER key.
- Press the DOWN key until “Clear setup for entire network” is displayed.
- Press the ENTER key.
  “Accept to clear network setup?” is displayed.
- Press the ENTER key to clear the setup or press the EXIT key to discard.

Error messages

Error message	Explanation
“!” **(e.g. as “96 kHz Center!”)**	The “!” indicates that the monitor is not connected to the network. The volume is then automatically set to -50 dB for this monitor.
“+” **(e.g. as “96 kHz L Front+”)**	The “+” indicates that this monitor is the System Controller.
>> A-Input Lo <<	This message is displayed in analog setups only. It indicates that the input level has been detected to be between -60 dB and -20 dB for a period longer than 3 minutes. This is a hint to turn up the Analog Input Sensitivity parameter – see “Setup menu ► Analog input sensitivity” on page 25.
>> A-Input Hi <<	This message is displayed in analog setups only. It indicates that an input level near 0 dB has been detected (peaks in 2 seconds above -1 dB). This is a warning and you should reduce Analog input sensitivity accordingly. See “Setup menu ► Analog input sensitivity” on page 25.
>> PSU error <<	This message is displayed if the power supplies fails. The power will be turned off and the monitor cannot operate. In this case, get in touch with support. See “Service” on page 5.
<Locked>	This message is displayed when a parameter is locked by AIR Control software and cannot be changed. Use AIR Control software to unlock parameters. See “AIR Control software” on page 66.
Standby	This message is displayed when no input signal above -65 dB has been detected for more than 30 minutes. The amplifier is turned off. Standby mode is released as soon a signal level above -65 dB has been detected.
>> Power save <<	This message is displayed when no signal has been detected on all networked monitors for more than 2.5 hours. Power is turned off. Exit this mode by pressing any key on the System controller or adjusting the volume from the AIR Remote.

Warranty

Dynaudio Professional products are warranted to be free from defects in components and factory workmanship under normal use and service for a period of two (2) years when bought from a reseller within the EU.

Dynaudio Professional products are warranted to be free from defects in components and factory workmanship under normal use and service for a period of one (1) year when bought from a reseller outside the EU.

When failing to perform as specified during the warranty period we will undertake to repair, or at our option, replace this product at no charge to its owner, provided the unit is returned undamaged and shipping prepaid, to an authorized service facility or to the factory.

Dynaudio shall not be responsible for any incidental or consequential damages. Dynaudio's responsibility is limited to the product itself. Dynaudio assumes no responsibility for any loss due to cancellation of any events, or rent of replacement equipment or costs due to third party's or customer's loss of profit, or any other indirect cost or losses however incurred.

Dynaudio reserves the right to make changes or improvements in design or manufacturing without assuming any obligation to change or improve products previously manufactured and/or sold. The product warranty is only valid in the country where the product was purchased.

Exceptions

Dynaudio will always follow the law of the respective markets should it differ from the policy stated above or the exceptions stated below.

This warranty shall be null and void, if the product is subjected to repair work or alteration by a person or facility other than those authorized by Dynaudio; mechanical damage including shipping accidents; war, civil insurrection, misuse, abuse, operation with incorrect AC voltage, incorrect connections, wrong accessories, incorrect use of accessories, operation with faulty associated equipment, exposure to inclement weather conditions and normal wear and tear.

Units on which the serial number has been removed or defaced are not eligible for warranty service.

Technical specifications

AIR 6 & AIR 15 (Master and Slave)

Model	AIR 15	AIR 6
System	Two-way Active Nearfield Monitor	Two-way Active Nearfield Monitor
Frequency response (±3 dB)	33 Hz – 22 kHz	40 Hz – 22 kHz
Peak SPL 1 m, pair (IEC Short Term)	> 128 dB peak	> 128 dB peak
Peak SPL 2 m, 5.1 (IEC Short Term)	> 126 dB peak (no LFE)	> 126 dB peak
Max SPL 1 m, (IEC Long Term)	103 dB RMS	104 dB RMS
Precision of monitor matching	±0.2 dB	±0.2 dB
Port tuning frequency	40 Hz	45 Hz
Internal cabinet volume	27 liters	12.1 liters
Bass principle	Bass reflex	Bass reflex
Crossover frequency	2150 Hz (DSP generated)	2150 Hz (DSP generated)
Crossover slope	24 dB/oct (Linkwitz Riley, DSP generated)	24 dB/oct (Linkwitz Riley, DSP generated)
Tweeter	Esotec 28 mm / 1.1” soft dome, rear chamber, magnetic fluid, 4 mm die-cast aluminum front, pure aluminum wire voice coil	Esotec 28 mm / 1.1” soft dome, rear chamber, magnetic fluid, 4 mm die-cast aluminum front, pure aluminum wire voice coil
Woofer	240 mm / 10”, one-piece molded polypropylene cone, 100 mm / 4” pure aluminum voice coil	175 mm / 6.5”, one-piece molded polypropylene cone, 75 mm / 3” pure aluminum voice coil, magnetic shielded
Mains voltage	100 to 240 VAC, 50 to 60 Hz (auto-select)	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power consumption	40 W @ 1/8 max power (IEC 60065)	40 W @ 1/8 max power (IEC 60065)
Finish		
Amp	Black anodized aluminum back plate	Black anodized aluminum back plate
Cabinet	Dark gray MDF baffle, Silver foil	Dark gray MDF baffle, Silver foil
Dimensions (H x W x D)	425 x 275 x 395 mm / 16,7” x 10,8” x 15,5”	338 x 216 x 345 mm / 13,3” x 8,5” x 13,6”
Weight	15.5 kg / 34.5 lbs	9.8 kg / 21.8 lbs
Amplifier		
Tweeter and woofer	Tweeter 200 W PWM amp/Woofer 200 W PWM amp	Tweeter 200 W PWM amp/Woofer 200 W PWM amp

AIR 20 & AIR 25 (Master and Slave)

Model	AIR 25	AIR 20
System	Three-way Active Nearfield Monitor	Three-way Semi-active Nearfield Monitor
Frequency response (±3 dB)	28 Hz to 22 kHz: ±3 dB	31 Hz to 22 kHz: ±3 dB
Peak SPL 1 m, pair (IEC Short Term)	134 dB peak	131 dB peak
Peak SPL 2 m, 5.1 (IEC Short Term)	132 dB peak	129 dB peak
Max SPL 1 m, (IEC Long Term)	107 dB RMS	104 dB RMS
Precision of monitor matching	±0.2 dB	±0.2 dB
Port tuning frequency	35 Hz	40 Hz
Internal cabinet volume	68 liters	35 liters
Bass principle	Bass reflex	Bass reflex
Crossover frequency	400 Hz (DSP generated) and 2400 Hz (DSP generated)	390 Hz (DSP generated) and 2600 Hz
Crossover slope	12 dB/oct and 6 dB/oct	
Tweeter	Esotar 28 mm / 1.1” soft dome, neodymium magnet, rear chamber, magnetic fluid, 4 mm steel front, pure aluminum wire voice coil	Esotar 28 mm / 1.1” soft dome, neodymium magnet, rear chamber, magnetic fluid, 4 mm steel front, pure aluminum wire voice coil
Midrange	145 mm / 5,5”, one-piece molded polypropylene cone, 38 mm / 1,5” pure aluminum voice coil	145 mm / 5,5”, one-piece molded polypropylene cone, 38 mm / 1,5” pure aluminum voice coil
Woofer	240 mm / 9,5”, one-piece molded polypropylene cone, 100 mm / 4” pure aluminum voice coil	2 x 240 mm / 9,5”, one-piece molded polypropylene cone, 100 mm / 4” pure aluminum voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (select)	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power consumption	45 W @ 1/8 max power (IEC 60065)	45 W @ 1/8 max power (IEC 60065)
Finish		
Amp	Black painted back plate	Black painted back plate
Cabinet	Black ash with dark gray MDF baffle	Black ash with dark gray MDF baffle
Dimensions (H x W x D)	510 x 535 x 450 mm / 20” x 21” x 17,7”	575 x 310 x 395 mm / 22,6” x 12,2” x 15,5”
Depth incl. amp and driver	490 mm / 19,3”	435 mm / 17,0”
Weight	46 kg / 101 lbs	28 kg / 62.2 lbs
Amplifier		
Tweeter, midrange and woofer	Tweeter 300 W amp / Midrange 300 W amp / Woofer 2 x 300 W amp	Tweeter & Midrange 200 W amp / Woofer 200 W amp

AIR BASE 1 & AIR BASE 2

System	Active Subwoofers
Total frequency response:	25 Hz – bssmng: 120 Hz, LFE: 2.5 kHz / 23 Hz – bssmng: 120 Hz, LFE: 2.5 kHz: ±3 dB
Max. SPL 1 m, one (IEC Short Term)	119 dB peak / 121 dB peak
Max. SPL 2 m, 5.1 (IEC Short Term)	113 dB peak / 115 dB peak (no front, rear & center)
Precision of monitor matching	±0.2 dB
Port tuning frequency	30 Hz / 27 Hz
Internal cabinet volume	37 liters / 78 liters
Bass principle	Bass reflex
Woofer	1 / 2 pcs. 240 mm / 10”, one-piece molded polypropylene cone, 100 mm / 4” pure aluminum voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (auto-select)
Power consumption	40 W @ 1/8 max power (IEC 60065)
Finish	
Amp	Black anodized aluminum back plate
Cabinet	Dark gray MDF baffle, Silver foil
Dimensions (H x W x D)	310 x 480 x 420 mm / 900 x 310 x 420 mm (12.2” x 18,9” x 16.5” / 35.4” x 12.2” x 16.5”) Depth incl. amp and driver: 447 mm / 447 mm (17.6” / 17.6”)
Weight	18 kg / 29 kg (39.6 lbs / 63.8 lbs)
Amplifier	250 W PWM amp

AIR Base 12

System	Active Subwoofer
Total frequency response	22 Hz to 200 Hz ±3 dB, depending on setting
Max. SPL 1 m, one (IEC Short Term)	123 dB peak
Max. SPL 2 m, 5.1 (IEC Short Term)	117 dB peak
Precision of monitor matching	±0.2 dB
Port tuning frequency	24 Hz
Internal cabinet volume	41 liters
Bass principle	Bass reflex. Down-firing port
Woofer	1 pcs. 300 mm/12”, two-piece molded polypropylene cone, 75 mm/3” pure copper voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (select)
Power consumption	Idle: 50 W/Max: 375 W
Finish	
Amp	Black painted metal back plate
Cabinet	Black ash with dark gray MDF baffle
Dimensions (H x W x D)	460 x 360 x 502 mm (18.1 x 14.2 x 19.7) Depth incl. amp and driver: 550 mm (not moving) Height incl. “feet”: 738
Weight	38 kg (83.8 lbs)
Amplifier	500 W amp

AIR Base 24

System	Active Subwoofer
Total frequency response	20 Hz to 200 Hz ±3 dB, depending on setting
Max. SPL 1 m, one (IEC Short Term)	126 dB peak
Max. SPL 2 m, 5.1 (IEC Short Term)	120 dB peak
Precision of monitor matching	±0.2 dB
Port tuning frequency	22 Hz
Internal cabinet volume	77 liters
Bass principle	Bass reflex. Down-firing port
Woofer	2 pcs. 300 mm/12”, two-piece molded polypropylene cone, 75 mm/3” pure copper voice coil
Mains voltage	100 to 240 VAC, 50 to 60 Hz (select)
Power consumption	Idle: 50 W/Max: 375 W
Finish	
Amp	Black painted metal back plate
Cabinet	Black ash with dark gray MDF baffle
Dimensions (H x W x D)	720 x 360 x 502 mm (28.3 x 14.2 x 19.7) Depth incl. amp and driver: 550 mm (not moving) Height incl. “feet”: 738 mm
Weight	60 kg (132.3 lbs)
Amplifier	700 W amp

Room size and typical listening distance

Typical listening distance			
AIR 6	**AIR 15**	**AIR 20**	**AIR 25**
1.2 to 2 m / 4 to 7 ft	1.5 to 2.5 m / 5 to 8,5 ft	1.5 to 3 m / 5 to 10.2 ft	
Typical room size			
AIR 6	**AIR 15**	**AIR 20**	**AIR 25**
50 to 100 m^3 / 1600 to 3500 ft	75 to 125 m^3 / 2600 to 4400 ft	80 to 130 m^3 / 2800 to 4600 ft^3	
AIR BASE 1	**AIR BASE 2**	**Two or three AIR BASE 1's**	**Two or three AIR BASE 1's**
30 to 60 m^3 / 1000 to 2000 ft^3	50 to 100 m^3 / 1600 to 4400 ft^3	50 to 100 m^3 / 1600 to 3500 ft^3	75 to 125 m^3 / 2600 to 4400 ft^3

General specifications for AIR 6, AIR 15, AIR 20, AIR 25, AIR BASE 1, AIR BASE 2, AIR BASE 12 & AIR Base 24

System sample rates	
Internal sample rate	192 and 176.4 via Dual Wire (optional Digital Card required) and 96, 88.2, 64, 48, 44.1 or 32 kHz
AIR Masters only	
I/O Connectors	XLR (2 channels AES/EBU in) 3 x RJ45 proprietary TC LINK
Formats	AES/EBU (24 Bit)
Word clock input	BNC, 75 ohm, 0.6 to 10 Vpp
Display	2 x 16 character dot matrix
Operation	Menu system / four buttons
Analog input option	
Input connectors	XLR balanced (pin 2+, pin 3-)
Impedance	10/3 kOhm (Balanced/unbalanced)
Selectable full scale input level	+9, +15, +21, +27 dBu
Dynamic Range	> 113 dB typ. (unweighted), BW: 20 Hz to 20 kHz
THD+N	< -105 dB typ. @ 1 kHz, -3 dBFS
Crosstalk	< -120 dB, 20 Hz to 20 kHz
A to D Conversion	24 Bit (Dual bit delta sigma sampling at 4.1/5.6/6.1/6.1 MHz)
AIR Slaves only	
I/O Connectors	2 x RJ45 proprietary TC LINK

AIR Remote

Finish	Black anodized aluminum and plastic
Dimensions (D x W x H)	120 x 70 x 35 mm
Weight	250 g
I/O Connectors	1 x RJ45 proprietary TC LINK
EMC	
Complies with	EN 55103-1 and EN 55103-2, FCC part 15 class B, CISPR 22 class B
Safety	
Certified to	IEC 60065, EN 60065, UL 6500 and CSA E60065 CSA FILE #LR108093
Environment	
Operating Temperature	32° F to 122° F (0° C to 50° C)
Storage Temperature	-22° F to 167° F (-30° C to 70° C)
Humidity	Max. 90 % non-condensing
Warranty	
Parts and labor	1 year on parts and labor

General specifications for all products

EMC complies with	EN 55103-1 and EN 55103-2, FCC part 15 class B, CISPR 22 class B
Safety certified to	IEC 60065, EN 60065, UL 6500 and CSA E60065 CSA FILE #LR108093
Environment operating temperature	32° F to 122° F (0° C to 50° C)
Storage temperature	-22° F to 167° F (-30° C to 70° C)
Humidity	Max. 90 % non-condensing
Warranty	2 years on parts and labor

Delay in system

Sample Rate			Analog Input *)			Digital Input	
(AES or WC In) kHz	centimeters	milliseconds	Samples @ Converter Rate	centimeters	milliseconds	Samples @ Input Rate	Converter kHz
32	39	1.14	73	100	2.91	93	64
44.1	28	0.83	73	53	1.54	68	88.2
48	26	0.76	73	29	0.83	40	96
64	39	1.14	73	18	0.53	34	64
88.2	28	0.83	73	13	0.39	34	88.2
96	26	0.76	73	12	0.35	34	96

* In Analog Input mode without WC Input selected, the system runs on the Master monitor’s own 96 kHz clock.

Due to continuous development, these specifications are subject to change without notice.

Certificate of conformity

TC Electronic A/S, Sindalsvej 34, 8240 Risskov, Denmark, hereby declares on own responsibility that following products:

- AIR 6
- AIR 15
- AIR 20
- AIR 25
- AIR BASE 1
- AIR BASE 2
- AIR BASE 12
- AIR BASE 24
- AIR REMOTE

that are covered by this certificate and marked with CE-label conform with following standards:

- **EN 60065 (IEC 60065)** – Safety requirements for mains operated electronic and related apparatus for household and similar general use
- **EN 55103-1** Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1: Emission.
- **EN 55103-2** Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2: Immunity.

With reference to regulations in following directives:
73/23/EEC, 89/336/EEC

Issued in Risskov, December 2002

Mads Peter Lübeck
Chief Executive Officer

Appendix: Acoustics

Introduction

When we talk about making a room “sound right”, we are usually dealing with room acoustics. As a science, acoustics has been around for about a hundred years. Until then, good acoustics happened by experiment, by experience, or simply by accident. Today, we know a lot more about the parameters that influence the “sound” of a room.

A control room should basically act as neutral as possible. But this is not always the case. Let’s take a look on some of the issues that we need to be aware of.

Good acoustics

Here is a list of important parameters concerning good acoustics.

- Proper reverberation time
- Good sound distribution
- Adequate sound pressure level
- Low background noise level
- No (flutter) echo

Now let us go through these issues one by one.

Reverberation time

The reverberation time is defined as the time until a sound is attenuated by 60 dB after the source is stopped.

In real life, we can experience reverb times from approximately 0 seconds (outdoors or in anechoic chambers) to around 10 to 12 seconds. In special reverb chambers, the time may exceed 20 seconds.

Control rooms should normally have a reverb time around 0.2 to 0.3 seconds.

Why do we have reverberation?

The speed of the propagating sound wave is very slow – at least compared to light, which travels at approximately 1130 feet or 340 meters per second.

If there are no reflecting surfaces between the sound source and our ears, only the direct sound is heard, and there is no reverberation.

If there is a single reflecting surface, we may hear the reflected sound in one way or another – but there is still no reverberation.

If the sound is generated in a typical room, there are many reflections. Each of these reflections travels different paths, with varying distances to the listener. Each time the sound hits an (absorbing) surface, it will lose some energy.

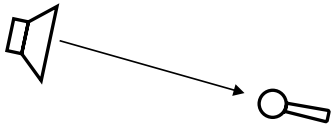

Fig. 57: One sound source, one receiver and no room. Only the direct sound is received.

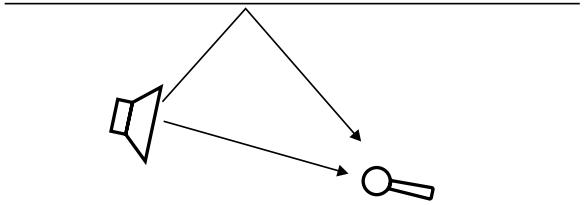

Fig. 58: One sound source, one receiver, and one reflecting surface. The sound is received twice. In the control room, this is normally experienced as comb filtering – see later.

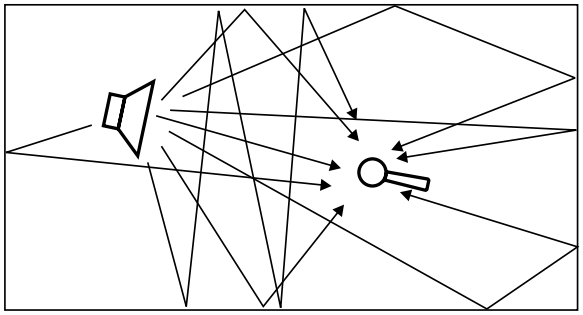

Fig. 59: One sound source and one receiver in a typical room. The sound impulse is reflected on many surfaces. The reflections are perceived as reverberation.

Sabine’s formula

Wallace Clement Sabine (1868-1919) is the father of modern acoustics. He found that reverberation time is described by a relationship between the room size and the amount of absorption in the room. Larger rooms will have longer reverberation. More absorption leads to shorter reverberation. This can be expressed in Sabine’s formula:

T = 0.161 * V / A

where:

- T: Reverberation time in seconds
- V: Volume in m^3
- A: Absorption in m^2 Sabine
- 0.161: A constant (to adapt the calculation to the actual units)

One square meter (1 m^2) Sabine is comparable to an open window with an area of one square meter. The sound that hits this hypothetical window will disappear and never return. In other words: One square meter Sabine is one square meter with full absorption.

The basic formula sounds simple – but the problem is that the materials in the room will absorb differently at different frequencies. The absorption may range from nothing (fully reflective) to total absorption.

A proper reverb time should be constant with frequency, but this is not always the case because of the behavior of the materials in the room. The low frequencies are the hardest to control. This is why the reverberation time against frequency in practice may look like this:

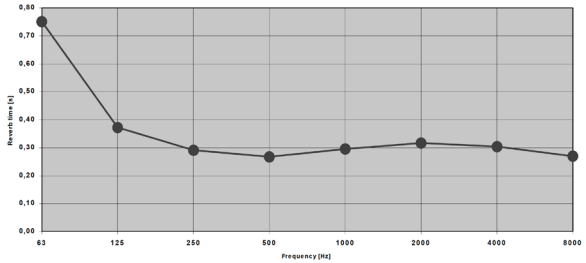

Fig. 60: Reverberation time measured in a control room. From 250 Hz and above, the curve is nicely placed around 0.3 seconds. But for lower frequencies, the reverb time rises to 0.75 seconds, which is too much.

Absorbers

All materials in a room act acoustically – even if they are not so-called “acoustical materials”. Basically, there are three kinds of absorbers:

Membrane absorbers
This class of absorber includes wooden floors, windows, doors, etc. These absorbers provide absorption in the low end of the frequency range. Under normal conditions, large areas of a basic room belong to this class. While their efficiency is normally not very high, specially designed membrane absorbers can be very effective.

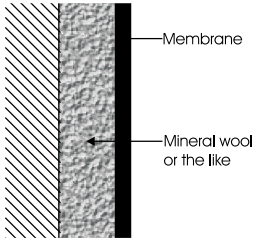

Fig. 61: Membrane absorbers

Resonance absorbers
Resonance absorbers include slit panels, perforated plates, Helmholtz resonators etc. These absorbers are normally used for midrange frequencies. The absorption is medium to high.

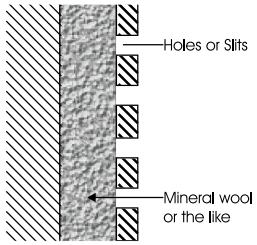

Fig. 62: Resonance absorbers

Porous absorbers
These absorbers include mineral wool, carpets, curtains, and so on. They can be very effective, but the thickness of the material has to be taken into account. Thin layers will only absorb the highest frequencies. Think of a rehearsal room in a concrete basement where the only damping is a carpet on the floor – this will do very little for low frequencies!

To absorb a given frequency (and all frequencies above), the thickness of the absorber must be the quarter of the wavelength of that frequency. Put differently: The front of the material must be placed at a distance of one quarter of the wavelength.

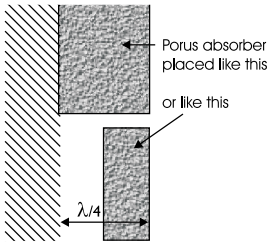

Fig. 63: Porous absorbers

Diffusors

A diffusor provides diffuse reflection of the sound radiated against it. Diffusers can be very useful in situations where reflections are disturbing the sound image and it is not advisory to add further absorption. So in order to reduce flutter echoes, comb filtering etc., special elements can be placed on the “disturbing” surface. These elements must have dimensions comparable to the frequencies at which diffusion is wanted.

Absorption or diffusion?

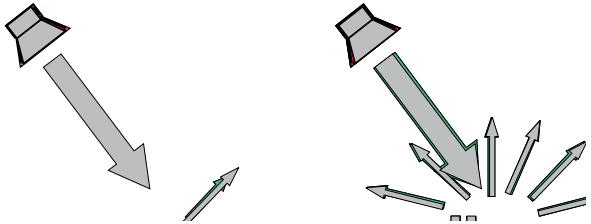

Fig. 64: Absorption versus diffusion

A special technique developed by Manfred Schroeder is very capable in making a smooth and controlled diffusion. These “Schroeder Diffusors” are available as prefab modules.

Standing waves

Standing waves exist in all kind of rooms. Important parameters that will determine the frequencies around which the phenomenon exists as well as the distribution of these standing waves are the shape of the room, the dimensions of the room, and the relationship between the dimensions of the room.

How do standing waves occur?

Imagine a sound source. When a sound is emitted, the sound wave will propagate in all directions if no obstacles in sight. This will of course happen with the speed of sound.

Now, if the sound source is placed inside a room, the sound wave will hit the boundaries of the room. If the boundaries consist of acoustically hard (reflective) surfaces, the sound is reflected. If the angle of incidence is 90º, the sound will be reflected right back where it came from. Under certain circumstances – for instance if the sound is reflected between two parallel walls –, the sound wave will meet itself again. This becomes a problem when the sound wave not only meets itself, but when it meets itself *in phase*. And this will happen when the distance between the walls is half a wavelength of the radiated sound wave. Or one whole wavelength – or 1.5, 2, 2.5 and so on.

This phenomenon is called standing waves. Actually, the sound wave is not “standing”. But it is experienced as that because the sound pressure maxima and minima are located in fixed places in the room.

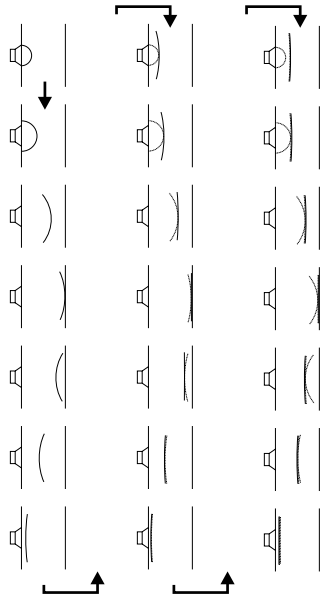

Fig. 65: The sound field is initially radiated exposing a radial wave front – but within a few reflections, the sound field has obtained a plane wave front.

Room modes

These special frequencies are also called room modes. Standing waves between parallel walls are called **axial modes**. Other modes exist – for instance, **tangential modes** and **radial modes** (see the following illustrations). Normally, the axial modes are the strongest.

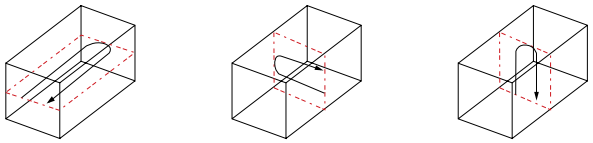

Fig. 66: Room modes: Axial modes

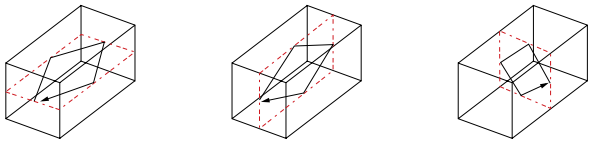

Fig. 67: Room modes: Tangential modes

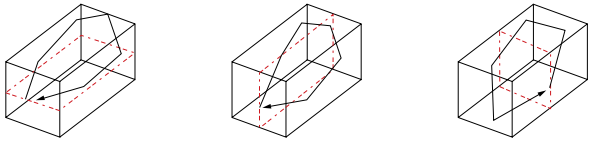

Fig. 68: Room modes: Radial modes

Standing waves are characterized by having a maximum sound pressure at the boundaries of the room. Depending on the frequency there are one or more dips across the room.

In a box-shaped room, the frequencies can be calculated as follows:

$$f = \frac{c}{2}\sqrt{\left(\frac{n_l}{l}\right)+\left(\frac{n_b}{w}\right)+\left(\frac{n_h}{h}\right)}$$

where

- f = frequency in Hz
- c = speed of sound (approx. 340 m/s or 1130 ft/s)
- l = length of the room
- w = width of the room
- h = height of the room
- n = integer from 0 and up

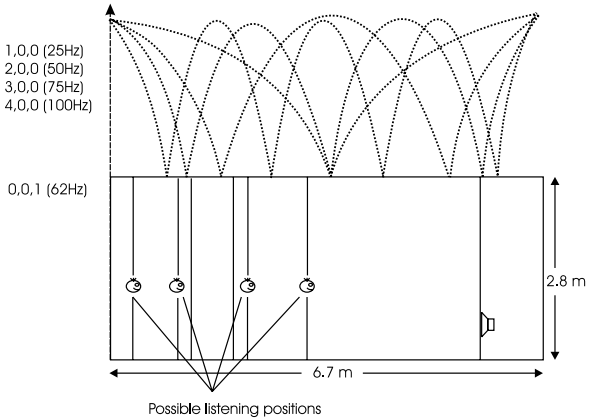

Fig. 69: Maxima of standing waves

The curves shown here express the area of the room where the respective frequency is audible. At the minima, that frequency's level is much lower (sometimes -40 dB compared to the maximum).

If the room's length, width and even height are identical, obtaining an even sound distribution can be very hard.

Prohibiting standing waves
Parallel walls in the room should be prevented. This will suppress the strongest modes.

When placing monitors, it is important that as few modes as possible are excited. This is why no monitor should be placed at the maximum of a standing wave.

When monitors are built into walls, you should therefore make sure that the opposite wall is not parallel to the wall with the monitor.

At low frequencies, a monitor can be considered as radiating its sound energy in all directions. This is also called a *4 π radiation*.

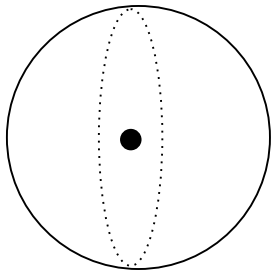

Fig. 70: 4 π radiation

When the monitor is placed close to a solid boundary (for instance a wall), the sound energy that should have been radiated in the direction of the wall is radiated into the free half space instead. Hence the sound pressure is *doubled* in the half space, which yields +6 dB. This is also called a *2 π radiation*.

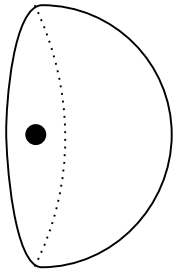

Fig. 71: 2 π radiation

When the monitor is placed against two boundaries (for instance in a corner limited by two walls), it is now radiating its energy to the quarter space. Accordingly, the sound pressure is doubled twice, which yields +12 dB. This is also called a *π radiation*.

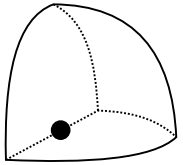

Fig. 72: π radiation

When the monitor is placed against three boundaries (for instance in a corner limited by the floor and two walls), the sound is radiated into 1/8 of the space. Compared to free space, the sound pressure now is increased by 18 dB. This is also called *π/2 radiation*.

In practice, placing a monitor close to boundaries will influence the frequency range below 125 to 150 Hz.

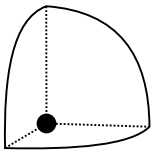

Fig. 73: π/2 radiation

Comb filtering

The filtering function that arises when a signal is added to itself after having been delayed in time is called a comb filter.

The resulting frequency response resembles a comb, hence the name.

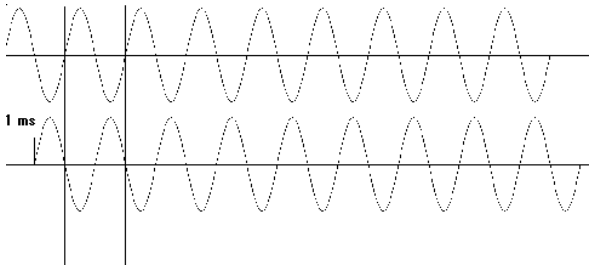

Fig. 74: Two 500 Hz sinusoidal tones added. The second tone is delayed 1 millisecond, hence the sum is zero.

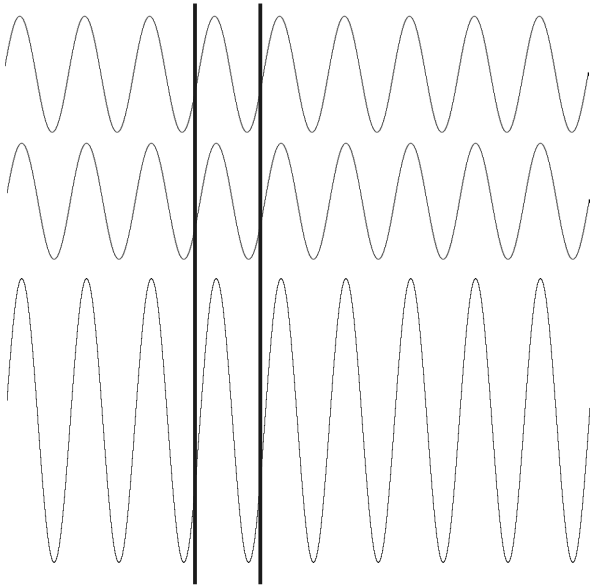

Fig. 75: Two 1 kHz sinusoidal tones added. The summed level is doubled (+6 dB).

The comb filter function is almost never intentional – but it is heard all the time in audio productions, where it can arise both for acoustical and electrical reasons.

Acoustically, comb filter effects typically occur when part of the sound travels from source to recipient both on a direct path and via a single reflective surface. This reflection must be attenuated at least 10 dB and preferably 15 dB in order for it not to have an effect on the sound field at the recipient's position. Electrically, the phenomenon arises when two microphones with a certain distance between them capture the same signal and the level from each microphone is of the same order of magnitude.

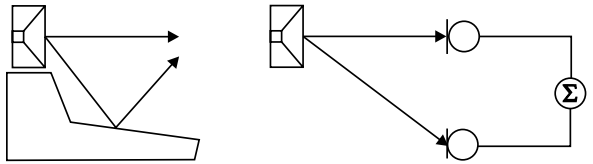

Fig. 76: Two typical situations in which comb filtering occurs, either acoustically or electrically

Generally speaking, all digital signal processing takes time. This means in practice that comb filter effects can arise if you send a signal through a signal processor and combine the processed (and hence delayed) signal with the original.

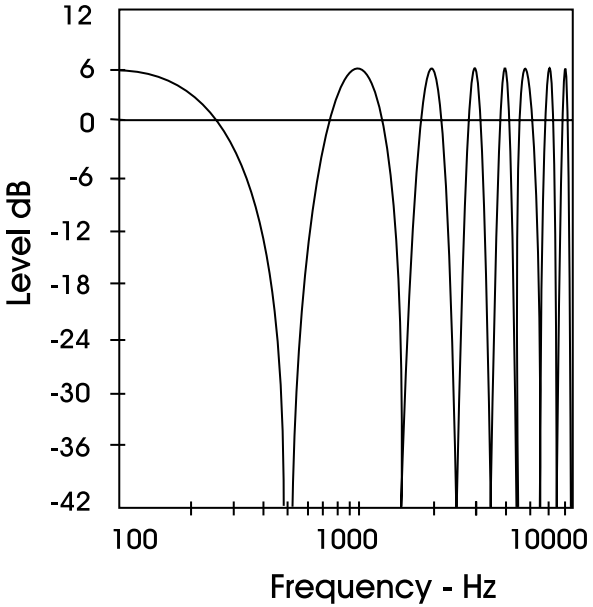

Fig. 77: An example of a comb filter effect created by combining two signals with the same amplitude and a one millisecond delay between them. Dips occur due to cancellation at 500 Hz, 1.5 kHz, 2.5 kHz etc., and the two signals' levels double (+6 dB) at low frequencies with a full wavelength's delay at 1 kHz, 2 kHz, 3 kHz etc.

Dip frequencies

Cancellation occurs for a comb filter at all the frequencies where the two signals are in opposite phase. This occurs when the time delay comprises duration of 0.5, 1.5, 2.5 etc. periods. At 1 kHz, the period is 1 millisecond. Half of the period is 0.5 milliseconds.

If a time delay of precisely 0.5 millisecond occurs, this will result in cancellation not only at 1 kHz, but also at 2 kHz, 3 kHz, 4 kHz etc.

Rear wall cancellation

When the monitor is set up at some distance in front of a wall, reflections from the wall may occur and influence the perceived frequency response. This could result in comb filtering if *all* frequencies produced by the monitor were radiated in all directions. But monitors are typically only omnidirectional at *low* frequencies.

The result of the reflection is a single or a few dips in the frequency response perceived in front of the monitor.

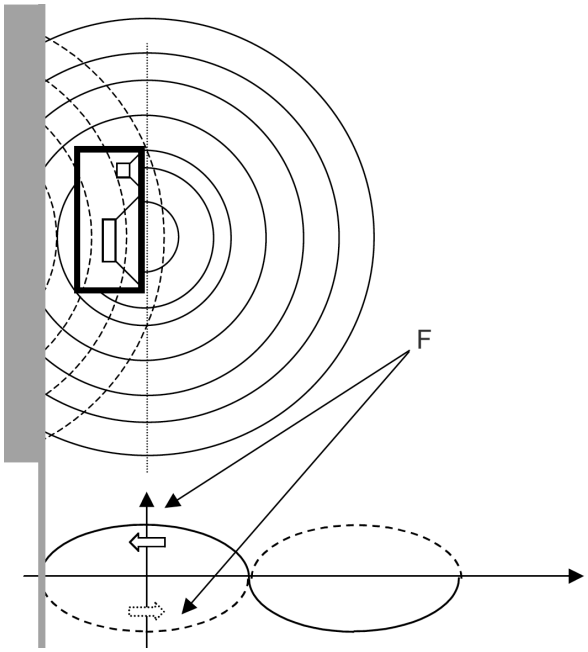

Fig. 78: A frequency (F) that has a wavelength of four times the distance to the rear wall is canceled because of the oppositely phased reflection.

The dip – or cancellation frequency – depends on the distance to the wall. If the distance is 1 meter, the first dip frequency will occur at a frequency with a wavelength of 4 meters.

$$l = c / f$$

where

- l = wavelength [meters or feet)
- c = speed of sound (meters/second or feet/second)
- f = frequency [Hz]

Hence

- 4 = 344 / f
- f = 86 Hz

A closer position will result in a cancellation at a higher frequency. This is then limited by the frequency where the monitor becomes directional and does rot radiate sound to the rear.

A farther position will result in cancellation at a lower frequency. This is limited by the distance being so long, that the reflected sound is attenuated due to the long extra path travel.

Subwoofers

A subwoofer is a monitor that reproduces low frequencies. The purpose is to take over from the main monitor(s) as frequencies approach the lower end of the frequency range – approximately below 120 Hz. For professional monitor systems, it is commonly preferred to use subwoofers below approximately 80 Hz – but of course, the best solution depends on the performance of the main monitors.

The low frequency contents of just one or all the main channels can be directed to one subwoofer.

Psychoacoustics tells us that there is no directional information in audio signals below approximately 120 Hz. Accordingly, a subwoofer should be placed in a position where the best distribution is achieved. However, it is very important to reduce subwoofer distortion to an absolute minimum, because distortion will add harmonics (2, 3, 4 etc. times the frequency reproduced). Especially the third harmonic may dominate the signal. Reproducing a frequency of 100 Hz can result in the generation of an audible frequency component at 300 Hz, which presents directional information to the human hearing system.

Bass management

Bass management is a very important and useful tool – and it is in general an absolute necessity if you want to work with a five channel setup in a small room. The bass management system is designed to subtract the bass contents from all main channels and reproduce it using a subwoofer. The AIR series provides a number of possible crossover frequencies that can be selected by the user.

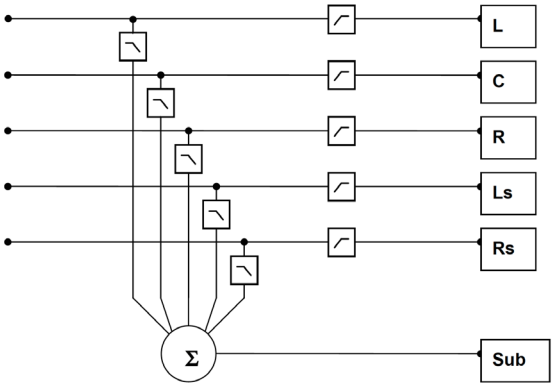

Fig. 79: Basic bass management setup

Checking summing phase cancellation

In a basic two channel setup or a five channel setup (such as ITU-775), a subwoofer is not specified and is not required. But when creating audio that should be played back using consumer equipment, one has to ensure that the mix will sound right in this situation. Many consumer setups today contain a subwoofer. Accordingly, it is very important to check what bass summing will sound like. If the program material basically is out of phase, the bass will be canceled when summed electrically. But this is not the case if the bass signals are reproduced by the main monitors and summed acoustically. The difference can be dramatic!

Controlling standing waves

It can already be difficult to position two monitors correctly in order to prevent the excitation of the standing waves. But placing five monitors is even more difficult.

In theory, each monitor should play under the same conditions – but this is rarely the case.

Three front monitors can normally be placed away from disturbing boundaries to prohibit the excitation of the standing waves. But in small rooms, the rear monitors are very often placed in corners or on a wall. Having the full frequency range reproduced from such monitors may lead to serious problems, resulting in poor low frequency distribution in the room. This is another reason for using bass management.

Simply put: When working with bass management, only one monitor – the subwoofer – has to be placed in a “safe” position. The crossover frequency can be set to a value just above the problematic frequency range.

The LFE Channel

LFE is an abbreviation for “Low Frequency Enhancement” or “Low Frequency Effects”. While the first is the original name, the second is more correct with regards to its main applications.

LFE is also referred to as the “.1 channel”, which indicates that the frequency range of this channel is only a fraction of the other channels in a multi channel setup. The actual frequency range is 20 Hz to 120 Hz. When reproduced, the signal is gained by 10 dB compared to the main channels. This provides a possibility of reproducing occasional high-level low frequency contents without affecting the general level setting of the main channels.

Signals being sent to the LFE channel should always be evaluated carefully, as not all transmission or reproduction systems may include this channel. In music production and mixing, there is usually no need for using this channel *(unless you are recording the 1812 Overture with all these cannons shots…)*.

Delaying monitors

ITU 775

When using a 5.x setup with monitors arranged on a circle (as with ITU 775), the distance from the listener to each of the main monitors is the same.

If space is limited, the three front monitors can be arranged on a straight line instead of a circle. To compensate the center monitor being closer to the listener than the left and right monitor in this setup, the center signal can be delayed. To obtain coincident arrival of the sound from all front monitors, a delay between 0 and 3 milliseconds is used for compensation. The speed of sound is approximately 340 m/s or 1130 ft./s. Accordingly, approximately 1 millisecond delay will be used to virtually move the monitor 1 foot or 30 centimeters backwards.

Cinema setup

In a cinema setup, the front monitors are always arranged on a straight line. Here, the audience is closer to the surround monitor(s) than to the front monitors. In order to retain the directional information towards the screen, the surround monitors are delayed.

Normally the psychoacoustic Haas effect is taken into account. In the listening position, the sound from the surround monitors will arrive about 15 to 20 milliseconds after the sound from the front monitors. The delay times involved with cinema processing for the surround channel is dependent on the size of the mixing facility, the cinema, or the home theatre/living room. Proper setup requires calculating the difference in distance between the front monitors and the closest surround monitor. Then, the time difference is calculated. To this, 15 to 20 milliseconds are added.

Example: From a listening position, the distance to the front monitors is 20 meters and five meters to the surround monitors, so the difference is (20 - 5 =) 15 meters. The time difference that needs to be compensated is 15/340 sec, which equals 0,044 seconds or 44 milliseconds. To this value, 15 milliseconds are added. Accordingly, the surround signal has to be delayed 59 milliseconds (or the closest possible value).

Line-up and calibration

Acoustic summation of audio signals
When summing two sound sources (for example, two monitors), the resulting total sound level depends on both the signal and the acoustics. The sound sources can be correlated or uncorrelated. The listening position (or measurement position) can be either in the direct sound field or in the diffuse sound field.

In the *direct sound field,* there is only one sound direction. This direct field exists either in the open, in a reflection-free room or close to the monitors.

The *diffuse sound field* occurs in a room when you are so far away from the monitors that the portion of direct sound is less than the sum of all the reflections.

The distance from the monitors where the direct sound field and the diffuse sound field are equally large is called the *critical distance*. In a control room, it can typically be 1 to 3 meters. The near field in front of the monitors can be regarded as a direct field.

If all monitors are in phase, the sum of the sound pressure from two monitors playing at the same level is 3 dB – unless the signals are correlated (identical) and the sum is measured in the direct field. In this case, the resulting sound pressure level is 6 dB higher than the level of the individual monitors.

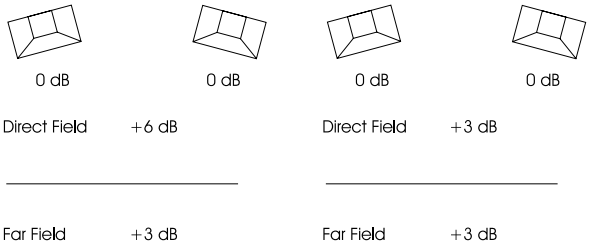

Fig. 80: Correlated (left) and uncorrelated (right) signals

Acoustic calibration of multi-channel systems
When working with sound for film, calibration of the acoustic sound levels has been a requirement for many years, but it has not been particularly common in other branches of the sound industry. However, with the widespread use of multi-channel formats for all forms of music and film presentation in the home, the benefits of controlling levels have become obvious in recent years.

It is important to differentiate between production for the cinema and production for 5.1 channel reproduction in the home based upon ITU 775.

Calibration of 5.1 in an ITU-775 arrangement
In a 5.1 system based on the ITU arrangement, all main channels are operated under the same conditions: There is one monitor per channel, and each monitor is placed at the same distance from the listener. However, there is no international agreement on the level or the bandwidth of the noise signals that should be used for acoustic calibration. Pink noise is a good starting point, as it includes all frequencies. However, it is impractical due to its “unsettled” character, which makes it difficult to measure at low frequencies.

Surround Sound Forum

Surround Sound Forum is a German interest group composed of the VDT (Verband Deutscher Tonmeister; Association of German Sound Engineers), the *Institut für Rundfunktechnik* (IRT) and the *Schule für Rundfunktechnik* (SRT). The SSF has prepared calibration guidelines, which are generally accepted in Europe. They specify three test signal, which are recorded at -18 dBFS (RMS).

Signal (only in one channel)	PPM level t < 0,1 ms	PPM level t < 10 ms	RMS level	Sound pressure level SLOW	Sound pressure level SLOW
	[dB]	[dB]	[dB]	[dB]	[dB(A)]
1 kHz sine	-18	-18	-18		
Pink noise 20 Hz to 20 kHz	-9	-13	-18	82	78
Pink noise 200 Hz to 20 kHz	-11	-15	-20	80	78

SMPTE

The corresponding SMPTE standard (RP155) uses a standard of -20 dBFS for the reference level. Here, the C-weighted sound pressure level of a 500 to 2 kHz noise signal ends up at 83 dB.

Calibration of cinema systems

In a cinema, the listeners are sitting far from the monitors. Presumably, the majority sits in the diffuse sound field. Attempts are made to establish a diffuse sound field from the surround monitors. Accordingly, when the sound pressure is measured inside the cinema or in a mixing theatre, it must be averaged over many different measurement locations. The typical basis for the majority of the standards is measuring at four or more locations. If there are different areas for the audience (for example main floor and balcony), measurements should be made in at least four locations in each area. Before these measurements can be made, the system's frequency response must also be in order.

Measuring sound pressure

Using a sound level meter or microphone

If you are used to performing acoustic measurements, you probably already own a **sound level meter**. A sound level meter can be used for the level calibration of the monitors.

If you do *not* have a sound level meter, there still is another possibility: Use an **omni-directional microphone** (this is also called a *pressure microphone)*. A studio condenser microphone is normally preferred, but the microphone must not be too big. A simple clip microphone can be used, as it does not influence the sound field. In any case, the microphone should have a flat frequency response.

- Place the microphone on a stand positioned at the listening seat. Leave the microphone pointing *upwards* to avoid sound pressure build-up in front of the diaphragm and to provide equal conditions for monitors in all directions.
- Connect the microphone to a mixing desk or a recording machine that has a meter built in.
- Play back a track containing pink noise from the Dynaudio Professional AIR monitors test signal collection, or use one of the other tracks that you have used for monitor setup and calibration.
- Adjust the gain on the microphone channel until the meter deflection reaches a point *10 dB below full scale*. This is now your reference for following measurements.
  Make sure that you have marks on the scale that makes it possible to read steps of 1 or 2 dB on either side of the reference deflection.
  If 10 dB below full scale is not an adequate point on your meter, you may choose another one – just be sure to have a reading on a adequate resolution.

If you use this microphone setup as described, it can be used for comparing levels between individual monitors.

Absolute sound pressure levels can be measured if you…

1. are using a well-calibrated microphone channel and
2. know the sensitivity of the microphone.

Links

Support resources

There is a large knowledge base and forum for you to use. Please make sure to search for your particular issue there before submitting a support ticket. It's likely that someone has already addressed the question and posted an answer.

- Dynaudio Professional support: dynaudioprofessional.com/support/
- Dynaudio Professional warranty information: dynaudioprofessional.com/en/pages/warranty
- Dynaudio Professional AIR: dynaudioprofessional.com/air-series/
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