

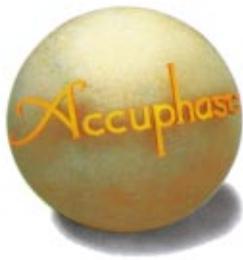
# Accuphase

*PRECISION DIGITAL PREAMPLIFIER*

## *DC-330*

- Fully digital preamplifier with ultra high-speed digital signal processing
- Ready for new-generation formats such as SACD and DVD-Audio
- Newly developed MDS type D/A converter minimizes distortion and assures outstanding S/N ratio
- High-precision tone controls and loudness compensation implemented in the digital domain
- Volume control with familiar analog feeling
- Ultra jitter-free PLL circuit topology





**Leaving the analog/digital division far behind – this digital preamplifier features ultra high-speed DSP and complete readiness for the new generation of super high quality audio sources. The newly developed MDS (Multiple Delta Sigma) converter with 24-bit ultra high precision resolution results in dramatically enhanced performance. Witness a new dimension of audio perfection.**

The DC-330 builds on the foundation of the DC-300, with some significant advantages over its predecessor. Ease of use has been further enhanced, and latest digital technology and redesigned circuitry assure total compatibility with the emerging new generation of top-quality audio sources such as SACD and DVD-Audio. The digital volume and tone controls function with previously unattainable precision, yet their smooth operation feel is on a par with the best of analog equipment. Internally, the DC-330 features ultra high-speed digital processing performed by a latest-generation DSP device. D/A conversion is handled by an innovative MDS (Multiple Delta Sigma) converter which boasts superior accuracy. This makes the DC-330 capable of bringing out the full potential of a new breed of audio sources that is just emerging, such as the Super Audio CD (SACD) and DVD-Audio. During the development of this amplifier, countless listening sessions were held to arrive at the detailed, rich sound that is a hallmark of every Accuphase product. In a preamplifier, the part that has a decisive influence on the sonic end result is the section where adjustments such as volume, tone, and loudness compensation are carried out. In the digital DC-330, this task is handled by an extremely fast DSP that assures a drastic leap in performance, achieving outstanding signal-to-noise ratio, amazing channel separation, and totally negligible distortion. The overall result is utterly natural and realistic sound with full control over every vital aspect. To provide complete flexibility with a view to future expansion, all inputs and recording

outputs of the DC-330 are implemented as option boards. The option board slots support the ADB2 (Accuphase Digital Bus 2) interface which accommodates also formats such as SACD and DVD-Audio. The DC-330 comes with a line input board for analog signals and a digital input/output board installed as standard equipment. As a perfect blend of analog operation feeling and sophisticated digital technology, the DC-330 transcends the mechanistic division of “analog” or “digital”, fusing them both into a higher dimension that is devoted solely to the enjoyment of music.

**Fully digital preamplifier with ultra high-speed DSP and support for high sampling rates: 2.8224 MHz/1-bit and 192 kHz/24-bit.**

Figure 1 shows the block diagram of the DC-330. Digital sources are connected via coaxial or optical inputs located on option boards. All option board slots of the unit are ready to handle the bit stream output of a SACD player which uses 2.8224 MHz/1-bit, as well as the 192 kHz/24-bit signal used for DVD-Audio. Other high-quality formats that may emerge will also pose no problem to the DC-330. After the input, an ultra jitter-free PLL circuit extracts a high-precision reference signal totally free from the adverse

effects of pulse transmission distortion and jitter. After conversion into the internal format of the DC-330, a DSP (Digital Signal Processor) operating at extremely high speed performs some of the major tasks that are handled by a preamplifier, such as tone control, loudness compensation, as well as mono and phase switching. All of these adjustments are accomplished entirely in the digital domain.



An ultra high-speed “isolated digital coupler” ensures effective electrical separation between the digital section encompassing the DSP and the D/A converter and subsequent analog segments of the amplifier. After digital volume, balance, and attenuation processing, the signal reaches the newly developed MDS type D/A converter which produces an analog signal of utmost precision. A 3-pole linear phase low-pass filter then removes any remnants of the digital process, before sending the signal to the balanced and unbalanced outputs.

**Innovative MDS (Multiple Delta Sigma) converter reduces distortion to theoretical limits and assures outstanding S/N ratio**

The D/A converter which has considerable bearing on the sonic end result is a newly developed type that provides excellent performance in all aspects. The MDS (Multiple Delta Sigma) principle employs several delta sigma type converters in a parallel configuration which results in a drastic precision enhancement. The delta sigma principle combines oversampling with noise-shaping (a kind of digital feedback) which projects the amplitude information of the digital signal onto a time axis for precise conversion. Figure 2 shows several delta sigma converters which are fed with the same signal and whose outputs are combined to arrive at the overall waveform. In the DC-330, six delta sigma converters are operated in parallel, which results in a performance improvement by a factor of 2.45 ( $=\sqrt{6}$ ). An important characteristic of the MDS principle is that the performance benefits are achieved regardless of signal

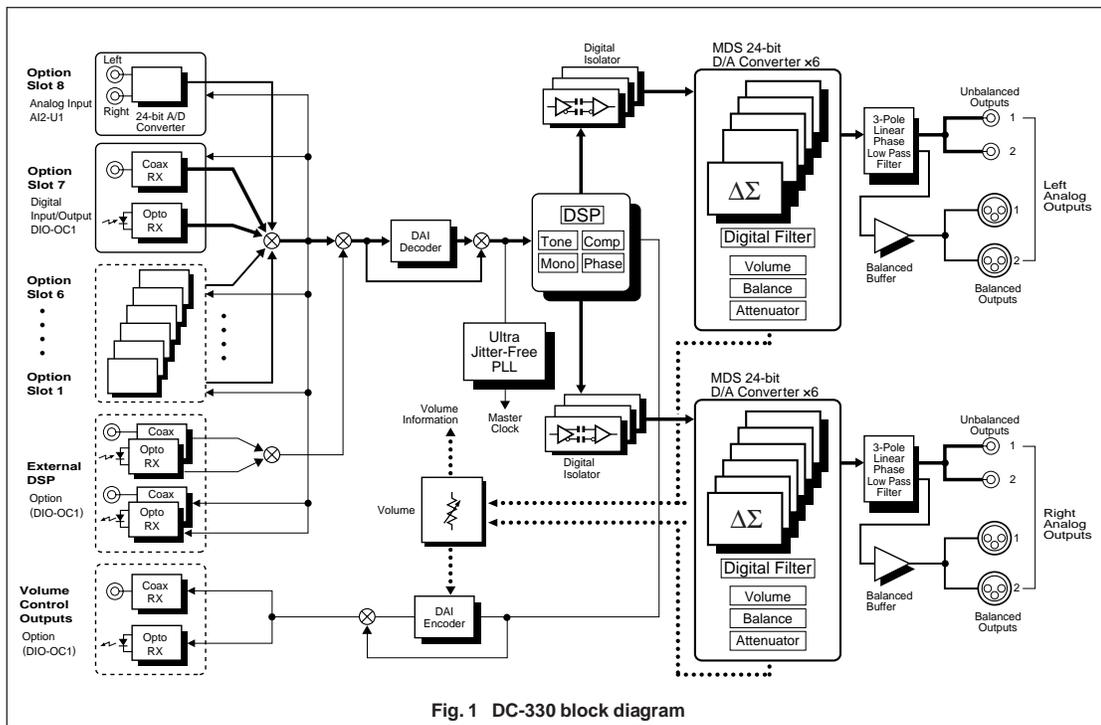
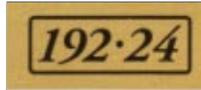


Fig. 1 DC-330 block diagram



■ This photograph shows the DC-330 with separately available option boards installed and with the shielding cover removed.



frequency and signal level. Therefore noise at very low signal levels that was difficult to contain with conventional delta

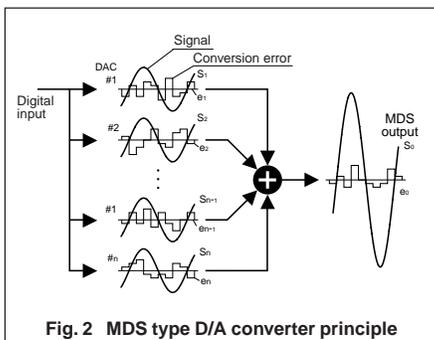
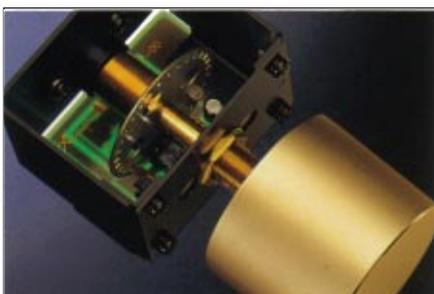


Fig. 2 MDS type D/A converter principle

sigma converters now could be drastically reduced. The audible result is music reproduction emerging from utter silence with an impressive sense of clarity and nuance.

### Volume control with smooth analog feel

A massive knob on a precision-machined shaft rotates a disc with star-shaped slits which



generate a series of pulses in a phase detector. These pulses are utilized by a microprocessor to govern the volume control function. For the user, the volume control of the DC-330 operates with a silky smooth and natural feel that perfectly matches the audible change in volume. The current volume setting is indicated by the numeric display and also by an array of LEDs on the circumference of the control. This lets you check the setting at a glance.

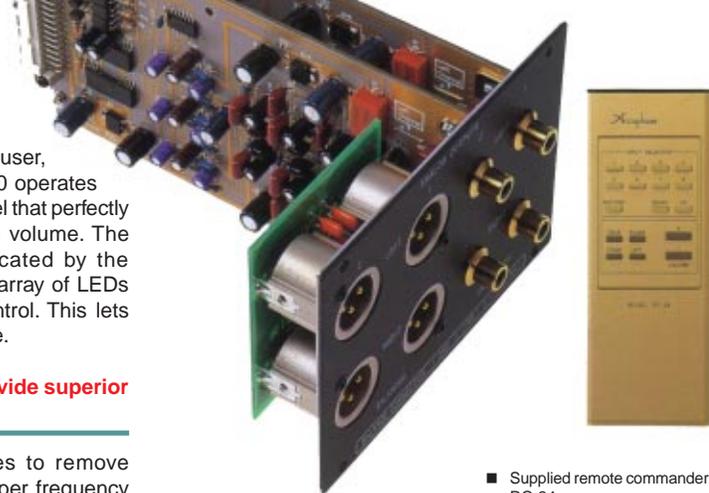
### Linear phase analog filters provide superior characteristics

The analog filter, which serves to remove aliasing noise in the extreme upper frequency range, is a 3-pole linear phase type filter with outstanding phase characteristics. The cutoff frequency is optimized to minimize phase shift within the passband. Strict selection of all filter components assures sonic purity and total musical accuracy.

### D/A converter with printed circuit boards made from Teflon (glass fluorocarbon resin) with low dielectric constant and low loss

The D/A converter boards use a substrate of

■ PCB assembly with analog output connectors (balanced and unbalanced, 2 each) and MDS D/A converter (2 boards for left and right) using Teflon® (glass fluorocarbon resin) substrate with low dielectric constant and low loss.



■ Supplied remote commander RC-24 Allows input selection and adjustment of volume, tone control on/off, loudness compensator on/off, attenuator on/off, and other functions.

glass fluorocarbon resin which has a stable, low dielectric constant as well as superior heat resistance and high-frequency characteristics. Using this material for the audio circuitry assures signal transmission with utmost purity, resulting in a clear improvement in perceived signal-to-noise ratio. In the DC-330, gold-plated copper

**Digital input**

- \* The digital input/output board (DIO-OC1) installed as standard equipment allows connection of a CD transport, or other digital devices, via coaxial cable (2 connectors) or Toslink optical cable (2 connectors).
- \* Option boards can be added for BNC (DI-BNC1), HPC optical cable (DIO-ST1), and HPC balanced cable (DIO-PRO1).

**SACD transport (DP-100) input**

- \* The HS-Link option board can be added for connection of the digital output of a SACD transport via dedicated cable.

**Digital recorder facilities**

- \* Standard equipment digital input/output board (DIO-OC1) allows connection of up to two digital recorders (DAT, MD, etc.) for recording and playback.
- \* Option boards can be added for HPC optical cable (DIO-ST1) and AES/EBU standard digital input/output (DIO-PRO1).

**Analog line input**

- \* The line input board (AI2-U1) installed as standard equipment allows input of analog signals from a CD player, tuner, analog tape recorder or the analog output of a DAT, MD or similar recorder.
- \* High-quality playback of analog output signals from SACD or DVD-Audio equipment possible (set AI2-U1, AI2-B1 to 96 kHz).
- \* Addition of balanced input (AI2-B1) possible.

**Phono playback**

- \* The optional analog disc input board (AI-AD1) allows playback of analog records.
- \* To implement dedicated inputs for MC and MM cartridges, install two boards.

**Analog recording**

- \* The line input/output board (AIO-U1) allows recording and playback with an analog tape recorder or an analog connection of a DAT, MD or similar recorder.
- \* Optional unbalanced (AO-U1) or balanced (AO-B1) output boards provide dedicated high-quality signals for analog recording.

**EXT DSP connectors for DG-28**

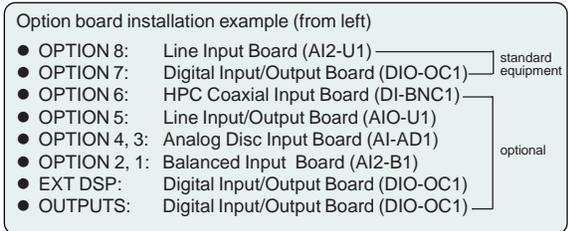
- \* The digital input/output board (DIO-OC1 etc.) allows connection of digital audio equipment.
- \* The Digital Voicing Equalizer DG-28 performs sound field compensation in the digital domain.

**OUTPUTS connector: DF-35 connection**

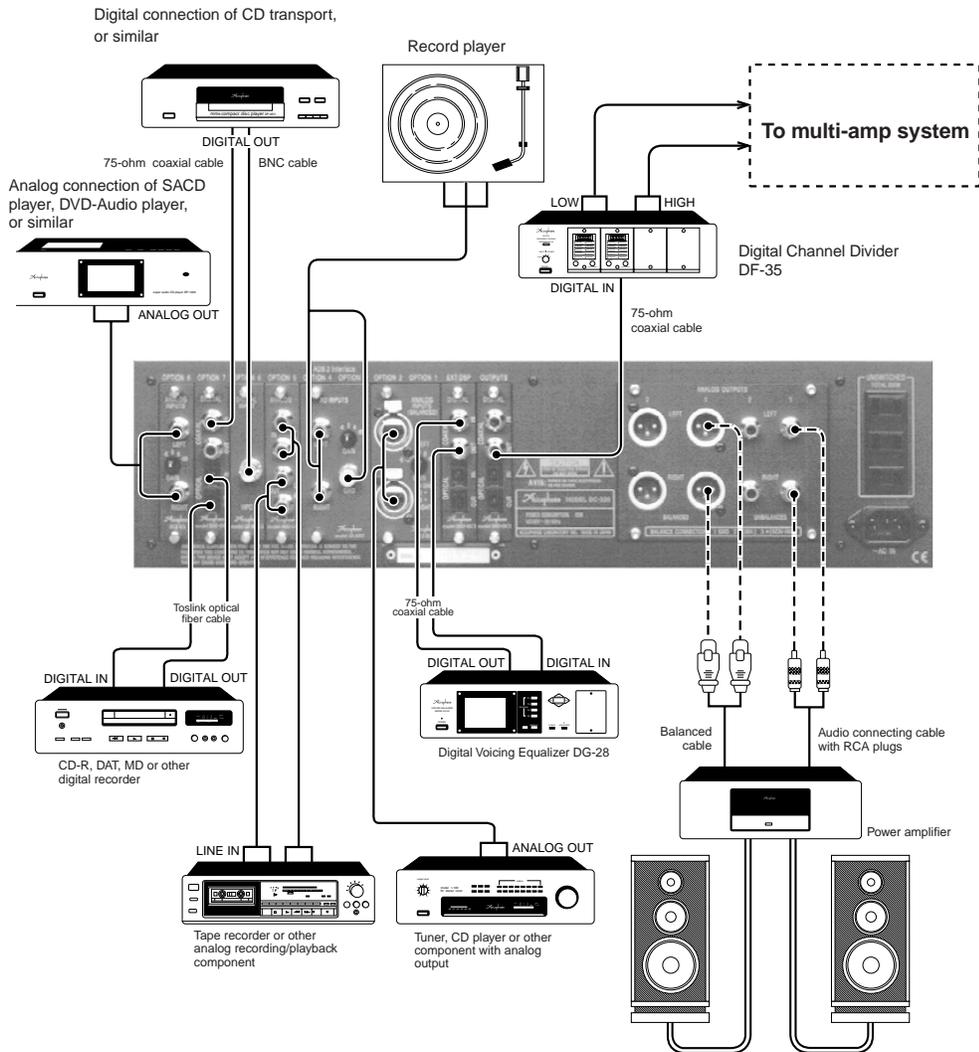
- \* The Digital output board (DIO-OC1 etc.) allows connection of digital audio equipment.
- \* The Digital Channel Divider DF-35 allows volume control in the digital domain.

**Analog outputs**

- \* Two sets of unbalanced and balanced output connectors are provided for power amplifier connection.



- \* For connection of digital equipment, 75-ohm coaxial cable, Toslink optical fiber cable, HPC optical fiber cable, etc. can be used.
- \* For analog input/output connections, audio cable with RCA plugs, balanced cables, etc. can be used.



traces further contribute to sonic purity.

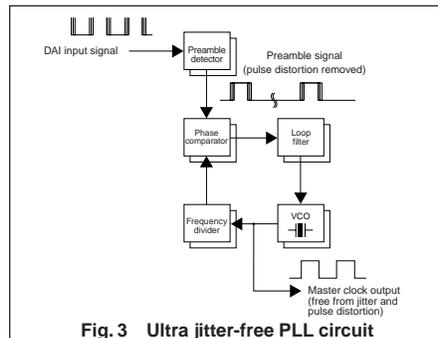
\* Teflon is a registered trademark of DuPont USA.



**Ultra Jitter-Free PLL Circuit**

For the purpose of synchronizing operation of

the D/A converter with the digital audio interface (DAI), a phase-locked loop (PLL) circuit is used which generates a master clock to be used as system reference. As shown in the diagram, the Ultra Jitter-Free PLL Circuit of the DC-330 consists of a preamble detector 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.

**Perfect separation of digital and analog sections totally shuts out noise**

Ultra-high speed isolated digital couplers rated for 80 MBPS are used to isolate the digital and analog sections of the DC-330. This ensures that the signal is transmitted faithfully, while noise is totally shut out, thus preserving the superior sonic transparency that is a hallmark of the DC-330.

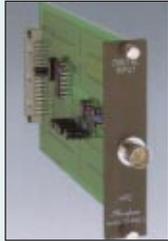


# OPTION BOARDS

Accuphase offers a wide range of digital and analog input/output boards which can be installed in the option board slots on the unit. This allows the user to configure the system to fit any need.

- All option boards designed for the DC-300, DP-75V, DG-28, DF-35, etc. can be used.
- When an option board has been installed and is selected, the input is shown on the alphanumeric display.
- The name shown for an input can be customized.

## Digital Boards



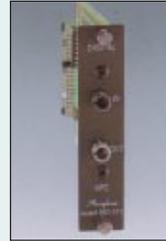
### For BNC coaxial cable input

#### HPC Coaxial Input Board DI-BNC1

Allows connection of coaxial cable with 75-ohm BNC connector.

Guaranteed specifications

- Digital input: 0.5 Vp-p, 75 ohms



### For HPC optical fiber cable input/output

#### HPC Optical Input/Output Board DIO-ST1

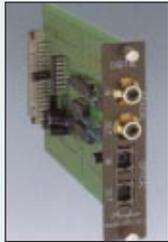
Allows connection of an ST type optical link.

Designed for an ultra high-speed link with a transfer rate of 150 MBPS.

- \* HPC optical fiber cables (HLG-10 etc.) are available from Accuphase.

Guaranteed specifications

- Optical input: -30 to -10 dBm
- Optical output: -19 to -14 dBm



### For additional digital input/output

#### Digital Input/Output Board DIO-OC1

Provides two sets of coaxial and optical connectors, for recording/playback with two digital recorders.

COAXIAL: for 75-ohm coaxial cable  
OPTICAL: for Toslink optical fiber cable

- \* One DIO-OC1 board is installed as standard equipment in the OPTION 7 slot.



### For professional-standard input/output

#### AES/EBU Input/Output Board DIO-PRO1

Provides a set of XLR input and output connectors conforming to AES/EBU professional digital standards.

Can be used to accept the output signal from a digital component or to perform playback and recording with a digital recorder having the same type of connectors.

- \* HPC balanced cables (HLC-10 etc.) are available from Accuphase.

## Analog Boards

\* Analog input signals are converted to digital signals by an on-board A/D converter. \* Digital output signals are converted to analog signals by an on-board D/A converter.  
\* The AI-U1, AI-B1 can also be used.

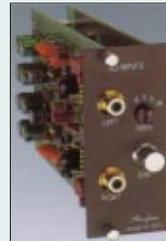


### For playback of analog source equipment

#### Line Input Board AI2-U1

Provides a conventional unbalanced high-level input for the analog output signal from a CD player, tuner, tape recorder or similar component.

- \* One AI2-U1 board is installed as standard equipment in the OPTION 8 slot.
- \* The sampling frequency can be switched between 48 and 96 kHz.
- \* Incorporates a 96 kHz/24-bit delta sigma type A/D converter.



### For playback of analog records

#### Analog Disc Input Board AI-AD1

Incorporates a high-performance, high-gain phono equalizer for playback of analog (phono) records.

- \* Incorporates a 20-bit, 5-pole delta sigma A/D converter with 64-times oversampling.
- \* On-board controls for MM/MC switching and subsonic filter switching
- [MM] gain: 30 dB, input impedance 47 kilohms
- [MC] gain: 60 dB, input impedance 100 ohms



### For analog playback of equipment with balanced output

#### Balanced Input Board AI2-B1

Provides a conventional balanced high-level input for the analog signal from a CD player, tuner, recorder or similar component with balanced analog output.

- \* The sampling frequency can be switched between 48 and 96 kHz.
- \* Incorporates a 96 kHz/24-bit delta sigma type A/D converter.

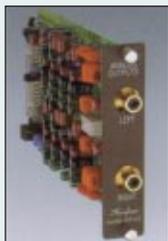


### For analog recording and playback

#### Line Input/Output Board AIO-U1

Provides analog inputs and outputs for use with a tape recorder.

- \* Incorporates an 18-bit, 4-pole delta sigma A/D converter with 64-times oversampling.
- \* Incorporates an 18-bit, 4-pole delta sigma D/A converter with 64-times oversampling.  
(The signal chosen with the Input Selector is converted to analog and output via this board.)

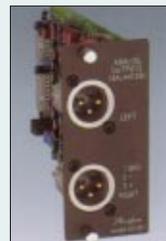


### For high-quality analog recording

#### Line Output Board AO-U1

Provides analog recording output for use with a tape recorder or the analog input of a DAT, MD or other recorder.

- \* The signal chosen with the Rec Selector is converted to analog and output via this board.
  - D/A converter: 20-bit, 4 MMB principle
  - Digital filter: 20-bit, 8-times oversampling



### For analog recording on equipment with balanced input

#### Balanced Output Board AO-B1

Provides an analog recording output for a recorder with balanced input.

- \* The signal chosen with the Rec Selector is converted to analog and output via this board.
  - D/A converter: 20-bit, 4 MMB principle
  - Digital filter: 20-bit, 8-times oversampling



## Slots for up to 10 option boards allow matching to any input and recording output configuration

All inputs and recording outputs of the DC-330 are implemented as option boards. All option board slots support the ADB2 interface standard that makes the unit ready to handle the next generation of audio sources, such as SACD and DVD-Audio.

- For digital input/output, one option board DIO-OC1 with optical and coaxial connectors is installed as standard equipment. Other available boards include BNC, HPC optical cable (ST), and HPC balanced input.
- The HS (High Speed) Link option board can be installed for connection of the SACD transport DP-100.

- For analog input, one option board, AI2-U1, with a high-precision 96 kHz/24-bit delta sigma A/D converter is installed as standard equipment. Playback of analog records is also possible with a separate option board.

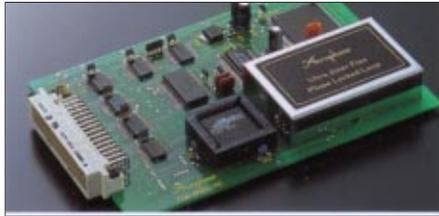
- The EXT DSP option board slot allows connection of the Digital Voicing Equalizer DG-28.

- The Digital Channel Divider DF-35 can be connected to a digital output board installed in the OUTPUTS slot, allowing digital volume control.

**ADB 2: Accuphase Digital Bus 2**  
Interface standard supporting also high sampling rates above 48 kHz, such as used by SACD and DVD-Audio.

**Ultra high-speed DSP achieves high-precision, high-quality tone control and loudness compensation**

Because the signal is being processed entirely in the digital domain, frequency response



■ DAI, DSP assembly  
Contains DAI encoder/decoder, ultra jitter-free PLL circuit, and DSP for tone control/compensator signal processing.

adjustments are possible without any alteration of circuit impedance. For the listener, this means that sonic realism and imaging are maintained regardless of the control setting.

**Outstanding S/N ratio and channel separation**

The digital volume control of the DC-330 introduces no quality deterioration regardless of the level setting, resulting in outstanding perceived signal-to-noise ratio. Digital processing also completely eliminates the problem of inter-channel crosstalk.

**User-editable alphanumeric input position indication**

When the input selector is operated, input

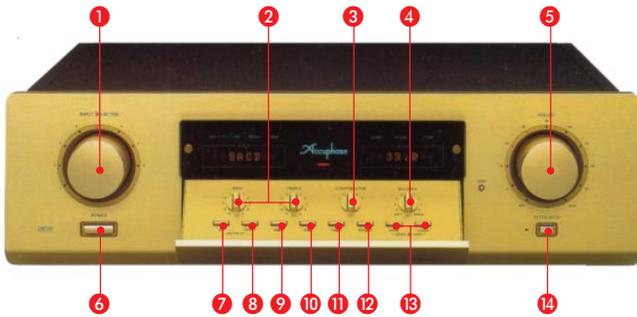
sources are shown on the display of the DC-330 using alphanumeric characters. If desired, any position can be renamed, using a choice of 96 characters and symbols. A large number of ready-made names such as SACD, DVD, CD, MD, etc. are also available.



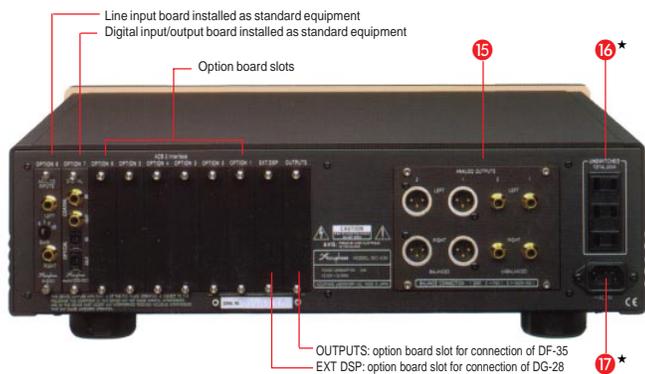
**Fully balanced analog output circuitry**

The analog output section features completely balanced circuitry which is isolated from the ground line. Two sets of balanced XLR connectors and unbalanced RCA-type phono connectors accommodate any system requirements.

■ FRONT PANEL



■ REAR PANEL



- 1 Input selector
- 2 BASS/TREBLE controls
- 3 Loudness compensator selector
- 4 Balance control
- 5 Volume control
- 6 Power switch
- 7 Output ON/OFF button
- 8 Phase selector button
- 9 Mono/stereo selector button
- 10 Tone control ON/OFF button
- 11 Loudness compensator ON/OFF button
- 12 External digital equipment ON/OFF button
- 13 Display mode/edit buttons
- 14 Attenuator buttons
- 15 Analog output connectors (Unbalanced, balanced; 2 each)
- 16 AC outlets\*
- 17 AC input connector (for supplied power cord)\*

- **Optional cables** (available in 2 m, 3 m, and 5 m lengths)
- HPC optical fiber (ST) HLG-10 (1 m)
  - HPC balanced cable HLC-10 (1 m)
  - Toslink optical fiber LG-10 (1 m)

**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, plug of the supplied power cord, and AC outlet depends on the voltage rating and destination country.  
 \* These unswitched AC outlets may not be supplied depending on the safety standards or regulations applicable in the particular country to where the unit is destined.

- **Supplied accessories**
- AC power cord
  - 75-ohm coaxial cable (DL-15)
  - Audio cable with RCA plugs
  - Remote Commander RC-24

**DC-330 Guaranteed Specifications**

[Guaranteed specifications are measured according to EIAJ standard CPR-2101]

- **Input format:** (EIAJ CP-1201 standard format)  
Quantization bits: 16 to 24 bits, linear  
Sampling frequency (auto detect): 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz, 2,822.4 MHz [implemented as option board]
- **Digital input format level** (EIAJ CP-1201)  
Format: Digital audio interface  
OPTICAL: Optical input, -27 to -15 dBm  
COAXIAL: 0.5 Vp-p, 75 ohms [implemented as option board]
- **Digital output format level** (EIAJ CP-1201)  
Format: Digital audio interface  
OPTICAL: Optical output, -21 to -15 dBm  
Wavelength, 660 nm  
COAXIAL: 0.5 Vp-p at 75 ohms [implemented as option board]
- **Frequency characteristics** 0.5 to 50,000 Hz +0, -3 dB
- **D/A converter** 24-bit MDS converter
- **Total harmonic distortion** 0.0006% (20 to 20,000 Hz)
- **Signal-to-noise ratio** 120 dB
- **Dynamic range** 112 dB (24-bit input, low-pass filter off)
- **Channel separation** 106 dB
- **Output voltage and impedance** (DSP)  
BALANCED: 5 V at 50 ohms, balanced XLR type  
UNBALANCED: 5 V at 50 ohms, RCA phono jack
- **Volume control** (DSP)  
Linear mode: -∞, 0.5 to 99.5 (in 0.5 steps), Max.  
dB mode: -∞, -94.0 to +12.0 dB, Speed-sensing principle
- **Balance control** (DSP)  
Left/right level difference: -∞, -4 to 0 dB (in 1 dB steps)
- **Tone control** (DSP)  
Crossover frequency and adjustment range  
Bass: 315 Hz ±5 dB (50 Hz), 1 dB steps  
Treble: 3.15 kHz ±5 dB (20 kHz), 1 dB steps
- **Loudness compensator** (DSP)  
1: +3 dB (100 Hz)  
2: +6 dB (100 Hz)  
3: +6 dB (100 Hz), +3 dB (20 kHz)  
4: +9 dB (100 Hz)  
5: +9 dB (100 Hz), +6 dB (20 kHz)
- **Attenuator** (DSP) -20 dB
- **Power requirements** 120 V / 230 V (Voltage as indicated on rear panel), 50/60 Hz
- **Power consumption** 25 W
- **Maximum dimensions**  
Width 475 mm (18-11/16")  
Height 150 mm (5-7/8")  
Depth 412 mm (16-1/4")
- **Weight** 20.2 kg (44.5 lbs) net  
25.2 kg (55.6 lbs) in shipping carton
- **Supplied Remote Commander RC-24**  
Remote control system: Infrared pulse  
Power requirements: 3 V DC, IEC R03 (size AAA) batteries x 2  
Dimensions: (WxHxD) 66 mm x 175 mm x 20 mm  
Weight: 220 g (including batteries)

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

