

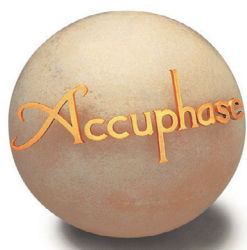
# Accuphase

MDS COMPACT DISC PLAYER

## DP-410

- High-precision CD drive
- High-quality CD tray and ultra quiet and smooth loading mechanism
- MDS++ D/A converter with four circuits driven in parallel
- "Direct Balanced Filter" with totally separate line and balanced signal paths
- Balanced output phase selector
- Digital interface with USB input
- Transport outputs and digital inputs allow insertion of DG-48 into signal path for sound field correction
- Numeric indication of sampling frequency





**Dedicated CD Player with high-precision CD drive and advanced processor — Exquisite CD tray made of extruded aluminum, plus quiet and smooth disc loading mechanism. Processor section with MDS++ type D/A converter featuring four circuits driven in parallel. Fully separate CD transport and processor section, each with coaxial, optical, and USB (input only) connectors. Coaxial and USB inputs support signals up to 192 kHz sampling frequency and 24-bit resolution.**

For its high-end dedicated CD player model DP-510, Accuphase developed a CD drive optimized for superb reproduction performance, which gained a high reputation in the audio world. The DP-410 is a successor model to the DP-400, but it also inherits the advanced know-how of the DP-510, offering enhanced performance and the latest digital technology to bring out all that the Compact Disc format has to offer. Many audiophiles have extensive CD collections and they want to get the best and most up-to-date reproduction quality possible. The DP-410 lets the listener explore the finest nuances of recordings, making them sound better than ever heard before.

The Accuphase-developed CD drive in the DP-410 features an extremely rigid and ultra precise transport mechanism that attains new levels of performance. Internal and external resonances and vibrations are reliably absorbed by the advanced chassis construction. The low center of gravity and the quiet and smooth loading mechanism also contribute to the quality of signal reproduction. The processor section features sophisticated circuit design and the latest digital technology. The MDS++ D/A approach developed by Accuphase has been further refined here, with four strictly selected high-performance delta-sigma devices operating in parallel, forming a conversion system of outstanding accuracy. Linearity at low signal levels is excellent, along with all other performance parameters that are crucial for bringing out the full musical potential of the CD. The analog filter provides totally separate filtering for the line and balanced signal paths, with 5-pole Butterworth type low-pass filters.

The outstanding sound and high performance of the D/A converter section can be accessed also by external equipment. Three types of digital inputs (USB, coaxial, and optical) accept digital signals from other components, for processing with the highest musical accuracy. Furthermore, the transport and processor sections are configured independently of each other. Even when the external processor input is used, the CD transport continues to operate, enabling for example sound field compensation in the digital domain, using the Digital Voicing Equalizer DG-48.

### CD transport section functions and features

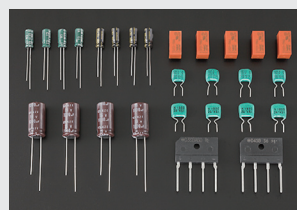
- **High-precision dedicated CD drive.**
  - ① Highly rigid construction with sturdy chassis absorbs external vibrations.
  - ② "Traverse Mechanism" with floating design and viscous dampers.
  - ③ Integrated design with large bridge cover joined to mechanism base.
  - ④ Low center of gravity and efficient vibration control.
  - ⑤ High-quality CD tray made of extruded aluminum, plus quiet and smooth disc loading mechanism.
- **Fully digital control of CD mechanism.**
- **Balanced drive circuitry for actuator control eliminates interaction with other circuits.**
- **Laser pickup with integrated RF amplifier for drastically reduced noise interference.**
- **Power-on play for automatic playback / Repeat playback function.**
- **"High Carbon" cast iron insulator feet with superior damping characteristics further enhance sound quality.**

High-rigidity, high-precision dedicated CD drive

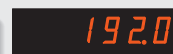


### Digital processor section and overall functions and features

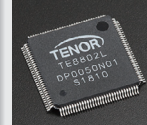
- **MDS++ D/A converter with four circuits driven in parallel.**
- **Digital level control with attenuation to -60 dB.**
- **Independent transport and processor sections with coaxial, optical, and USB (input only) connectors.**
- **Sampling frequency indication for transport operation / external input.**



Electronic parts selected for high sound quality and reliability



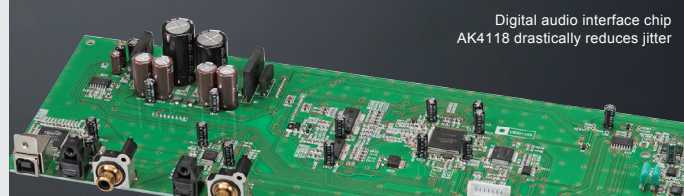
Sampling frequency indication example



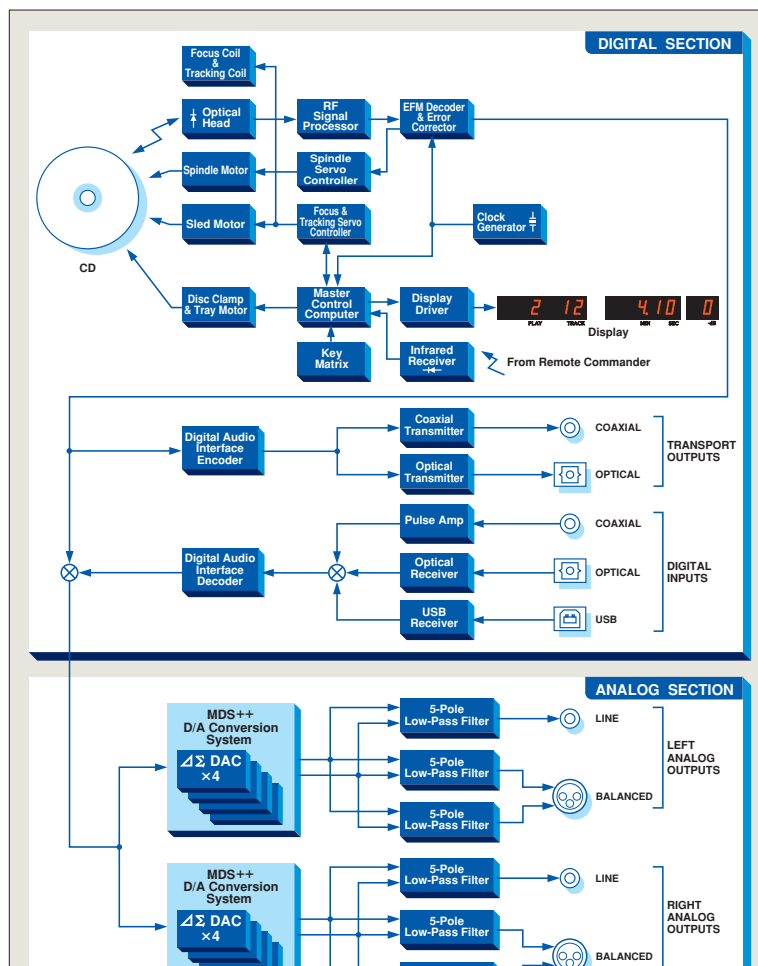
USB chip



USB port



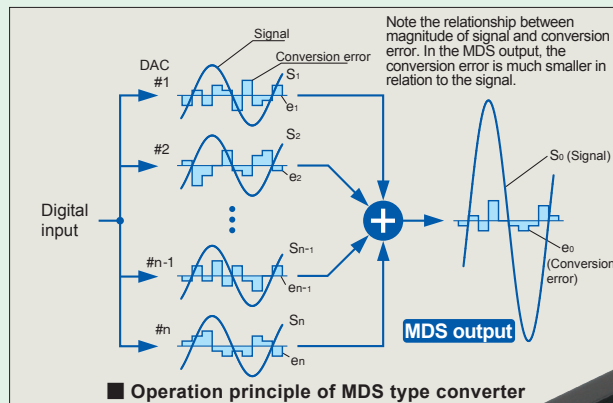
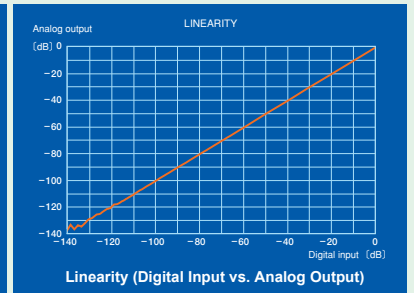
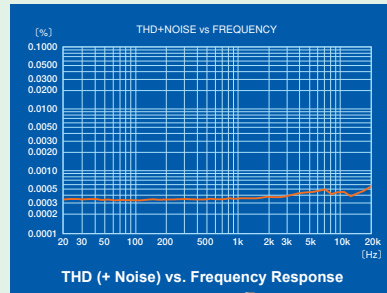
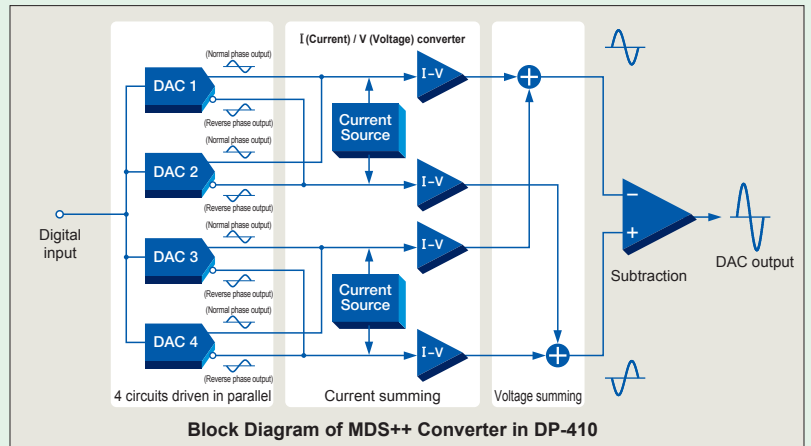
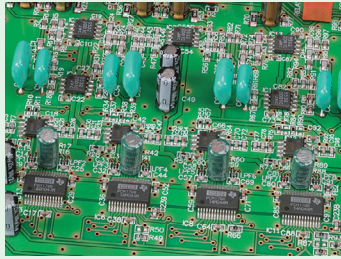
Digital audio interface chip AK4118 drastically reduces jitter





## Further refined MDS++ D/A converter

MDS (Multiple Delta Sigma) is a revolutionary design which employs several delta sigma type converters in a parallel configuration. The same digital signal is supplied to each converter. In the combined output of these multiple converters, the signal values are added up, but conversion errors cancel each other out, resulting in lower values than by simple addition. The ratio between the signal and conversion errors therefore increases significantly. Converter performance is improved in all relevant aspects. In the DP-410, four delta sigma type PCM1796 converters (made by Texas Instruments) are driven in parallel. Compared to a single converter, this results in an overall performance improvement by a factor of 2 ( $= \sqrt{4}$ ). As shown in the illustration, the MDS++ converter in the DP-410 also features an enhanced current-to-voltage (I/V) converter for processing the D/A converter output current, combined with a voltage summing circuit. The result is even better stability and top-notch performance. The music emerges from a totally silent background, with breathtaking detail resolution and accurate spatial information.



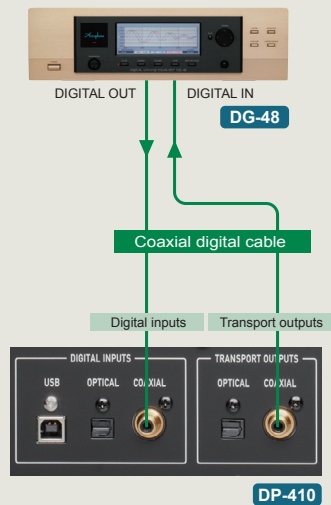
■ **Supplied remote commander RC-110**  
Provides access to direct play, repeat play, input source selection, level control, and other functions.





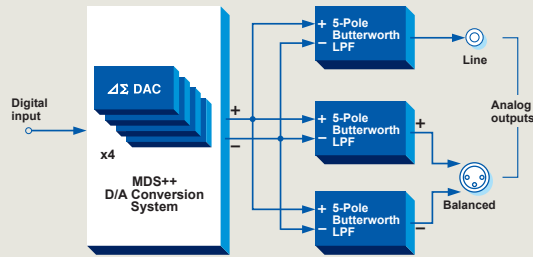
## Connection example for DG-48

The DG-48 can be connected (by coaxial or optical fiber cable) between the transport output and the digital input of the DP-410, for sound field processing of the CD transport signal in the digital domain.



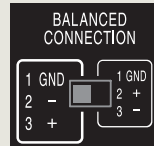
## Direct Balanced Filter with separate line/balanced circuitry

The analog filter circuitry that removes aliasing noise in the very high frequency range employs 5-pole Butterworth analog filters with extremely flat frequency response in the passband. In order to prevent unwanted interaction, completely separate low-pass filters (LPF) are provided for the line and balanced signal paths.



## Phase selector for balanced output

- In the factory default condition, the switch is set to the left side (pin 3 positive).
- If the connected preamplifier or integrated amplifier uses a "pin 2 positive" arrangement, change the setting of the switch.



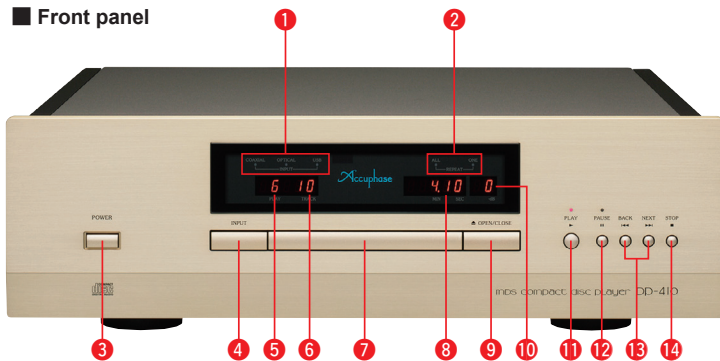
## Using the USB port

This port enables connection to a computer with a downloaded music library, for playback of high-resolution music data (up to sampling frequency 192 kHz/24 bit) with high quality.

- Before using the USB port, it may be necessary to install driver software from the supplied USB Utility Disc (CD-ROM), depending on the computer.
- The capability for playback of music data via USB depends on the operating system and music playback software of the computer.
- For information on USB settings and connection, refer to the computer documentation.



## Front panel



## Rear panel



- 1 Input selection indicator  
COAXIAL / OPTICAL / USB
- 2 Repeat indicator  
ALL / ONE
- 3 Power switch
- 4 Input selector button
- 5 Play track indicator
- 6 Total track indicator
- 7 Disc tray
- 8 Time indicator
- 9 ▲ Disc tray open/close button
- 10 Output level indicator
- 11 ► Play button
- 12 II Pause button
- 13 ◀ BACK/ ▶ NEXT track search buttons
- 14 ■ Stop button
- 15 Digital input connectors (USB, optical, coaxial)
- 16 Transport output connectors (optical, coaxial)
- 17 Balanced output phase selector switch
- 18 Analog outputs  
Balanced output connectors  
① Ground ② Inverted [-] ③ Non-inverted [+]  
(Can be changed with phase selector switch 17)
- 19 AC power connector★

## Supplied accessories

- AC power cord
- Audio cable with plugs (1 meter)
- Remote Commander RC-110
- USB Utility CD-ROM
- USB Setup Guide

## Remarks

- ★ This product is available in versions for 120/220/230 V AC. Make sure that the voltage shown on the rear panel matches the AC line voltage in your area.
- ★ 230 V version has an Eco Mode that switches power off after 120 minutes of inactivity.
- ★ The shape of the AC inlet and plug of the supplied power cord depends on the voltage rating and destination country.

## DP-410 GUARANTEED SPECIFICATIONS

- \* Guaranteed specifications are measured according to the JEITA standard CP-2402A.
- \* Measurement disc: JEITA CP-2403A

## CD Transport

- Format  
Standard CD format  
Quantization: 16 bits  
Sampling frequency: 44.1 kHz  
Error correction principle: CIRC  
Number of channels: 2  
Revolution speed: 500 - 200 rpm (CLV)  
Scan velocity: 1.2 - 1.4 m/s, constant
- Data read method  
Non-contact optical pickup  
GaAlAs (double hetero-junction visible-spectrum semiconductor laser diode)
- Laser  
COAXIAL (IEC 60958): 0.5 Vp-p, 75 ohms  
OPTICAL (JEITA CP-1212): Light output -21 to -15 dBm  
Wavelength 660 nm
- Transport output level

## Processor

- Digital input  
COAXIAL Format: IEC 60958 compliant  
OPTICAL Format: JEITA COMPUTER-1212 compliant  
USB Format: USB 2.0 Hi-Speed (480 Mbps) compliant
- Sampling frequencies  
32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz, 192 kHz (all 16 - 24 bit 2ch PCM) (OPTICAL 32 kHz - 96 kHz)
- D/A converter  
24 bits, 4MDS++ type
- Frequency response  
0.7 - 50,000 Hz +0, -3 dB
- Total harmonic distortion  
Max. 0.001% (20 - 20,000 Hz, 24-bit input)
- Signal-to-noise ratio  
114 dB or better
- Dynamic range  
110 dB or better (24-bit input)
- Channel separation  
110 dB or better
- Output voltage and impedance  
BALANCED: 2.5 V, 50 ohms, balanced XLR type  
LINE: 2.5 V, 50 ohms, RCA type phono jack
- Output level control  
0 to -60 dB in 1-dB steps (digital type)

## General

- Power requirements  
120/220/230 V AC, 50/60 Hz  
(Voltage as indicated on rear panel)
- Power consumption  
120/220 V AC: 10 W  
230 V AC: 13 W
- Max. dimensions  
Width 465 mm (18-5/16")  
Height 151 mm (5-15/16")  
Depth 393 mm (15-1/2")
- Mass  
14.0 kg (30.9 lbs) net  
20.0 kg (44.1 lbs) in shipping carton

