Accuphase

COMPACT DISC PLAYER

DP-11

COMPACT disc DIGITAL AUDIO

"8-time Oversampling Digital Filter", "18-bit D/A Converter" Precisely Adjusted One by One, and Complete Separation Between the Digital and Analog Sections via the "Very High Speed Optoisolators"

Utilizing the technology developed for its predecessor, the top-rated CD player, Accuphase's new CD player, the DP-11, brings an attractive world of music to the user, unattainable by any other CD player of this class.

Inside the chassis of the DP-11, digital circuitry, such as the player, is electrically isolated from the analog circuitry by ultra high-speed, 40M bits/second optoisolators. In addition, special technology protects the internal circuitry from electromagnetic and static electricity interference, thus preventing the sound quality from being degraded by high-frequency noise.

Carefully selected, top-grade 18-bit ICs are adopted for the D/A converters, each of which is precisely adjusted on the production line to achieve upper-limit performance. A 20-bit eight-time oversampling filter, the most advanced digital filter, is provided for both the left and the right channels. These digital filters are independent of each other and achieve a remarkable bandpass attenuation of −110dB and a bandpass ripple of ±0.00005dB.

The DP-11 can boast a lot more of Accuphase's state-of-the-art technology though, such as a noise shaper that reduces quantized noise to near the theoretical lower limit, a 3-pole GIC lowpass filter with excellent amplitude and phase characteristics, a high-precision digital deemphasis circuit with a deviation of ±0.001dB, and digital remote control that can adjust the gain down to −24dB in 1dB steps.

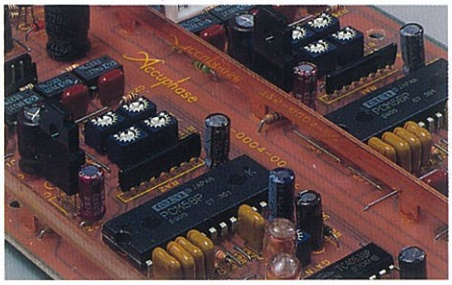
Another feature of DP-11 is its rigid construction and high resistance to vibration and shock. The linear motor laser pickup is securely mounted on a diecast aluminum frame. This construction brings the total weight of DP-11 to almost 14kg, making it one of the heaviest CD players available.

The DP-11 has opened a new era in the world of digital audio.

1 Individually Adjusted 18-bit D/A Converters

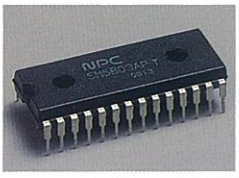
The D/A converter is the heart of digital audio equipment. The Accuphase DP-11 employs carefully selected 18-bit D/A converter ICs offering excellent characteristics. These D/A converters are designed specifically so that their bit precision can be individually adjusted during the production process to achieve upper-limit performance.

While the number of bits of a D/A converter can be increased by connecting an external circuit to the converter. This technique has no real effect on an IC with a precision as high as 18 bits. In producing the DP-11, therefore, the utmost emphasis is placed on perfecting the 18-bit precision of the ICs, and the long-term stability of the unit under a variety of evironmental changes. All the D/A converters in the DP-11 have achieved the theoretical upper-limit characteristics.



2 Independent 20-bit Eight-Time Oversampling Filters for Both Left and Right Channels

A digital filter eliminates the causes of sound quality degradation by increasing the sampling frequency in multiples of fundamental frequency and by employing the noise-reducing audio filter with smooth cutoff characteristics. Therefore, a digital filter that can only deal in multiples is not enough for practical applications, and the capability to suppress the unwanted components in the audio band and between sampling frequencies is of the utmost importance.



The DP-11 employs eight-time oversampling digital filters that operate on a high-level digital algorithm and suppress unwanted components in the range of 24.1 to 328.7kHz to an astonishing level of −110dB. Bandpass ripple, which can cause degradation of sound quality, is reduced to ±0.00005dB, proving that these digital filters are the highest in quality currently available on the market.

3 3-Pole GIC Butterworth Active Filter Having Specially Selected Elements

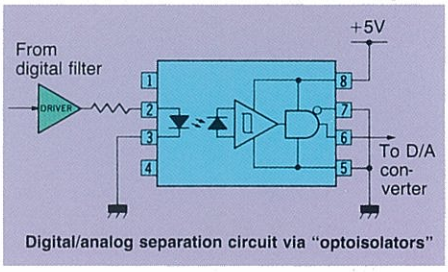
Since the sampling frequency is increased eight-fold to 352.8kHz, the signal output from the D/A converter contains high-frequency components of over 332.8kHz (=352.8−20). Of course, unwanted components also exist in sampling frequencies that are increased 16-fold, 24-fold, and so on. An audio lowpass filter that cuts off these unwanted high-frequency components should only have moderate, 3-pole (18dB/oct.) characteristics. The discrete 3-pole GIC Butterworth active filters employed in DP-11 are made up of specially selected elements to improve the sound quality.

4 Digital Circuitry and Analog Circuitry are Completely Isolated to Prevent Degradation of Sound Quality by High-Frequency Noise

Digital signals have components of very high frequency, which may mutually interfere with demodulated audio signals, degrading the sound quality, To prevent this, it is essential to completely isolate the digital circuitry from the analog circuitry to suppress the influence of static electricity and electromagnetism.

The digital circuitry, including the player, of the DP-11 is electrically isolated by optoisolators from the analog circuitry in the stage following the D/A converter. Four ultra high-speed, 40M-bit/second optoisolators are provided for each channel, so that only high-fidelity signals are transmitted in the form of light.

But though the digital and analog circuitry are isolated, high-frequency noise may be transmitted along the power cable. Therefore, the digital and analog circuits have their own independent power transformers to maintain their isolation. In addition, the power to the left and right channels is supplied from different windings to improve audio characteristics.

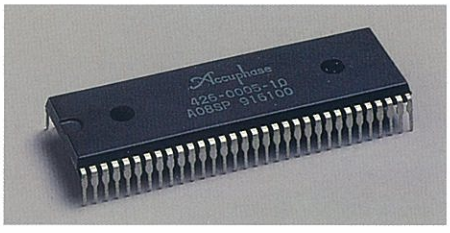


Digital/analog separation circuit via "optoisolators"

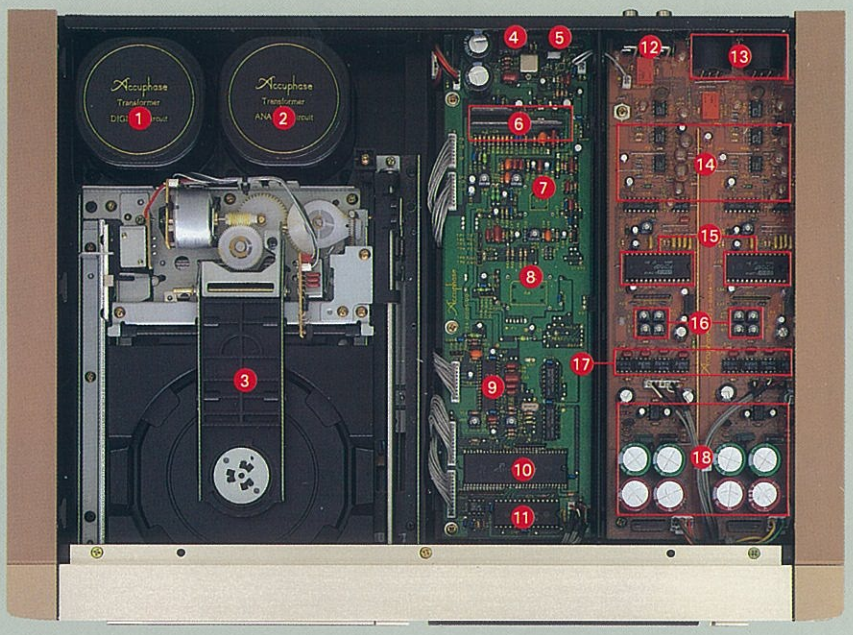
High-frequency noise may also travel through air causing static electricity and electromagnetic interference. Electrically isolating the digital and analog circuits is therefore not enough to protect them from the adverse influence of high-frequency noise. For this reason, both the analog and digital circuits of the DP-11 are completely shielded with a thick metal plate.

5 Selection Time of 1 Second or Less is Achieved by Employing a Linear Motor Laser Pickup and 8-bit Microprocessor

Direct key selection is an attractive feature of CD players. The DP-11 employs the most advanced linear motor mechanism for swift and smooth tracking of the laser pickup. With this mechanism and the 8-bit microprocessor developed for this CD player, selection time of 1 second or less is achieved. Additionally, the disc table is controlled by microprocessor, guaranteeing smooth operation.



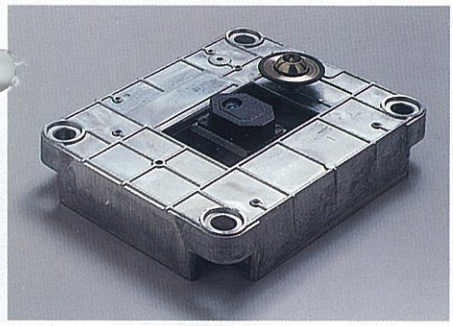
1. Power supply transformer for digital circuit
2. Power supply transformer for analog circuit
3. CD mechanism deck
4. Optical digital output receptacle
5. Coaxial digital output receptacle
6. Operating amplification IC group for mechanical drive
7. ICs for servo control (rear side)
8. ICs for digital signal processing (rear side)
9. RF amplification ICs for laser pickup
10. 8-bit microprocessor (for mechanicals and main control)
11. 20-bit 8fs digital signal processor
12. Receptacle for unbalanced output
13. Receptacle for balanced output
14. 3-pole GIC type tertiary Butterworth low-pass filter
15. 18-bit D/A converter
16. Trimmer for adjusting the top 4-bit
17. Very high speed optocoupler group for separation between digital and analog signals
18. Power supply circuit for rectifying and stabilizing the analog circuit



Internal layout

6 The Mechanism is Mounted on a Diecast Aluminum Frame Floated from the Chassis so that the Effects of Vibration and Resonance on the Sound Quality are Virtually Eliminated.

Since the disc rotates at 200 to 500rpm, if measures to eliminate vibration and resonance are not taken, components inside the unit will vibrate end cause deterioration of sound quality. In the DP-11, the mechanism itself is mounted on a floating diecast aluminum frame so that vibration is almost totally eliminated. Similarly, the disc compartment is also floated from the chassis so that external shock to the mechanism is minimized.



The DP-11 weighs about 14kg and is one of the heaviest of CD players. The thick, metal frame construction of the entire unit is effective against vibration and resonance, and the sound quality is not affected by sound pressure from the speakers or by location, guaranteeing stable operation.

7 Noise Shaper

A noise shaper reduces the noise in the audio frequency band by feeding back the rounding errors generated by each digital filter to the next data. This noise shaper reduces the requantized noise to the lower limits to improve sound quality and allow full reproduction of delicate nuances.

8 Digital Deemphasis Circuit with Ideal Characteristics of 0.001dB Deviation and 1.5 degree Phase

Emphasized CD software that raises the high-frequency band during recording and lowers it during reproduction to improve the signal-to-noise ratio is now available on the market.

These emphasized CDs have special signals which are detected by the player during reproduction so that the high-frequency characteristics are automatically selected. These characteristics cause CR elements to change the frequency characteristics of audio circuits. The DP-11 employs a digital deemphasis circuit that changes the frequency characteristics at the digital signal stage. This deemphasis circuit achieves an ideal deviation of ±0.001dB and a phase of 1.5 degree maximum vis-a-vis given values, allowing the DP-11 to fully exploit emphasized CDs.

9 DC Directly Coupled Output Stage with a Buffer Amplifier with 0dB Gain

The quality of reproduced sound is ultimately determined by the performance of the audio stage. The DP-11 has converters with output that does not need to be amplified and a DC servo directly coupled amplifier with a buffer only. As a result, the upper limits of signal-to-noise ratio and distortion characteristics have been achieved.

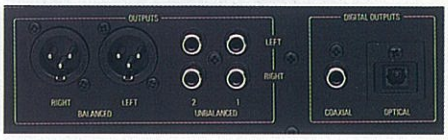
10 Digital Level Control that Can be Adjusted by Remote Commander. Three Output Systems: Two Unbalanced and One Balanced.

The DP-11 is provided with a digital level control, making the best use of the 18-bit D/A converter. Thanks to the extra two bits, the sound quality is not degraded even when the volume is turned down, and the level can be controlled ideally in a range of 0 to −24dB by the remote commander.

Two pairs of ordinary RCA phono jacks and one pair of XLR type balanced output jacks are provided. The balanced output jacks are the result of Accuphase's search for the overall balance of amplification systems in a product, and have made noise-free, high quality sound possible.

11 Wideband Optical Fiber and 75-ohm Coaxial Cables for Output

The digital signals are output from a standard 75-ohm coaxial cable connector and optical fiber connector, as originally proposed by Accuphase and regulated by EIA. The optical transmitter improves pulse width distortion and jitter, so that excellent, pure signals can be transmitted.

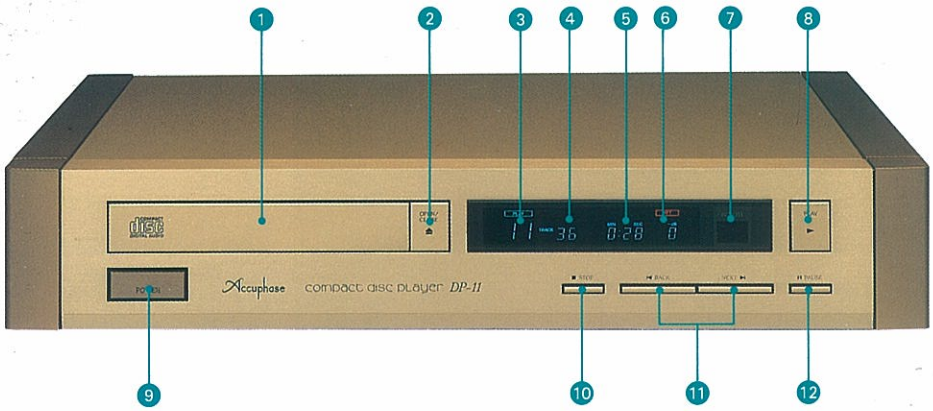


12 Power-ON Play Function that Starts Playback from Specified Music

The DP-11 has a power-ON play function that works with a timer to begin playback as soon as the power is applied. The starting track can also be freely selected.

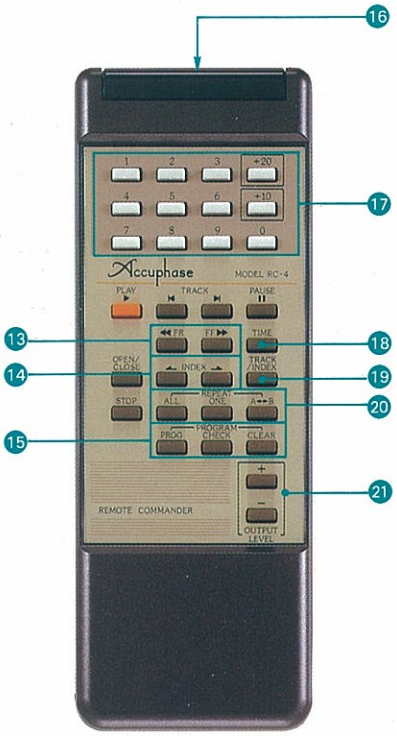
13 Simple, Yet Elegant Appearance Harmonizes with Other Accuphase Products

Accuphase's traditional champagne-gold finish panel supported by solid metal end blocks coodinates perfectly with other Accuphase products, including the 11 series C-11 Preamplifier and P-11 Power Amplifier, and blends right into any kind of room to add comfort to listening pleasure.



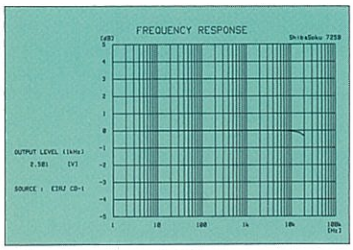
DP-11 front panel

1. Disc tray
2. Disc tray OPEN/CLOSE key
3. Play track indicator
4. TRACK/INDEX indicator
5. Time indicator
6. OUTPUT LEVEL indicator
7. Remote sensor
8. PLAY key
9. Power switch
10. STOP key
11. TRACK search key
12. PAUSE key

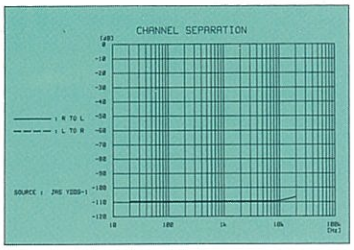


Remote commandar RC-4
(Functions added separately from the main unit)

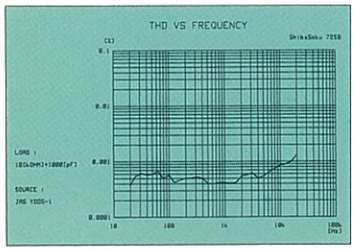
13. Fast rewind/forward keys
14. INDEX search key
15. PROGRAM key
16. LED transmitting section
17. Direct play key
18. Time display switching key
19. TRACK/INDEX display switching key
20. REPEAT key
21. OUTPUT LEVEL adjusting key



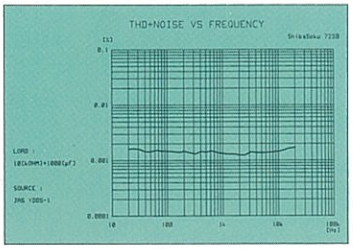
• Frequency characteristic



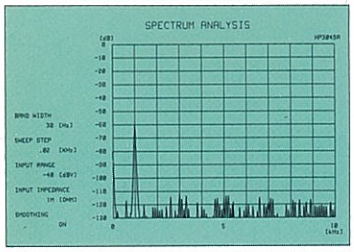
• Channel separation characteristic



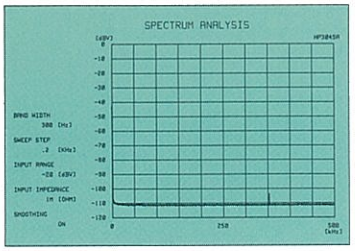
• THD vs. frequency characteristic



• THD + noise vs. frequency characteristic



• Spectrum analysis of reproducing signal at 1kHz: −60dB



• Spectrum analysis of non-signal reproduced noise vs. frequency characteristic (352.8kHz sampling frequency is attenuated to about 104dBV.)

GUARANTY SPECIFICATIONS

(Guaranty specifications are measured according to EIAJ standard CP-307.)

Performance Guaranty:
All Accuphase product specifications are guranteed as stated.

- **Type:**
  CD digital signal player
- **Format:**
  Compact disc standard format
  Number of quantizations: 16 bits
  Sampling frequency: 44.1kHz
  Error correction method: CIRC
  Number of channels: 2
  Spindle speed: 200 to 500rpm
  Scan velocity: 1.2 to 1.4m/s
- **Data read:**
  Non-contact optical pickup (semiconductor laser pickup)
- **Laser:**
  GaAlAs (double heterodyne diode)
- **Frequency characteristics:**
  4.0 to 20,000Hz ±0.3dB
- **D/A converter:**
  Ladder resistor type, 18 bits
- **Digital filter:**
  Eight-time oversampling
  Noise shaper function
  Digital deemphasis function
  Deviation: ±0.001dB
- **Total harmonic distortion + noise:**
  0.002% (20 to 20,000Hz)
- **Signal-to-noise ratio:**
  114dB
- **Dynamic range:**
  98dB
- **Channel separation:**
  106dB
- **Output voltage and impedance:**
  Balanced: 2.5V at 50 ohms (25 ohms/25 ohms), balanced XLR type
  Unbalanced: 2.5V at 50 ohms, RCA phono jack
  Digital level control: 0 to −24dB, 1dB steps
- **Digital output format level:**
  Format: digital audio interface
  Optical: output: −21 to −15dBm (EIA)
  wavelength: 660nm
  Coaxial: 0.5Vp-p at 75 ohms
- **Semiconductors used:**
  15 transistors, 46 ICs, 26 diodes
- **Power requirements:**
  Voltage: 100V, 117V, 220V, 240V, 50/60Hz
- **Power consumption:**
  20W
- **Dimensions:**
  445mm (17-1/2") width, 95mm (3-3/4") height max., 325mm (12-13/16") depth
- **Weight:**
  13.7kg (30.2 lbs.) net,
  18.7kg (41.2 lbs.) in shipping carton

Supplied remote commander RC-4
Remote control system: Infrared pulse
Power requirements: 3V DC with two batteries IEC designation 6 (size AA)
Dimensions: 64mm (3-1/2") width, 176mm (6-15/16") height, 18mm (11/16") depth
Weight: 180g (0.4 lbs) (including batteries)

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