Accuphase

DIGITAL VOICING EQUALIZER

DG-48

● Fully digital signal processing Voicing Equalizer ● High-speed 40-bit floating point DSP devices ● Separate digital filters for Voicing and Equalizer sections ● Wide-format color LCD panel allows direct writing of response curve with stylus pen ● Freely programmable 20 pattern memory ● Real-time spectrum analyzer for music signal and microphone input ● Analog and digital inputs/outputs provided as standard

Create your ideal listening environment with a stroke of the pen – High-speed DSP chips and super advanced digital technology in this third-generation Digital Voicing Equalizer make your dream a reality. Offering both sound field compensation (Voicing) and sound field creation (Equalizer) functions, the DG-48 lets you use a stylus pen to directly draw the desired response curve on its large, wide-format color display panel. Even complex operations can be accomplished quickly and easily. The standard configuration includes both analog and digital inputs and outputs.

The DG-48 is a third-generation Digital Voicing Equalizer featuring extremely sophisticated digital signal processing technology developed by Accuphase. In 1997, Accuphase introduced the first such component, the DG-28, which revolutionized the concept of the graphic equalizer and made headlines in the audio world. This was followed by the DG-38, a further refined product that offered automatic sound field measurement and compensation. It was celebrated as an essential addition to a truly high-quality audio system and made serious music lovers realize again the importance of the sound field.

When wishing to reproduce superb program sources with optimum fidelity, the characteristics of the entire reproduction chain, including the speakers as well as the listening room itself, have to be taken into consideration, and the capability for providing adequate compensation is essential. The DG-48 meets this requirement with a two-fold approach, by enabling both sound field compensation (Voicing) and sound field creation (Equalizer). This is accomplished using the latest 40-bit floating point high-speed DSP technology, making it possible to handle all sources including SA-CD entirely in the digital domain. But power does not have to mean complexity when using the product. The newly added Simple Voicing course makes automatic sound field measurement and adjustment a breeze, while the Custom Voicing Course provides the user with extensive control over every aspect. A full complement of balanced and unbalanced analog inputs and outputs as well as digital inputs and outputs including HS-Link connectors ensure that the DG-48 will fit perfectly into any system configuration.

The high-precision wide-format color display on the front panel makes using the supplied stylus pen a pure joy, enabling the user to create any desired response simply by drawing on the screen. Commanding this much power and flexibility has never been so easy.
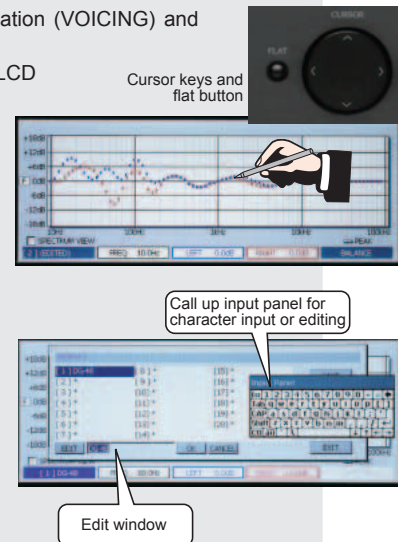
What is a "Voicing Equalizer"?

This somewhat unusual term was chosen to symbolize the advanced capabilities of the DG-48. While this product is a full-fledged high-precision graphic equalizer in its own right, it also incorporates a sophisticated system for automatic sound field compensation.

It divides the audible frequency range into distinct bands (voices), and lets the user choose a target response curve that is then expressed (voiced) by the unit through a process of precise measurement and adjustment steps. The result is full control over frequency response characteristics at the listening position.
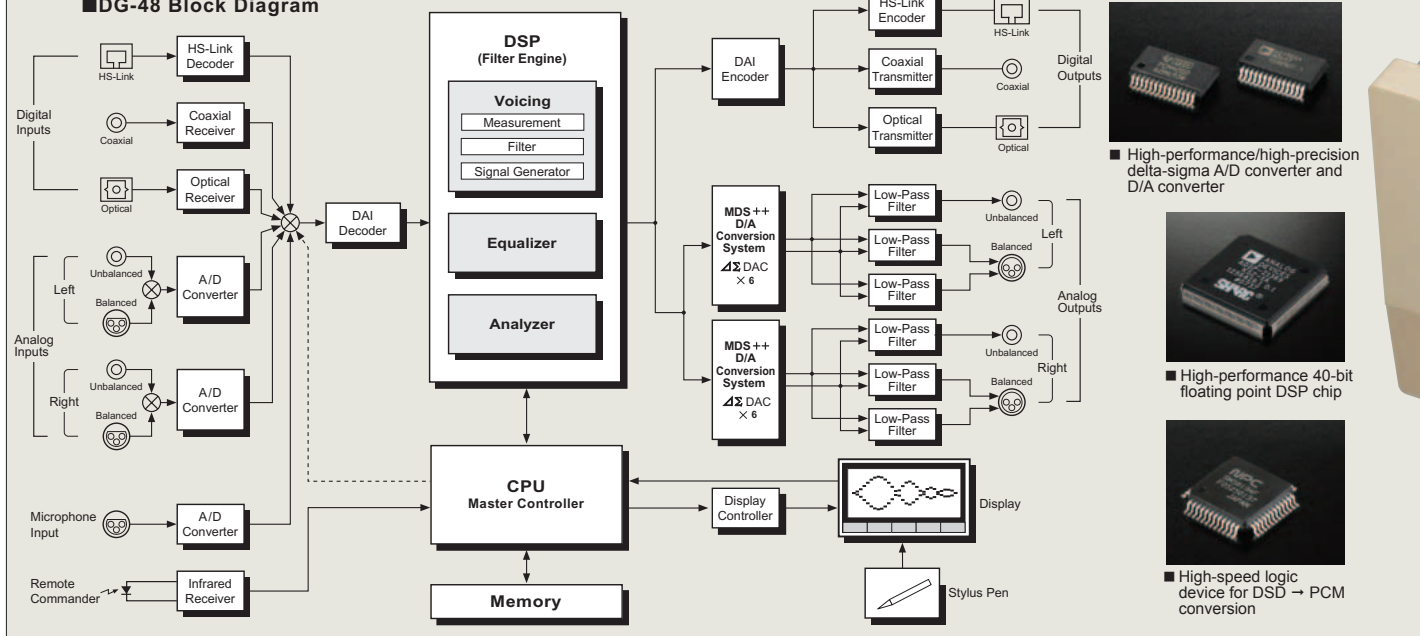
Through creative use of the capabilities offered by the DG-48, the scope of sound reproduction in the home environment can be significantly enhanced. Get ready to experience a new dimension of music enjoyment.

DG-48 Features

- Fully digital Voicing Equalizer with 40-bit floating point DSP and high-performance CPU/FPGA for digital signal processing
- Two equalizing modules for Sound Field Compensation (VOICING) and Sound Field Creation (EQUALIZER)
- Large, wide format (6.2 inches) high-resolution TFT LCD panel with fast refresh rate and excellent color reproduction characteristics

Cursor keys and flat button

- Glass touch panel and supplied stylus pen
  - Allows direct drawing of response curve on screen
  - Cursor keypad can be called up for pinpoint operation
  - Control functions by tapping or dragging symbols displayed on screen
- Sound field measurement microphone AM-48 included

Call up input panel for character input or editing

- 20 memory slots to store entire patterns including target curve, pre/post-compensation curve, equalizer curve etc. Data sets can be given a name and called up or modified at any time.
- Balanced and unbalanced analog inputs/outputs Digital inputs/outputs (HS-Link/Coaxial/Optical)

Edit window

- Side panels with elegant persimmons wood finish

■DG-48 Block Diagram

High-performance/high-precision delta-sigma A/D converter and D/A converter

High-performance 40-bit floating point DSP chip

High-speed logic device for DSD → PCM conversion

Sound Field Compensation (Voicing)

Because the DG-48 incorporates both measurement and adjustment functions, accurate sound field compensation can be carried out easily.
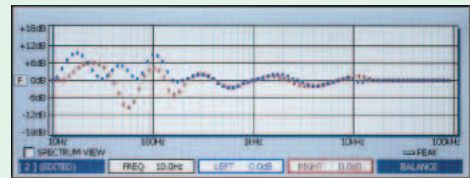
■SIMPLE VOICING

Simply set up the microphone and activate a button on screen to complete the procedure.

■CUSTOM VOICING

Gives the user detailed control over compensation mode and level, microphone setting, target curve, and other parameters, for even more accurate sound field compensation.

Sound Field Creation (Equalizer)

● Directly draw the desired response curve on the screen, using the stylus pen or the cursor keys.

● Call up saved data from previous Voicing operations and use these as a starting point for drawing a further modified curve, to create any desired sound field.

● Use the unit only as an equalizer without the Voicing function, to shape the sound according to your preferences.

The DG-48 has four main operation modes: "Voicing", "Equalizer", "Analyzer", and "Configuration".
Four buttons on the front panel are used to select the respective mode.

VOICING

EQUALIZER

CONFIGURATION
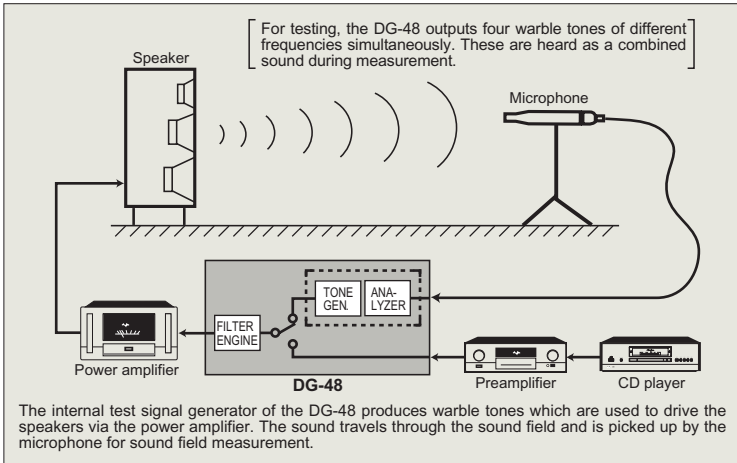
ANALYZER

Configuration

This screen lets you make environment and function settings, such as selecting the Voicing/Equalizer modes, controlling the sampling frequency and gain for the analog inputs, setting output levels and left/right balance, adjusting screen brightness, turning the display on and off, etc.

Frequency Analysis (Spectrum Analyzer)

After selecting either L&R or L/R, the content of the input signal can be displayed on a frequency spectrum screen with 1/3 octave spacing, in 35 bands, in real time. It is also possible to check total peak levels, compare the Voicing and Equalizer On/Off conditions, and display the frequency spectrum of the microphone input.

■ Supplied Remote Commander RC-300 Controls memory save and recall, input switching, channel switching, VC/EQ selection, cursor activation and more.

Advanced Measurement and Compensation Functions: VOICING

Using its built-in high-precision measurement facilities, the DG-48 accurately measures the sound field and determines adequate compensation to achieve the target response specified by the user. There is a choice of two operation modes: Simple Voicing for easy operation and Custom Voicing for comprehensive control over all aspects.

For testing, the DG-48 outputs four warble tones of different frequencies simultaneously. These are heard as a combined sound during measurement.

The internal test signal generator of the DG-48 produces warble tones which are used to drive the speakers via the power amplifier. The sound travels through the sound field and is picked up by the microphone for sound field measurement.

■ Supplied microphone AM-48
A dedicated sound field measurement microphone with controlled frequency response is supplied with the DG-48.
The microphone is a 1/4-inch type back-electret condenser type with an ultra-thin and extremely small diaphragm, assuring linear response over a wide frequency range.
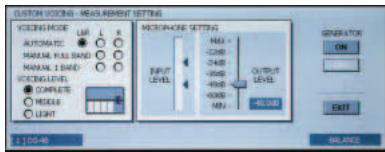
■ Setup screen for compensation mode and microphone parameters
The Voicing compensation mode (Auto/Manual) and compensation level and microphone level (measurement tone) are selected from this screen.

SIMPLE VOICING

Simply by setting the microphone level and following instructions appearing on the screen, the Voicing procedure can be carried out quickly and easily. The target curve is automatically set to flat response.

Simple Voicing section

Press ENTER

Start Simple Voicing.

Memory number indication
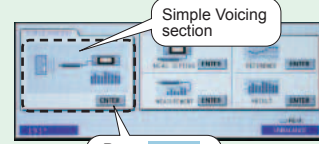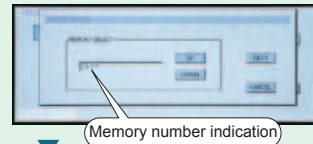
Use UP DOWN to select memory number for saving.

Level bar graph
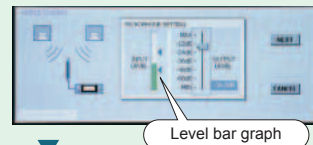
Set the level of the tone generator (measurement tone).

Start automatic measurement and compensation.

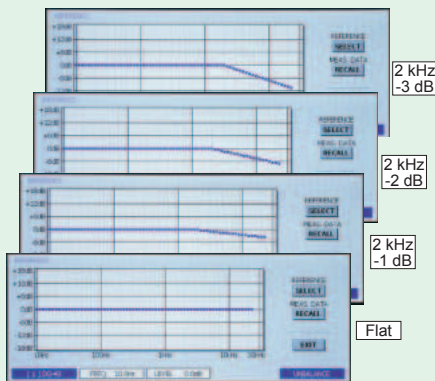Sweep left and right channels twice, with four simultaneous warble tones.

Compensation completed.

About 90 seconds after starting setup procedure

✱ With Simple Voicing, compensation data are stored automatically in the selected memory after completion.

CUSTOM VOICING

Ex.1 Using preprogrammed standard reference curve

2 kHz -3 dB

2 kHz -2 dB

2 kHz -1 dB

Flat

The DG-48 comes with four preprogrammed reference curves: three curves with a high-end rolloff above 2 kHz (-1 dB, -2 dB, -3 dB per octave) and flat response.

If flat response was selected for compensation

Ⓛ

Ⓡ
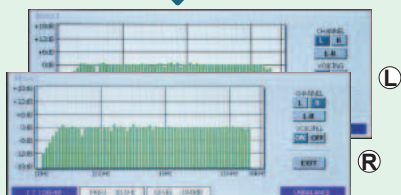
L/R channel characteristics example for performing sound field compensation with the "flat" target curve. Peaks and dips caused by listening room acoustics and speaker characteristics are evened out, resulting in approximately flat response.

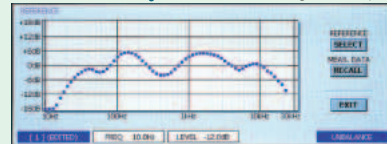**Ex.2 Compensation with automatically created target curve**
(Creating a curve that incorporates speaker and room characteristics)

Ⓛ

Ⓡ
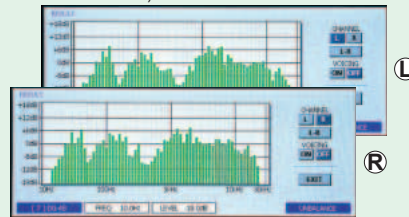
First, automatic measurement of characteristics before compensation is carried out.
● Speaker and room characteristics
(Separate measurement for L, R or simultaneous L/R measurement is possible)
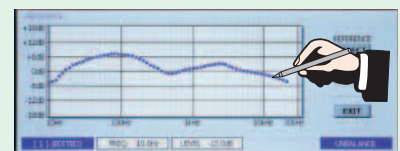● Individual speaker characteristics

Ⓛ + Ⓡ (Auto generation of averaged curve)

Based on the measured characteristics before compensation, a target curve for achieving balanced L/R response at the listening point is created automatically. The curve can be further modified on screen to reduce small peaks and dips.
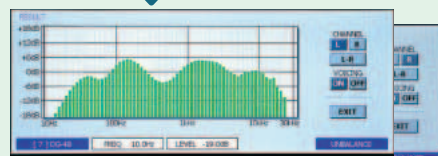
Ex.3 Compensation with freely created curve

Using the stylus pen, any desired target curve can be created freely.
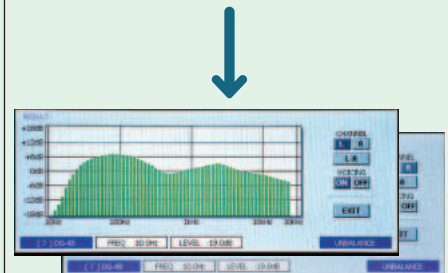
Auto compensation is performed based on the target curve. By comparing the characteristics before and after compensation, the difference can be easily checked visually as well as aurally.

Auto compensation is performed based on the created target curve. By harnessing room characteristics and speaker characteristics, it is possible to counter the effect of standing waves and achieve well balanced compensation for the right and left channels.

Connections Between DG-48 and Other Components

The DG-48 is a Voicing Equalizer with many functions, and therefore quite different from a conventional graphic equalizer. By incorporating it into an existing audio system, the entire reproduction chain including the speakers and the listening room can be measured and optimized to achieve the best possible playback quality.
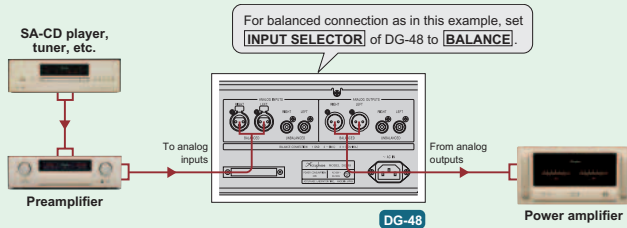
Because the DG-48 is equipped with balanced and unbalanced analog inputs/outputs and with digital inputs/outputs including HS-Link, it can be connected to all types of other equipment, either digital or analog, without requiring any option boards.

Analog connection examples

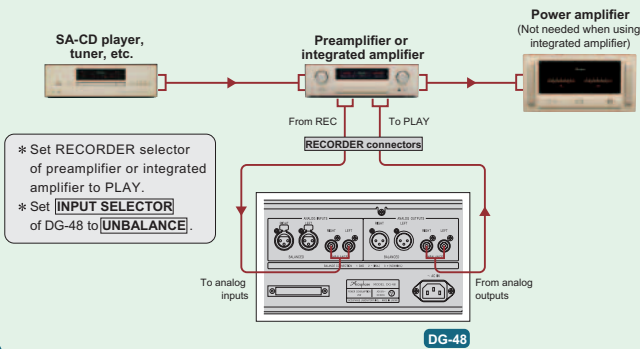✳ For analog connection to other components, use shielded audio cables.

Connection of DG-48 between preamplifier and power amplifier

This is an example for a conventional analog connection, inserting the DG-48 between preamplifier and power amplifier. The connection can be made with balanced or unbalanced cables.

For balanced connection as in this example, set INPUT SELECTOR of DG-48 to BALANCE.

SA-CD player, tuner, etc.

Preamplifier

To analog inputs

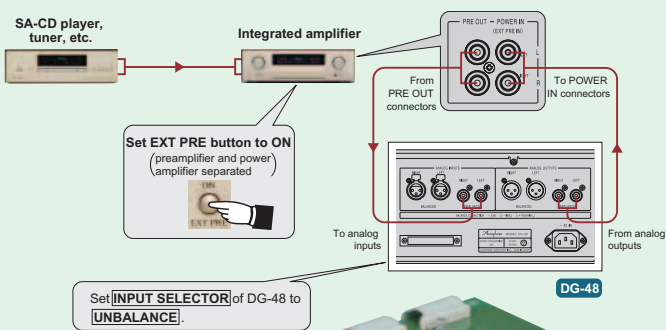From analog outputs

Power amplifier

DG-48

Connection of DG-48 in external component loop of preamplifier or integrated amplifier

This is an example for inserting the DG-48 in the RECORDER loop (using the PLAY/REC connectors) of a preamplifier or integrated amplifier.

SA-CD player, tuner, etc.

Preamplifier or integrated amplifier

Power amplifier
(Not needed when using integrated amplifier)

From REC   To PLAY

RECORDER connectors

✳ Set RECORDER selector of preamplifier or integrated amplifier to PLAY.
✳ Set INPUT SELECTOR of DG-48 to UNBALANCE.

To analog inputs

From analog outputs

DG-48

Connection of DG-48 to integrated amplifier with separately accessible preamplifier and power amplifier sections

This is an example for connecting the DG-48 to an integrated amplifier that allows separation of pre/power amplifier sections.
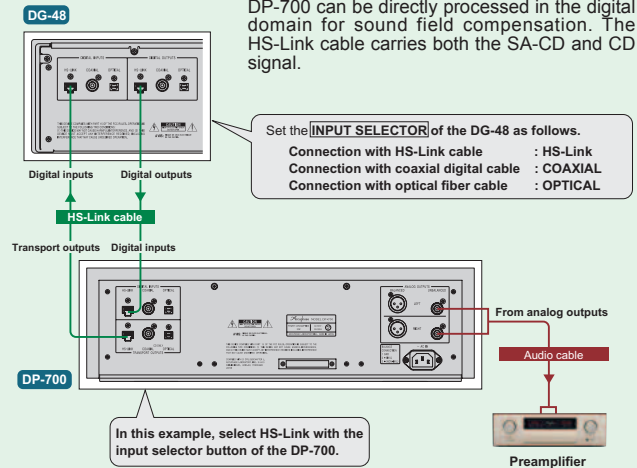
SA-CD player, tuner, etc.

Integrated amplifier

PRE OUT — POWER IN (EXT PRE IN)

From PRE OUT connectors

To POWER IN connectors

Set EXT PRE button to ON
(preamplifier and power amplifier separated)

ON
EXT PRE

To analog inputs

From analog outputs

DG-48

Set INPUT SELECTOR of DG-48 to UNBALANCE.

Digital connection examples

✳ When using the DP-800 and DC-801, connect the DG-48 directly to the DC-801 with a digital link.
✳ The DP-500 and DG-48 can also be connected directly via a digital link.
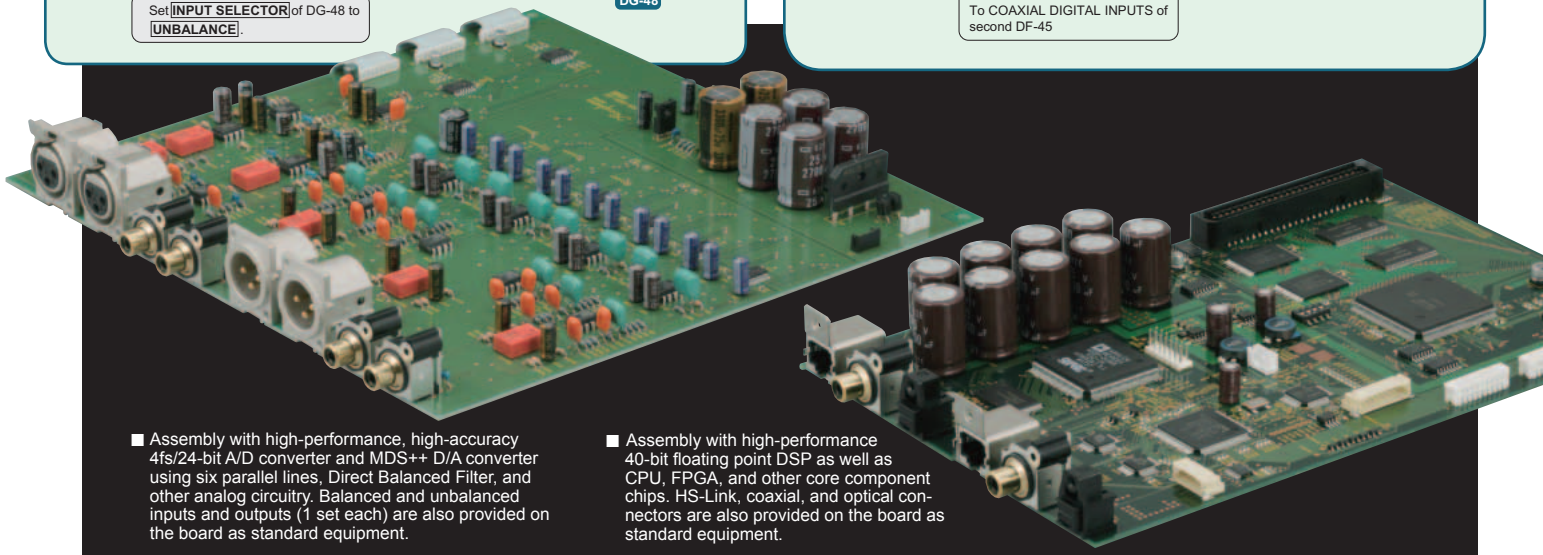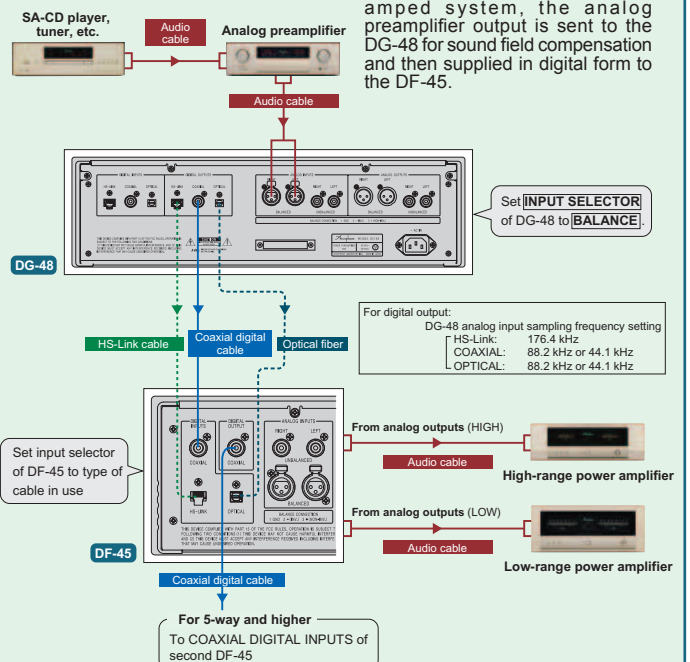
Direct digital connection of DP-700 and DG-48

DG-48

Digital inputs   Digital outputs

HS-Link cable

Transport outputs   Digital inputs

DP-700

The signal of the SA-CD/CD transport of the DP-700 can be directly processed in the digital domain for sound field compensation. The HS-Link cable carries both the SA-CD and CD signal.

Set the INPUT SELECTOR of the DG-48 as follows.
Connection with HS-Link cable : HS-Link
Connection with coaxial digital cable : COAXIAL
Connection with optical fiber cable : OPTICAL

From analog outputs

Audio cable

Preamplifier

In this example, select HS-Link with the input selector button of the DP-700.

Connection example for multi-amped system with DG-48 and DF-45

SA-CD player, tuner, etc.

Audio cable

Analog preamplifier

Audio cable

DG-48

In this example of a 2-way multi-amped system, the analog preamplifier output is sent to the DG-48 for sound field compensation and then supplied in digital form to the DF-45.

Set INPUT SELECTOR of DG-48 to BALANCE.

HS-Link cable   Coaxial digital cable   Optical fiber

For digital output:
DG-48 analog input sampling frequency setting
HS-Link: 176.4 kHz
COAXIAL: 88.2 kHz or 44.1 kHz
OPTICAL: 88.2 kHz or 44.1 kHz

Set input selector of DF-45 to type of cable in use

From analog outputs (HIGH)

Audio cable

High-range power amplifier

From analog outputs (LOW)

Audio cable

Low-range power amplifier

DF-45

Coaxial digital cable

For 5-way and higher
To COAXIAL DIGITAL INPUTS of second DF-45

■ Assembly with high-performance, high-accuracy 4fs/24-bit A/D converter and MDS++ D/A converter using six parallel lines, Direct Balanced Filter, and other analog circuitry. Balanced and unbalanced inputs and outputs (1 set each) are also provided on the board as standard equipment.

■ Assembly with high-performance 40-bit floating point DSP as well as CPU, FPGA, and other core component chips. HS-Link, coaxial, and optical connectors are also provided on the board as standard equipment.

■ ZOOM function

Pressing the ZOOM button allows the user to zoom the horizontal (frequency) axis by a factor of two for easier viewing. This function is available on the equalizer screen, target curve writing screen, and manual compensation screen among others. Zooming allows drawing the desired frequency curve with further enhanced precision.
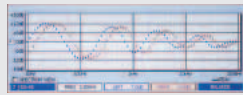
ZOOM:ON

■ After Voicing, results can be checked on screen and by ear

The unit can display the response curve before and after compensation separately for each channel. It is also possible to compare the sound while playing music, by switching Voicing/Equalizer on and off.

■ Editing a sound field compensation curve

After checking the sound and the curve display, the user can return to the Voicing screen and make further adjustments at will.

■ Draw an equalizer curve based on Voicing results

After Voicing, the user can go to the Equalizer screen and further modify the curve.

■ Manual compensation

If automatic compensation leaves slight irregularities in the response curve, manual compensation in specific bands may bring the result even closer to flat response.

■ Individual speaker measurement

This function is helpful, for example, to achieve proper level matching for the different frequency bands in a multi-amped system.

Accuphase original digital interface
## HS-Link: High Speed Link

HS-Link is an ultra high-quality digital audio interface developed by Accuphase. It supports send/receive verification for copyright protection. The LVDS (Low Voltage Differential Signaling) principle allows a single dedicated HS-Link cable to transmit signals using advanced formats such as 2.8224 MHz/1-bit or 192 kHz/24-bit. Conventional digital formats are also supported. Because digital audio data are transmitted with utmost fidelity, the sound quality achieved by HS-Link is simply outstanding.

■ HS-Link Block Diagram
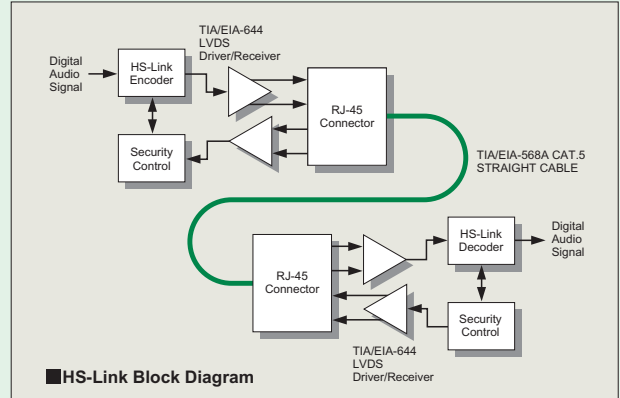
■ Front Panel

■ Rear Panel

House the supplied stylus pen here.
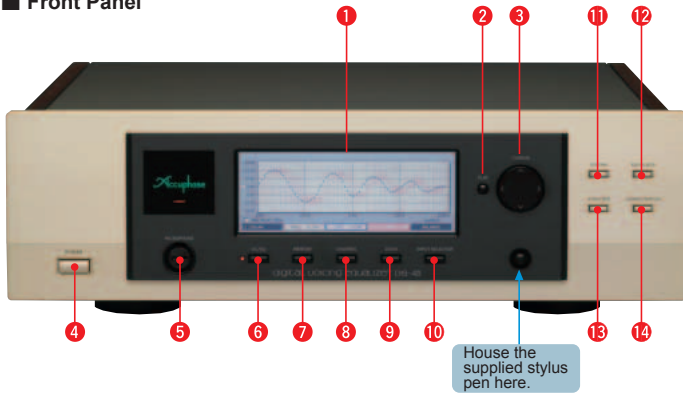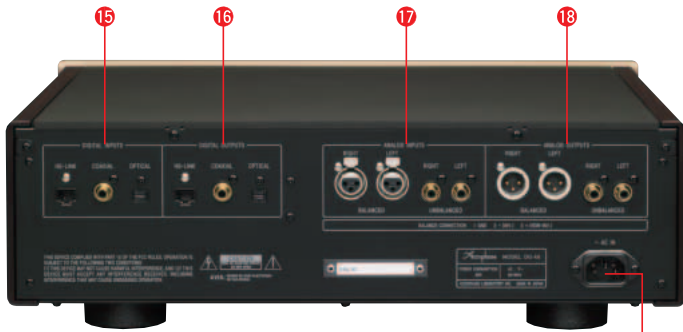
1. Display
2. Flat button
3. Cursor keys
4. Power switch
5. Microphone input jack
6. VC/EQ selector button
7. Memory selector button
8. Channel selector button
9. Zoom selector button
10. Input selector button
11. Voicing (sound field compensation) button
12. Equalizer button
13. Analyzer button
14. Configuration button
15. Digital inputs
    HS-Link COAXIAL OPTICAL
16. Digital outputs
    HS-Link COAXIAL OPTICAL
17. Analog inputs
    BALANCED UNBALANCED
18. Analog outputs
    BALANCED UNBALANCED
19. AC power connector ★

✻ Microsoft and Windows are registered trademarks of Microsoft Corporation in the U.S. and in other countries.

Remarks
★ This product is available in versions for 120/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.
★ The shape of the AC inlet and plug of the supplied power cord depends on the voltage rating and destination country.

■ Supplied Accessories
- Stylus pen
- Microphone cable
- Audio cable with plugs (1 m)
- Remote Commander RC-300
- Microphone AM-48
- Microphone holder
- AC power cord
- Cleaning cloth

DG-48 Guaranteed Specifications

[Guaranteed specifications and standard compliance are measured according to JEITA CPR-2101.]

● **Voicing**	1/6 octave 67-band IIR filter Adjustment range ±12 dB
● **Equalizer**	1/6 octave 80-band hybrid IIR filter Adjustment range ±12 dB
● **Measurement signal**	Warble tones
● **Frequency Response Curve Input Principle**	Direct drawing with stylus pen or input with cursor keypad
● **Spectrum Analyzer**	1/3 octave, 35-band real-time type Display level: ±18 dBFS to –90 dBFS (5 ranges, switchable)
● **Reproduction Frequency Response**	0.5 - 50,000 Hz +0 –3.0 dB (For sampling frequency 2.8224 MHz or 192 kHz) 4.0 - 20,000 Hz +0 –0.3 dB
● **THD + Noise**	(from analog inputs to analog outputs, 20 - 20,000 Hz) 0.001%
● **Gain**	+12 to –90 dB, variable
● **Analog input maximum level**	GAIN +6 dB: 0.88 V GAIN 0 dB: 1.75 V GAIN –6 dB: 3.50 V
● **A/D Converter**	Principle: 1-bit delta-sigma modulation Sampling frequency: 44.1 kHz, 88.2 kHz, 176.4 kHz Resolution: 24 bits
● **D/A Converter**	Principle: MDS++ Sampling frequency: 32 kHz - 192 kHz Resolution: 24 bits
● **Digital Inputs**	HS-Link Connector type: RJ-45 Suitable cable: Dedicated HS-Link cable COAXIAL Format: IEC 60958 OPTICAL Format: JEITA CP-1201 compliant Sampling frequency 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz (16 to 24-bit 2-channel PCM) [With HS-Link only] 176.4 kHz, 192 kHz (24-bit 2-channel PCM) 2.8224 MHz (1-bit 2-channel DSD)
● **Digital Outputs**	HS-Link Connector type: RJ-45 Suitable cable: Dedicated HS-Link cable COAXIAL Format: IEC 60958 OPTICAL Format: JEITA CP-1201 compliant
● **Operating System**	Microsoft® Windows® CE operating system
● **Power Requirements**	AC 120 V/230 V, 50/60 Hz (Voltage as indicated on rear panel)
● **Power Consumption**	25 watts
● **Maximum Dimensions**	Width: 465 mm (18-5/16") Height: 151 mm (5-15/16") Depth: 396 mm (15-9/16")
● **Mass**	13.8 kg (30.4 lbs) net 20.0 kg (44.1 lbs) in shipping carton

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Accuphase
ACCUPHASE LABORATORY, INC.

• Specifications and design subject to change without notice for improvements.

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