

DCN28

Stereo Digital Pre-Amplifier / Digital Crossover

User Manual



True Performance Audio Product for High End Listening

Warranty

DCN28 is warranted against defects in components and workmanship for a period of two years from the date of purchase. During the warranty period, Ground Sound will, at its discretion, either repair or replace the product which prove to be defective, provided that the product is returned, shipping prepaid, to an authorised Ground Sound dealer or to the Ground Sound address. Defects caused by unauthorised modifications, misuse, negligence, nature or accident, or any use of this product that is not in accordance with the instructions provided by Ground Sound, are not covered by this warranty. This warranty is exclusive and no other warranty is expressed or implied. Ground Sound is not liable for consequential damages from the use of DCN28 and the supplied software, XOverWizard II advanced.

Safety

To prevent the risk fire or shock hazard, do not expose the unit to rain or excessive moisture.

To avoid electrical shock do not open the unit as there are no user-serviceable parts inside.

To prevent damage to the unit do not expose the unit to excessive heat.

To prevent damage to the unit ensure that the AC mains outlet voltage is within the specified range of the purchased unit. If the unit is connected to wrong type of AC mains, it may result in damage to the unit.

Always turn DCN28 and associated equipment off before connecting or disconnecting any cable to the equipment as you may unwillingly damage either DCN28 or the associated equipment.

Equipment connected in the audio system requiring grounding must be grounded to the same ground point as DCN28.

Unplug this product during lightning storms or when unused for long periods of time.

Failure to observe these warnings can result in damage to DCN28 or associated equipment and will not be covered by warranty.

Caution

Damage may be the result to your speaker drivers and other equipment if your audio system is connected incorrectly or if DCN28 is used incorrectly. Read this manual in full before configuring the hardware and review driver specifications to ensure correct operating conditions and other relevant information of associated equipment. If you are in any doubt please seek assistance from Ground Sound dealer/distributor or contact Ground Sound direct - active@groundsound.com

Cleaning the front

If the front panel needs to be cleaned use a soft cloth – if necessary use a very small amount of lukewarm water and a drop of mild, non abrasive detergent – like dish wash detergent.

DO NOT USE ANY ketones, aromatics, esters, halogens, window cleaning sprays, alcohol, kitchen scouring compounds, solvents (acetone, benzene, gasoline, carbon tetrachloride, thinners) or ammonia based cleaning solutions on the LED display window - it will be damaged !

Unpack

Congratulation with your new true performance Digital Crossover / Preamplifier unit and thank you for buying this Ground Sound product.

Please check visually for shipping damage. In the event of any visual damage immediately contact shipping company and sales office at Ground Sound dealer/distributor or Ground Sound.

What's in the package?

1 unit DCN28 Digital Crossover / Preamplifier

1 USB dongle-key with Lanyard for XOverWizard II **advanced** software

1 unit Philips SRT8215 pre-programmed IR remote control

1 USB-A male / USB-B male cable 5m

Installation

The installation depends upon the final setup and it's highly recommended to plan this carefully after reading the whole manual. For convenience a "Planning of my system" sheet is included in this manual, simply print the "Planning of my system" page and plan the hardware connections before any programming is done (page 9). DCN28 comes with a factory setup with full-range output from A to output 1-4 and B to output 5-8.

Don't test the system full-range at too high volumes on unfiltered tweeters – you will likely damage the tweeter! If you want to test the system before running any measurements – it's recommended to make a simple crossover setup in the XOverWizard II with the approximately expected crossover points and slopes.

Important note: It's also very important to turn off system sound on the PC/laptop or make sure that the system sounds is played on other sound card than the one used for measurements (eg laptop internal speakers plays system sounds and USB sound card for measurements). If this is ignored, you might risk burning a tweeter because of the low frequency content of the system sounds!

Installation of USB driver

The USB-interface for programming setups is actually an onboard USB to COM Port (RS-232) adaptor and the circuit is made by <http://www.ftdichip.com/>. The driver will either be installed automatically by the Windows OS (eg Windows 7) or you will have to do it via the installation wizard of the OS.

If the driver isn't installed automatically when the DCN28 unit is connected to the PC with the supplied cable you will have to download the driver here <http://www.groundsound.com/CDM 2.04.16 WHQL Certified.zip> (Windows OS) or at the manufactures web page. It's recommended that you place the driver file on the desktop; so it's easy to find and to point out to the installation wizard. Remember to unzip the file onto the desktop before starting the installation guide. If you have troubles installing the driver then you can find more information at <http://www.groundsound.com/faq.php> and if this isn't helping enough contact Ground Sound active@groundsound.com.

Note that the Windows OS automatically assigns a COM port number to the specific FTDI chip. If this number is 10 or more you have to reassign this number to a number in the range 1-9. Again see more on the FAQ page.

Installation of the XOverWizard II advanced

To measure your loudspeaker system and setup the DCN28, you need the XOverWizard II advanced software. You can download the XOverWizard II advanced software here:

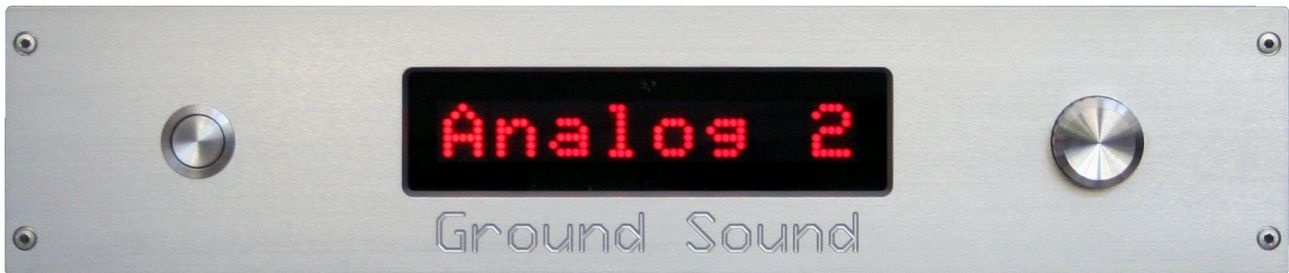
<http://www.groundsound.com/technical.php> or <http://www.groundsound.com/download.php>

The software will only run when the supplied USB dongle-key is inserted in the PC/laptop.

Note that the software will automatically shut down 3 minutes after the dongle-key has been removed –so always remember to save measurements and setups before removing the dongle-key!

For information of how to use the XOverWizard II advanced software please look in the help file of the software.

Front Panel



The front panel on DCN28 is designed so that you have a clear view of selections and values and a simple operation on a daily basis. On the front you find the power ON/OFF button. The easy readable dot-matrix display is in center and to the right you find the encoder button, which controls the menu selection and changing of values by pushing and turning the button.

At power ON you will get this welcome sequence:



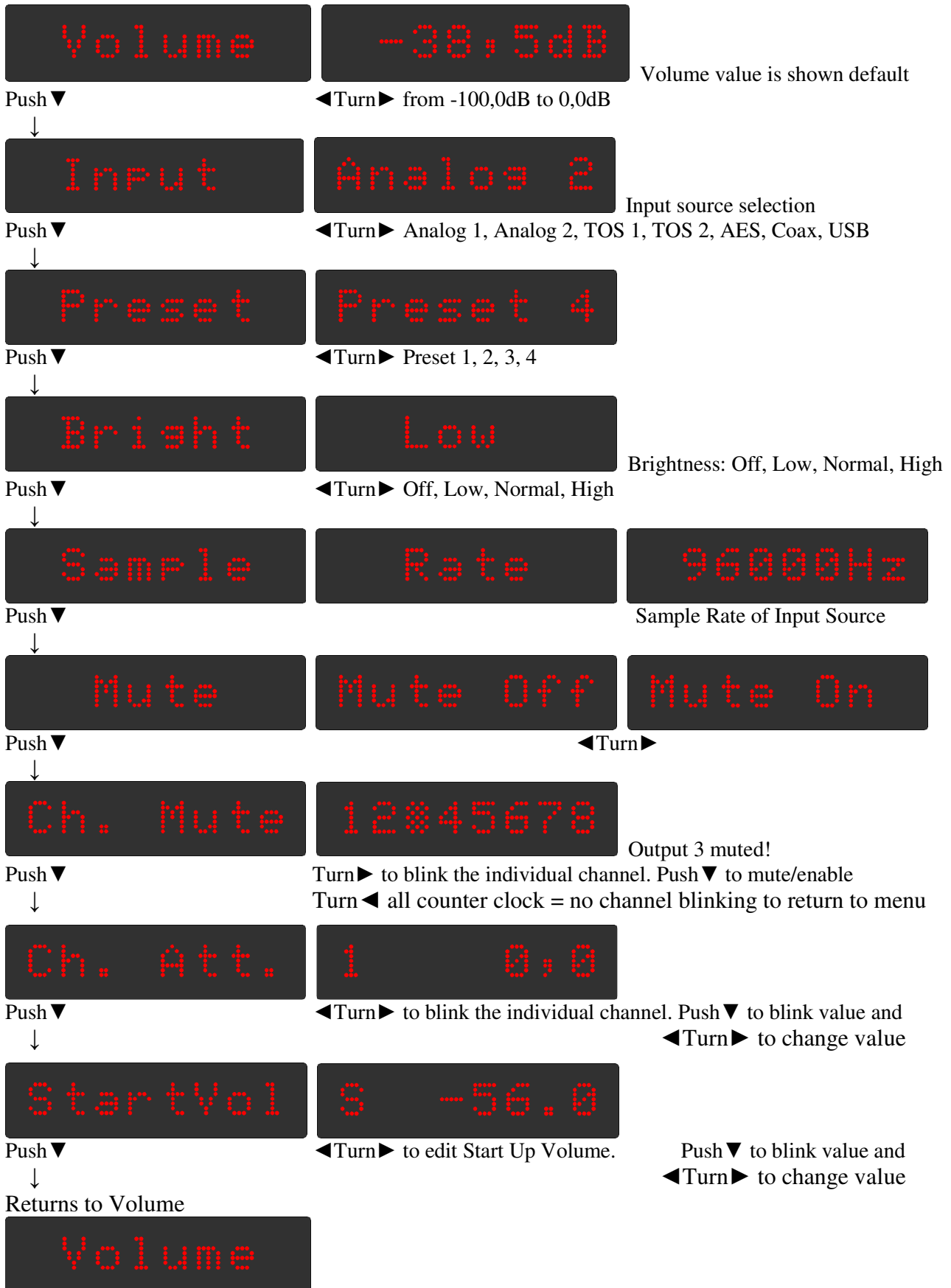
The small LED in the display will flash for about 2 seconds before the welcome text comes:



DCN28 has a **standby mode** and you can go into standby mode by pressing the encoder button for about 1 second or via the IR remote control. To turn on from standby mode you also have to **press the encoder** button for about **1 second** or select an input source via the remote control. In standby mode all remotely switched power amplifiers are also switched off. At power on from standby mode or from OFF the remotely switched power amplifiers are turned on sequentially with a interval of about 1,5 seconds to prevent house fuse from blowing / tripping.

Menu of Encoder Button

The encoder button on the front panel controls all functions of the DCN28 by pushing and turning the button. The display will show the volume of the output when there are no activities. The display will return to volume from other menu displays after 3 seconds without any activity.



Philips SRT 8215 IR Remote

LCD Screen

Page 1:

Analog 1	Analog 2
TOS 1	TOS 2
AES	Coax

Page 2:

USB	Sample Rate
Preset 1	Preset 2
Preset 3	Preset 4

Page 3:

Brightness Up
Brightness Down

Volume Up/Down →



← Standby

To change LCD screen page



← Input source toggle Up/Down

← Info displays input and preset on DCN28

← Mute On/Off (X over speaker symbol)

Optional remotes

You can find DCN28 IR codes for Logitech Harmony universal remotes in their on-line data base.

Back Panel



Clip

Clip LEDs will flash in the event that the analogue input is overloaded and you have to lower the output of the analogue source to avoid digital clip. The sensitivity is optimized for normal outputs of 2V_{rms} and therefore there is normally no need to do anything.

Input 1 & Input 2

The analogue input connectors are true balanced Neutrik XLR and according to standard – pin1 GND, pin2 non-inverted and pin3 inverted. If a singled ended source with RCA is used, you have to use an adapter or an adapter cable which shorts pin3 to pin1, GND. Optional a resistor of 100Ω can be used instead of the short. See Ground Sound web FAQ for more info: <http://www.groundsound.com/faq.php>

TOS 1 & TOS 2

Digital optical input with standard TOS-link connector. Maximum sample rate for optical sources is 96kHz.

AES/EBU

Digital balanced input with XLR connector. The input is transformer coupled and loaded with 110Ω.

S/PDIF

Digital S/PDIF input with RCA connector. The input is transformer coupled and loaded with 75Ω.

Audio USB

Direct digital audio streaming from PC/MAC. Non driver installation is needed. Max. 48kHz / 16 bit.

Programming USB

Connection for programming of setups. Driver is required - see previous chapter how.

All tree LEDs will flash when programming is in progress.

If there is no valid program stored or it is corrupted, the upper LED will be lit constantly.

Outputs 1-8

Analogue outputs with male Neutrik XLR connectors and according to standard – pin1 GND, pin2 non-inverted and pin3 inverted. If the connected power amplifier only has singled ended RCA input you will have to use an adapter or better an adapter cable. **IMPORTANT NOTE:** make sure that the inverted output (pin3) is NOT shorted to GND (pin1). You might damage the output buffer in DCN28. For clarification: It is **not** necessary to terminate the inverter (pin3) output with any load – this is an output and there is no reason to load it when not used neither short it

Amp Trig

Remote 12Vdc output for switching power amplifiers with trigger input. Maximum 100mA per output.

Connector is 2,5mm DC-plug with positive in center and negative on sleeve – ordinary thin wire can be used.

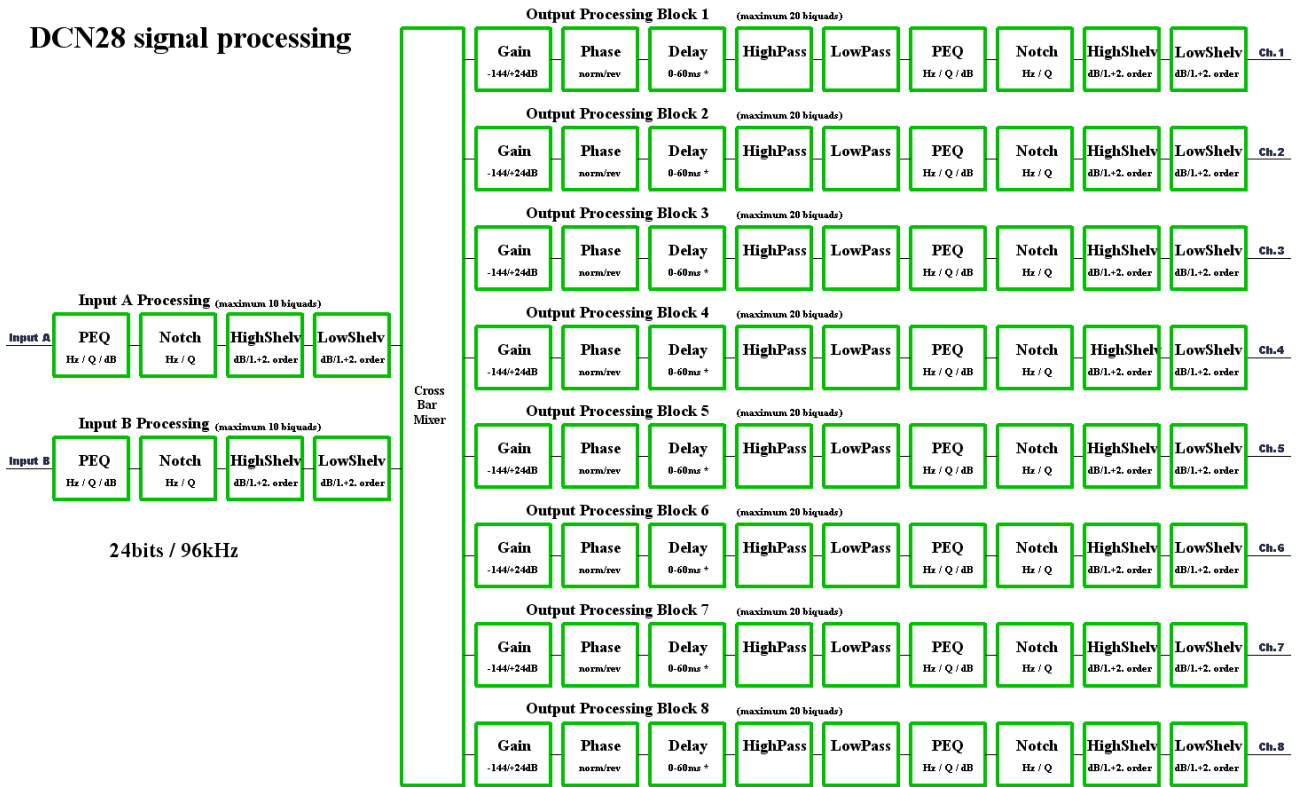
Serial

Here is the unit's serial number. Be alert and contact Ground Sound if this is removed when buying second hand.

Mains

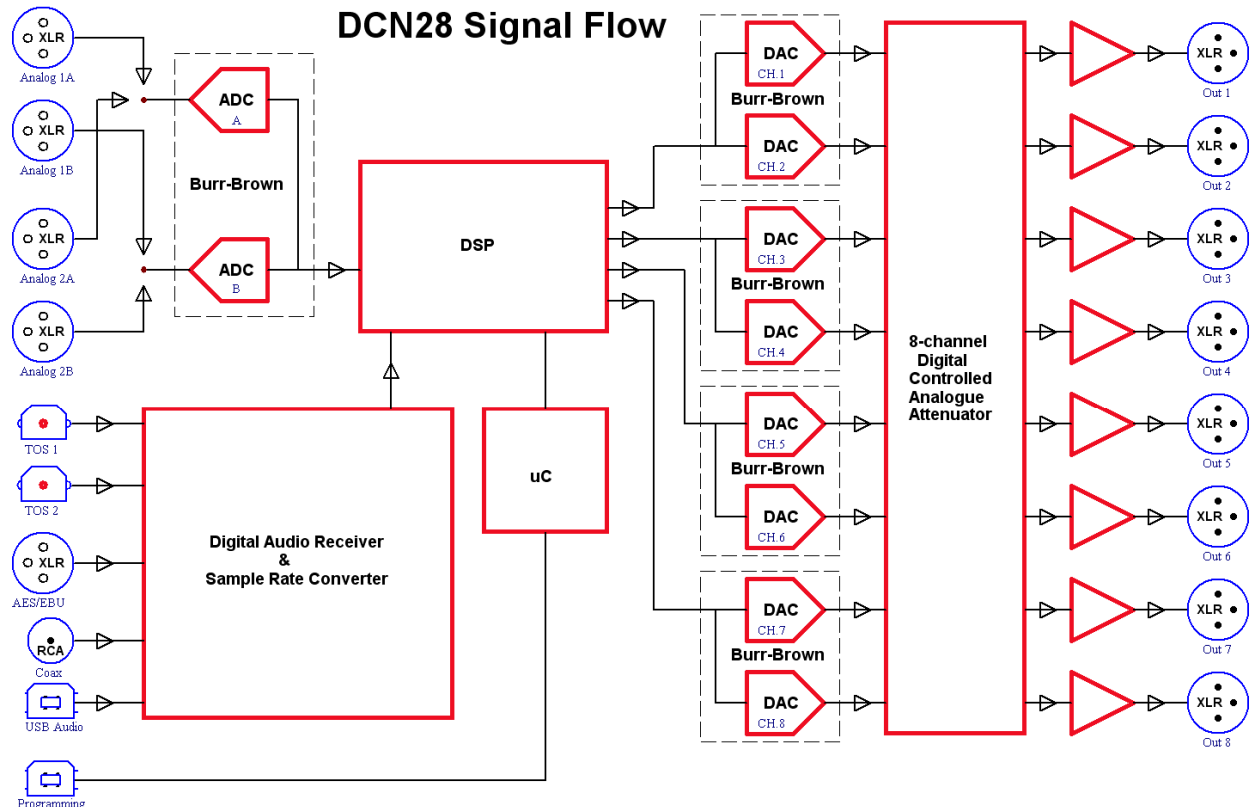
IEC Mains power inlet 230Vac – 50/60Hz. Mains ground pin is connected to chassis.

Processing Blocks in DSP



This is an overview of how the processing is setup in the DSP of DCN28. You will be more familiar with the possibilities of the DSP when you begin using the XOverWizard setup software.

Hardware Block Diagram



A simplified overview of the internal signal flow through DCN28

Planning of my active system:

Channel / - Tweeter

Model: _____
 Impedance: _____
 Sensitivity: _____
 Max. Power: _____
 Frequency Range: _____
 Note: _____

Tweeter Amplifier

Model: _____
 Class/Type: _____
 Output Power @ 8Ω: _____
 Output Power @ 4Ω: _____
 Minimum Load Impedance: _____
 Note: _____

Channel / - Mid-range

Model: _____
 Impedance: _____
 Sensitivity: _____
 Max. Power: _____
 Frequency Range: _____
 Note: _____

Mid-range Amplifier

Model: _____
 Class/Type: _____
 Output Power @ 8Ω: _____
 Output Power @ 4Ω: _____
 Minimum Load Impedance: _____
 Note: _____

Channel / - Bass

Model: _____
 Impedance: _____
 Sensitivity: _____
 Max. Power: _____
 Frequency Range: _____
 Note: _____

Bass Amplifier

Model: _____
 Class/Type: _____
 Output Power @ 8Ω: _____
 Output Power @ 4Ω: _____
 Minimum Load Impedance: _____
 Note: _____

Channel / - Sub Woofer

Model: _____
 Impedance: _____
 Sensitivity: _____
 Max. Power: _____
 Frequency Range: _____
 Note: _____

Sub Woofer Amplifier

Model: _____
 Class/Type: _____
 Output Power @ 8Ω: _____
 Output Power @ 4Ω: _____
 Minimum Load Impedance: _____
 Note: _____

Other notes about / drawing of my system:

Initial setup

After all connections have been done it's recommended to make a simple test setup in the XOverWizard II software and upload it to DCN28 to see if all drivers, amplifiers and DCN28 do as supposed to. Example: If your system is 3-way stereo fully active you probably have 3 stereo power amplifiers connected with one amplifier to a pair of dome tweeters, one to a pair of 6,5" mid-ranges and finally one to a pair of 10" basses. Then make and upload a setup with crossings at 2,5kHz and 150Hz. Check at low volume that the tweeter in each side really plays the high frequencies, that the mid plays the band-pass range and finally the bass plays the lowest frequencies. Also check that each range is in phase by listening from a center position and that the sound seems as it's coming from between the loudspeakers with adequate bass level. Now that you know that everything is working correctly, you can proceed to make the real setup with measurements etc. in the XOverWizard software.

Hint: When you have measured the system and made the real setup and if you have ended up with very different gains of the output channels. Example the tweeter has -10dB, mid -6dB and bass is 0dB gain you could make this adjustment in the Channel Attenuation on the DCN28 – see under Menu of encoder further up. You will get the absolute best resolution this way.

Power Off & Standby mode

At power off or standby mode the input source will be stored and used at power on – so you will resume with the same source except when you turn on from stand by via remote.

Remember to enjoy the music !

This is why you have invested the time and money in this advanced sound system!

Note that you will normally play a bit louder than you think you are doing because of the clear and undistorted sound from your new active system.

Thanks

Robert GS

DCN28 Specifications

Audio Performance

24-bit Resolution

96 kHz Sample Rate

Signal to Noise Ratio better than 115 dB

THD less than 0,01%

Maximum input voltage (balanced) 2Vrms (optional 4Vrms internally configured)

Input impedance (balanced) 10k Ω

Input connectors Neutrik gold XLR 3-pol female (pin2 hot, pin3 cold, pin1 GND)

Maximum output voltage (balanced) 6Vrms

Output impedance (balanced) 200 Ω

Output connectors Neutrik gold XLR 3-pol male (pin2 hot, pin3 cold, pin1 GND)

Digital Audio Interface

Accepts PCM data format only

Supports Sample Rates up to 216kHz

Supports Data Resolution up to 24 bits

THD + Noise less than 0,003%

Dynamic Range 140 dB typical

Transformer coupled coaxial input - RCA connector

Coaxial input load impedance 75 Ω

Transformer coupled AES/EBU inputs – Neutrik gold XLR 3-pol female connector

AES/EBU input load impedance 110 Ω

Optical TOS-link input

Standard type Toshiba connector

Soundcard input

Supports sample rate 32kHz; 44,1kHz and 48kHz

Supports 16 bits data word

Standard driver - No driver installation is needed

Fully isolated from the rest of the units electronics with Analog Device coupler

USB-B male connector

DSP internal

IIR processing

76 bit internal resolution

96kHz sample rate

Configured with 2 input processing blocks of 10 biquads each

Configured with 8 output processing blocks of 20 biquads each

Latency input- output approximately 1ms

USB programming interface

Requires FTDI driver www.ftdi.com

Fully isolated from PC

USB-B male connector

Power amplifier triggers

4 pcs 12V DC trigger outputs max. 100mA 2,5mm DC plug (+ tip / - ring)

Mains

230 VAC \pm 8%, 30 Watts maximum

3-pin IEC type C14, 2 internal fuses 315mA T & 100mA F , 5 \times 20 mm

Dimensions and Weight

100 \times 430 \times 290 mm

Netto weight: 5kg – Total shipping weight: 7kg

Remarks and Revision history

Ground Sound reserves the rights to make alterations without prior notice.

Revision A: 2010-07-07	
Revision B: 2011-01-26	Minor text edit
Revision C: 2011-03-02	Start Up Volume in Encoder menu & new Remote SRT8215
Revision D: 2012-10-17	Minor text edit
Revision E: 2014-10-18	Minor text edit