

Accuphase

DIGITAL VOICING EQUALIZER

DG-38

- Fully digital signal processing Voicing Equalizer
- 40bit 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
- 20 pattern memory
- Real-time spectrum analyzer
- Analog connection possible via option boards





Create your ideal listening environment with a stroke of the pen — the Digital Voicing Equalizer makes this dream a reality. Separate sound field compensation (Voicing) and sound field creation (Equalizer) functions implemented using powerful DSP devices and advanced signal processing technology. Large, wide-format color display panel allows use of a stylus pen to directly draw or modify a curve. Connection to analog components possible using option boards.

What is a "Voicing Equalizer"?

This somewhat unusual term was chosen to symbolize the advanced capabilities of the DG-38. 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-38, the scope of sound reproduction in the home environment can be significantly enhanced. Get ready to experience a new dimension of music enjoyment.

When wishing to reproduce high-quality 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. The Digital Voicing Equalizer DG-38 was created with this fact in mind. It embodies Accuphase's highly advanced knowledge of digital signal processing technology for audio applications. Latest high speed DSP chips as well as HS-Link input and output capability make the DG-38 perfectly suited to handle all high-quality program sources including SACD.

Functionally, the DG-38 is divided into two equalizing modules. The first is the VOICING module designed to provide sound field compensation, and the second is the EQUALIZER module that lets the user creatively and actively shape the sound field. These central DSP functions are handled by four 40bit floating point SHARC processors from Analog

Devices. The display of the DG-38 is a supremely large, wide-format color LCD that is configured as a touch panel. It lets you simply draw a desired frequency curve with the supplied stylus pen and immediately hear the results. Control of other functions is also easily accomplished with this panel. A spectrum analyzer function has been newly incorporated, providing a visual representation of the spectral content of any source in real time.

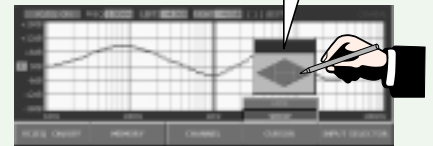


The DG-38 can be connected to other digital Accuphase components such as the DP-100/DC-101, DC-330, DP-85, and DP-77 via the HS-Link interface. Analog components can be accommodated by installing suitable analog input/output option boards.

DG-38 Features

- Fully digital Voicing Equalizer with 40bit floating point DSP devices for digital signal processing.
- 192 kHz/24 bit input/output interface
- Two equalizing modules: sound field compensation (VOICING) and sound field creation (EQUALIZER)
- Large, wide-format color LCD panel (154 x 58 mm)
- Touch panel and supplied stylus pen
 - Allows direct drawing of response curve on screen
 - Cursor keypad can be called up for pinpoint operation and touchup

Call up cursor pad to select frequency and adjust level by moving cursor right and left or up and down.



- Control functions by tapping or dragging symbols displayed on screen

- 20 memory slots to store entire patterns including target curve, pre-compensation curve, post-compensation curve, equalizer curve etc. Data sets can be given a name and called up or modified at any time.

Call up input panel for character input or editing



- RS-232 connector for interfacing with a computer
- Sound field measurement microphone AM-28 supplied

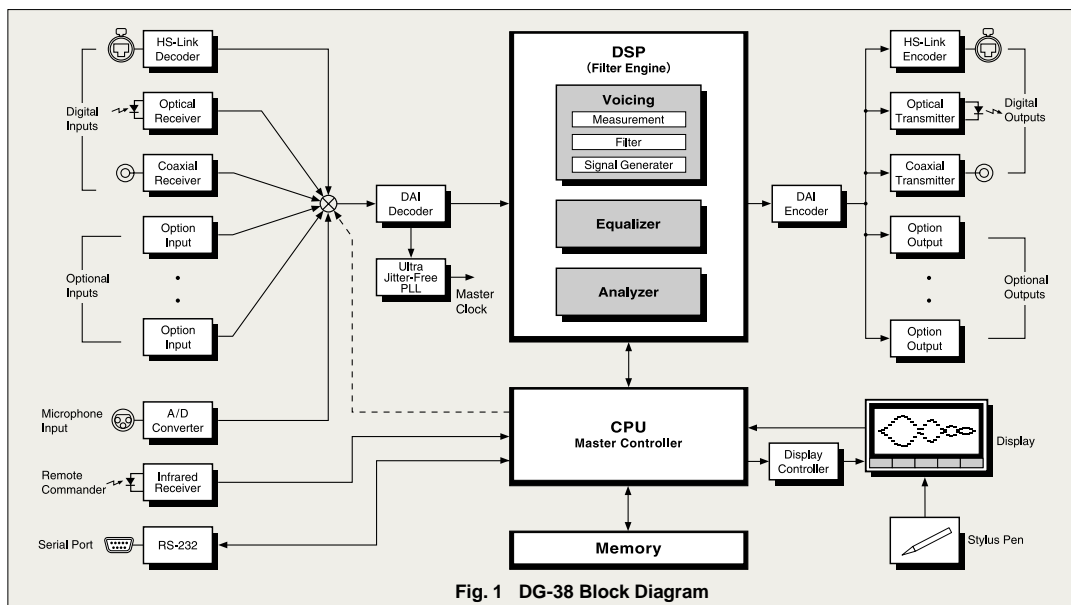
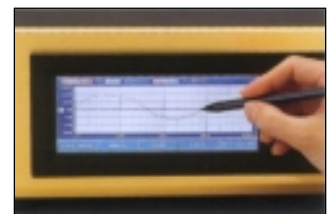


Fig. 1 DG-38 Block Diagram



Supplied stylus pen can be used to draw any desired response curve.

- Supplied Remote Commander RC-30 Controls input selector, equalizer on/off, memory recall, memory number up/down.



Two main circuit assemblies with four high speed 40bit floating point DSP chips, Ultra Jitter-Free PLL circuit, tone generator, HS-Link en-coder/decoder, digital input/output connectors etc.



Sound field compensation (voicing)



Because the DG-38 incorporates both measurement and adjustment functions, accurate sound field compensation can be carried out easily. 68 IIR type filters with 1/6 octave spacing are used for measuring the sound field, and the resulting data provide the basis for accurate compensation.

This screen gives access to various functions including microphone setup, target curve setup, auto compensation, display of frequency response before and after compensation, and calling up or saving frequency response curves.

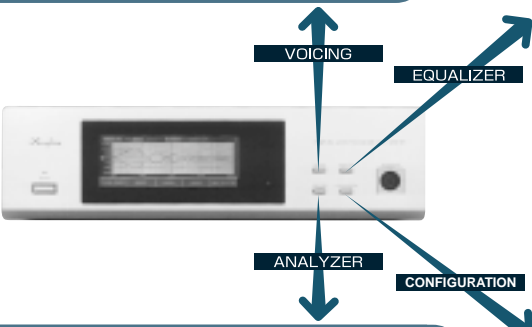
Sound field creation (Equalizer)



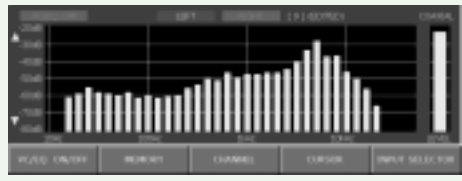
When power to the DG-38 is turned on, the Equalizer screen shown here appears. In this mode, the user can create a desired sound field by drawing a frequency response curve. This can be done with the supplied stylus pen directly on the display screen. A cursor keypad is also available, for manually creating the curve or making adjustments. The values set using this screen are automatically read and applied by the digital filters.

The equalizer filter section uses 74 IIR + FIR hybrid type filters with 1/6 octave spacing. Because the digital filters for sound field compensation and sound field creation are separate, equalization can be further modified after the sound field compensation (voicing) curve has been established.

The DG-38 has four main operation modes: "Voicing", "Equalizer", "Analyzer", and "Configuration". Four buttons on the front panel are used to select the respective mode.



Spectrum analyzer



The spectral content of the input signal can be displayed on a spectrum analyzer screen with 1/3 octave spacing, 35 bands, and real-time operation. This function is entirely separate from the adjustment functions of the unit, allowing you to monitor peak levels in real time. Comparison of Voicing and Equalizer on/off condition and checking of right/left frequency distribution are also possible.

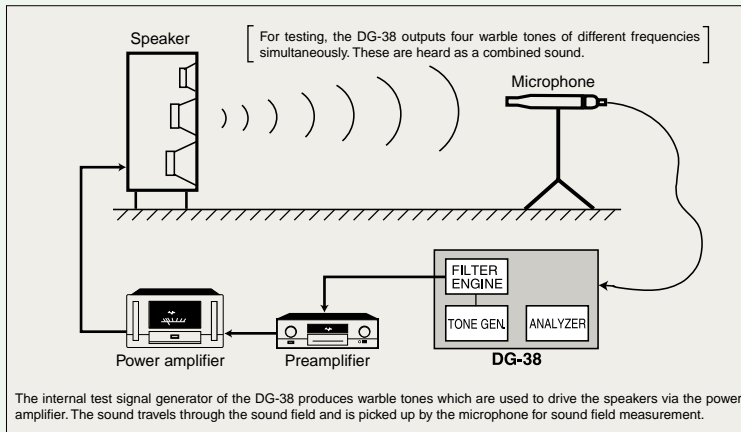
Configuration



This screen lets you make environment and function settings, such as selecting the Voicing/Equalizer modes, controlling levels, left/right balance, screen brightness and contrast, screen data send etc. Functions are activated directly on the screen with the stylus pen.

《Advanced compensation functions》 VOICING application examples

The DG-38 automatically measures the sound field and provides accurate compensation based on target characteristics representing the ideal sound field. Compensation may be performed using ① a preprogrammed standard reference curve, ② an automatically created target curve, or ③ a freely created curve.

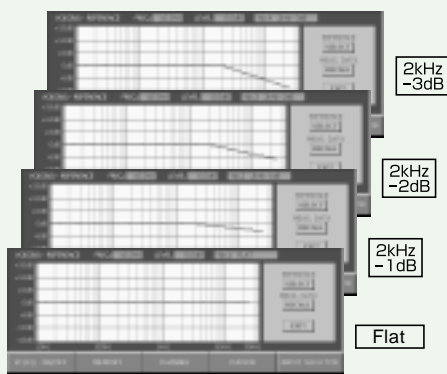


A dedicated sound field measurement microphone with controlled frequency response is supplied with the DG-38. The microphone is a 1/4-inch type back-electret condenser type with ultra-thin diaphragm, which assures linear response over a wide frequency range.

Setup screen for Voicing level and channel, microphone settings, etc.



Ex. 1 Using preprogrammed standard reference curve



The DG-38 comes with four preprogrammed reference curves: three curves with high-end rolloff (-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

L + R (Auto generation of curve for flat response)



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.

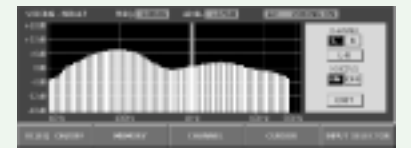


Auto compensation is performed based on the created target curve. By harnessing room characteristics and speaker characteristics, it is possible to counter the effect of standing waves and achieve well balanced compensation for the right and left channels.

Ex. 3 Compensation with freely created curve



Using the stylus pen, any desired target curve can be created freely.

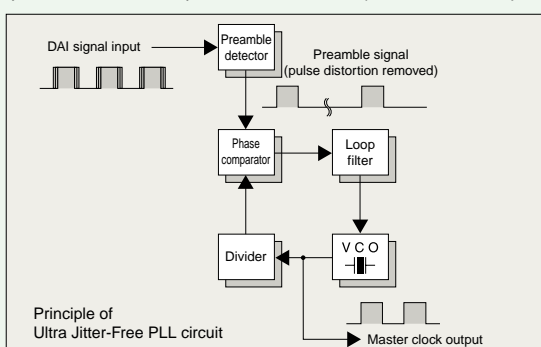


Auto compensation is performed based on the target curve. By comparing the characteristics before and after compensation, the difference can be easily checked visually as well as aurally.

Ultra Jitter-Free PLL circuit

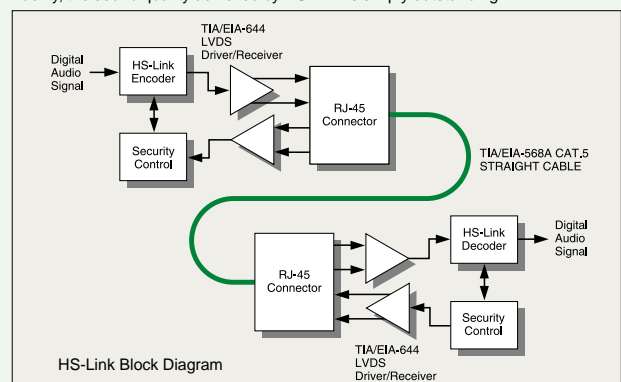
The operation of a D/A converter must be synchronized with the input signal. For this purpose, a phase-locked loop (PLL) circuit generates a master clock which is used as system reference. In the DG-38, the so-called Ultra Jitter-Free PLL circuit developed by Accuphase is used.

As shown in the illustration, this circuit consists of a detector for the preamble component (a kind of start marker for the L/R signal) and a voltage-controlled oscillator (VCO) using a quartz crystal element. The master clock produced by this PLL circuit is totally free from the effects of pulse distortion and jitter.



~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.



Connections between DG-38 and other components

The DG-38 is a Voicing Equalizer with many functions. 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.

The DG-38 can be connected to digital components such as the DC-330, DP-85, or DP-77 (with DO2-HS1 installed) via HS-Link. This provides full support for digital signals using various sampling frequencies, including the DSD signal of SACD sources and 192 kHz/24 bit signals. To connect analog components, separately available option boards can be installed which incorporate high-quality A ⇌ D converters that keep signal degradation to an absolute minimum.



- HS-Link, optical, and coaxial digital input/output connectors provided as standard equipment
- Input signal selector menu of DG-38 allows the user to choose HS-Link, optical, coaxial, or installed option board
- Connection to analog components implemented via option boards
- Up to four option boards can be installed

Option boards that can be used in the DG-38

◆ Digital boards

Digital Line Input/Output Board
DIO-OC1
[Number of slots used: 1]

Provides coaxial and optical inputs and outputs.

* Supports sources with sampling frequencies up to 96 kHz.

HS-Link cable
HDL-15

Serves for transmission of digital signal corresponding to the HS-Link interface.

* Shielded twisted pair 8-conductor OFC cable (TIA/EIA568-A CAT.5)

* 3 m, 5 m, 7.5 m, and 10 m cable lengths are also available.

◆ Analog boards

Line Input Board
A12-U1
[Number of slots used: 1]

* Conventional high-level input

* Input signal is converted to 24-bit digital signal by on-board A/D converter.

* Internal sampling frequency selector should be set to 96 kHz.

◆ For unbalanced connections

Balanced Input Board
A12-B1
[Number of slots used: 2]

* Conventional high-level input

* Input signal is converted to 24-bit digital signal by on-board A/D converter.

* Internal sampling frequency selector should be set to 96 kHz.

◆ For balanced connections

Line Output Board
AO2-U1
[Number of slots used: 2]

* Conventional high-level output

* On-board high-precision D/A converter supplies analog output signal.

* D/A converter type: 192 kHz (max.), 24 bit, MDS Plus.

◆ For unbalanced connections

Balanced Output Board
AO2-B1
[Number of slots used: 2]

* Conventional high-level output

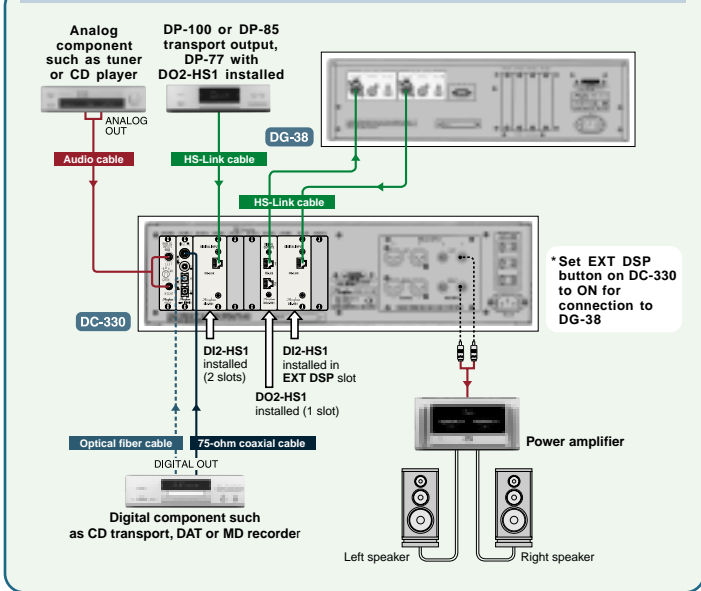
* On-board high-precision D/A converter supplies analog output signal.

* D/A converter type: 192 kHz (max.), 24 bit, MDS Plus.

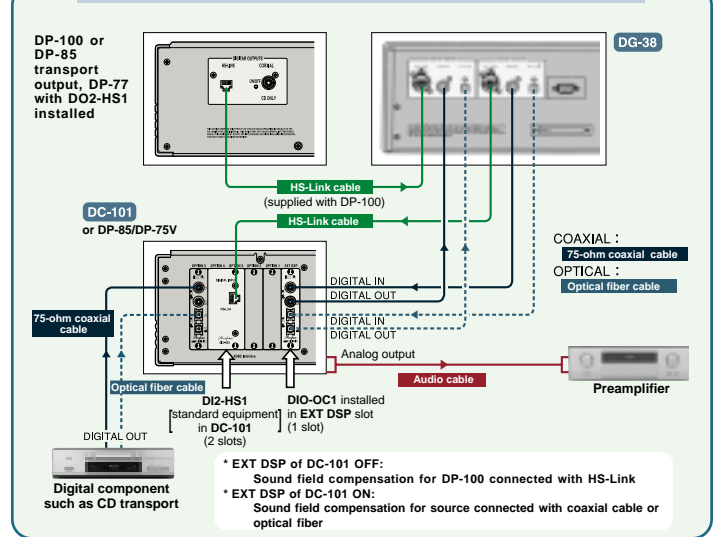
◆ For balanced connections

* The analog input signal is converted to a digital signal by an on-board A/D converter. The digital output signal is converted to an analog signal by an on-board D/A converter.

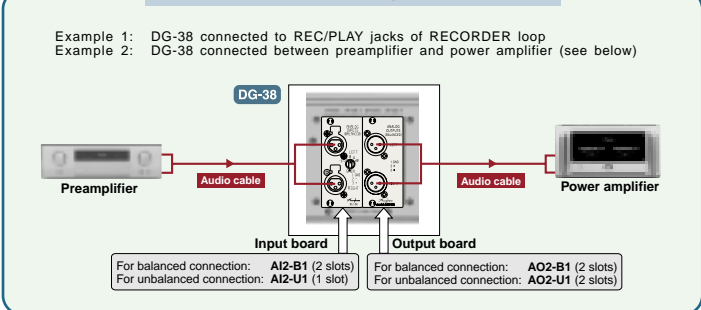
Sound field compensation for all program sources input to DC-330



Connection example for use of DC-101 or other DAC



Connections to analog components



Connection of analog output and digital output to DG-38

