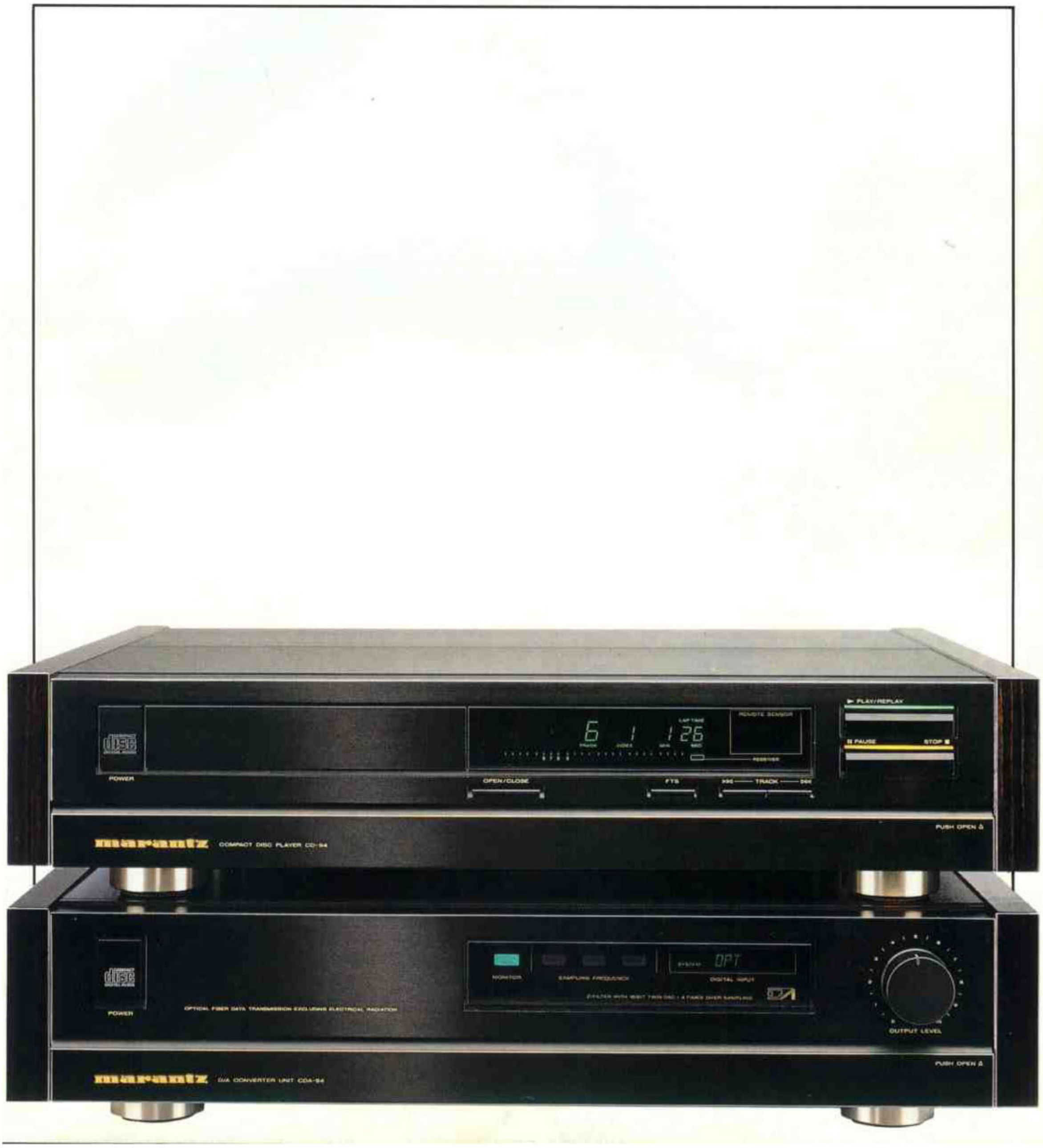
marantz®

CD94
CDA94

CD PLAYER D/A CONVERTER



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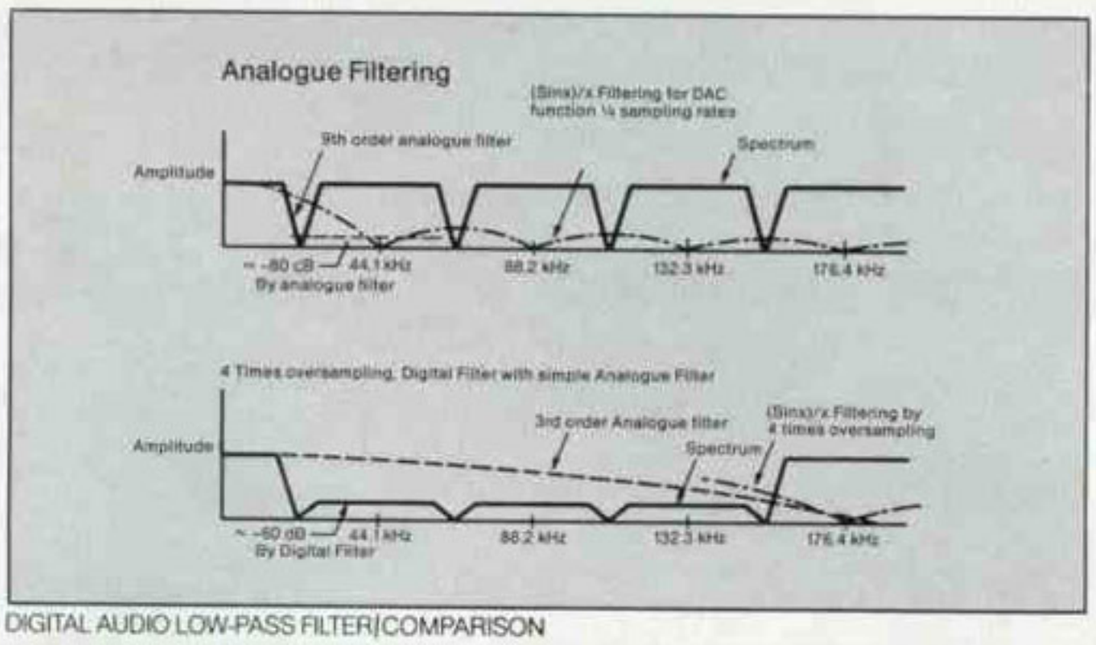
With the partnership of the CD-94 Compact Disc Player and CDA-94 Digital-to-Analogue Converter, Marantz presents true digital audio equipment for audiophiles. Equipment dedicated to the digital audio requirements of today and tomorrow. Both incorporate two Marantz features which add to the fidelity of the reproduced sound: 16-bit D/A conversion with 4 times oversampling, and optical coupling.

16-BIT 4 TIMES OVERSAMPLING

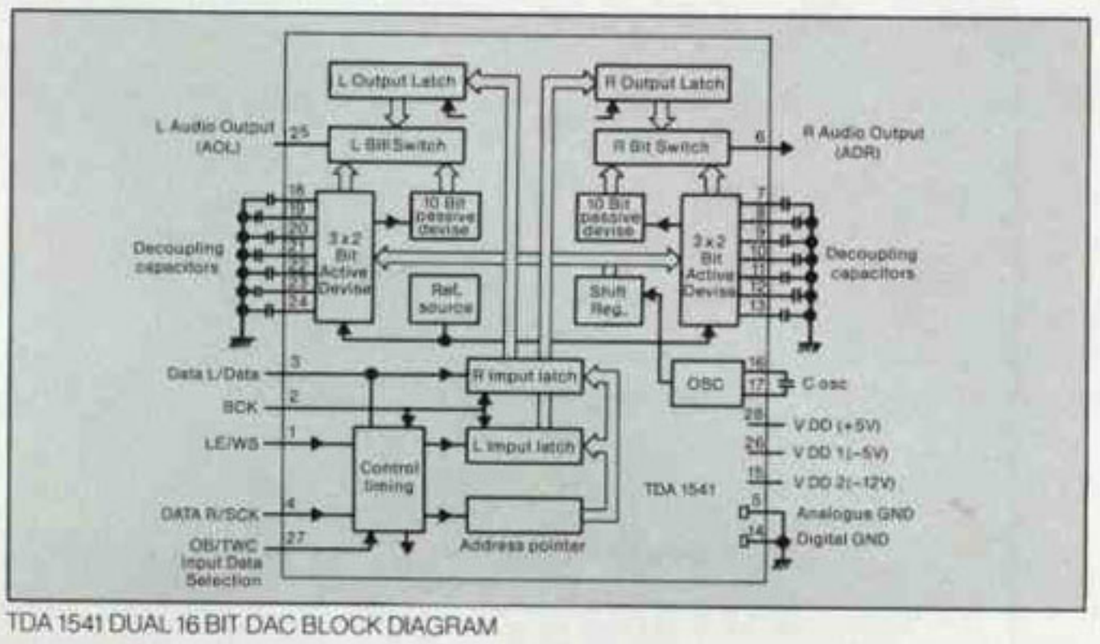
In digital audio sound reproduction the digital signal from the Compact Disc (or from Digital Audio Tape or Satellite broadcast) is converted into a music signal in the digital-to-analogue (D/A) converter. The critical part of the D/A converter, for top quality sound, is the low-pass filter. Marantz D/A converters use a digital filter, unlike many other converters which use complicated and problematic ninth or higher order analogue filters.

In the Marantz filter, the sampling frequency (which puts the digital samples back into their correct time scale) is run at four times normal speed – 176.4kHz instead of 44.1kHz for Compact Disc. Intermodulation distortion (between the sampling frequency and the audio frequency band) is also pushed up four times in frequency – far away from the audio frequencies it could otherwise distort.

Now, instead of the very sharp analogue filter used in other linear D/A converters (using 44.1kHz sampling) a very gentle 3rd order Bessel filter can be used. The result is virtually no 'ringing', which means virtually no distortion or phase error.



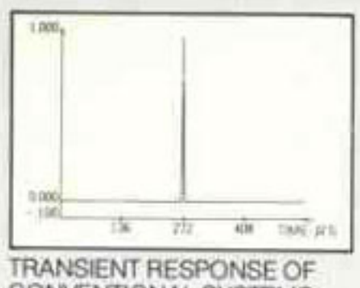
DIGITAL AUDIO LOW-PASS FILTER|COMPARISON



TDA 1541 DUAL 16 BIT DAC BLOCK DIAGRAM

TRANSIENT RESPONSE OF 16 BIT 4 TIMES OVERSAMPLING

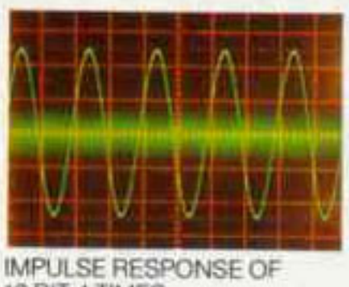
NOISE RESPONSE OF 16 BIT 4 TIMES OVERSAMPLING



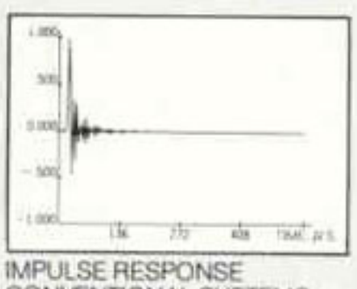
TRANSIENT RESPONSE OF CONVENTIONAL SYSTEMS

VLSI s FOR 16 BIT 4 TIMES OVERSAMPLING DIGITAL FILTER

NOISE RESPONSE OF CONVENTIONAL SYSTEMS



IMPULSE RESPONSE OF 16 BIT 4 TIMES OVERSAMPLING



IMPULSE RESPONSE CONVENTIONAL SYSTEMS (SEE ECHOS)

The new 16-bit Very Large Scale Integrated Circuit (VLSI) has tighter channel balance, an even flatter frequency response (five times tighter than the previous specification), at least 5dB more dynamic range and much improved distortion performance.

The 16-bit converters no longer require noise-shaping. A very wide dynamic range of 104dB (wider than that recorded in the studio!) faster transient response and very high phase linearity is the result.

This technique, known as four times oversampling, is used in all Marantz CD players, and the CDA-94 D/A converter.

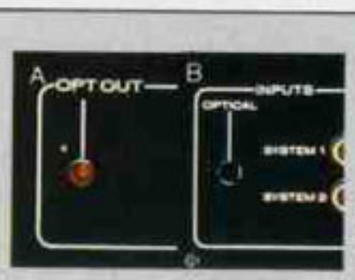
16-BIT DIGITAL-TO-ANALOGUE CONVERSION

Previously Marantz has used a D/A converter chip which offers full 16-bit resolution in combination with a digital filter/3rd order Bessel filter described above, even though it was a 14-bit chip.

A new generation of full 16-bit chips are now being employed with the oversampling and filtering techniques – the Z filter – which already mark Marantz CD players out from the rest.

OPTICAL COUPLING

In the new arena of multiple digital audio sources – now that Digital Audio Tape and Satellite broadcasts are about to join Compact Disc – there is the need for signal transfer at the digital level. And the highly efficient way to make this transfer is by optical coupling. Optical coupling sends digital signals, not as electric currents, but as light; from an optical sender, along an optical fibre cable, to a photodiode receiver.



A. OPTICAL OUTPUT CONNECTOR

B. OPTICAL INPUT CONNECTOR

C. OPTICAL FIBRE CABLE

The technique has a number of advantages over conventional electrical connections using 75ohm coaxial cable. Because of the wide bandwidth, there is much less transmission distortion. Signal losses are very small, and the signals are immune to electrostatic or electromagnetic interference. A very clean, noise-free digital signal arrives at the receiving end.

- 16-bit 4 times oversampling Digital Filter
- Twin 16-bit Digital-to-Analogue converter
- 104dB Dynamic Range, with fast transient response and outstanding phase linearity
- Fully floating diecast aluminium laser mechanism
- Diecast aluminium chassis
- Copper plated rear panel
- High VA power transformer with 4 secondary windings
- Customized components
- Single-chip decoding and error correction
- Optical and electronic digital outputs
- 2-motor precision disc loading tray
- FTS Favourite Track Selection
- Infra-red Remote Control
- Aluminium Topplate

CD94

COMPACT DISC PLAYER

The superb audiophile performance of the CD-94 is based on the proven superiority of the Marantz full 16-bit 4-times oversampling digital filter. it is characterized by very low distortion and almost no phase error.

The Digital filter is employed in conjunction with the improved 16-bit dual Digital-to-Analogue converter TDA-1541A. This VLSI (Very Large-Scale Integrated circuit) delivers greatly improved channel balance, flatter frequency response and at least 5dB higher dynamic range, than previous IC's.

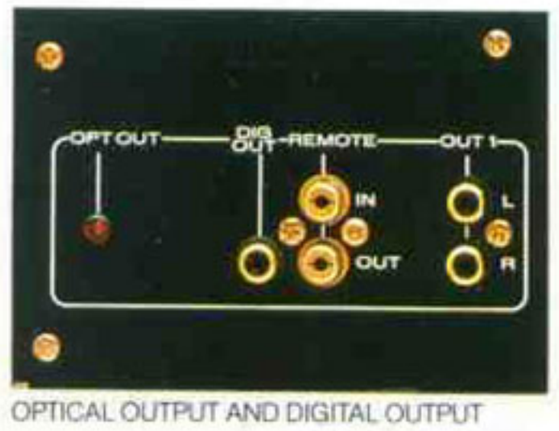
The combination of digital filtering and dual digital-to-analogue conversion result in the enormous dynamic range of 104dB, coupled with extremely fast transient response and very high phase linearity.

A vital factor in the performance of the CD-94 is accurate read-out of the disc. The CDM-1 mechanism, made of diecast aluminium, provides rigid support for the laser pick-up. The complete assembly is floated off the main chassis on massive rubber dampers; a suspension system that assures

CDM 1 DRIVE MECHANISM

freedom from vibration and acoustic feedback. Furthermore, the mechanical control circuits have been separated from the CDM-1 mechanism to avoid magnetic interference in the control circuitry and possible vibration from the drive mechanism.

The main chassis and the top cover plate are also diecast in non-magnetic aluminium. They are designed to reduce distortion caused by acoustic feedback and eddy current coupling. The rear plate, and all of the screws used on the inside are copper plated for the same reason.



OPTICAL OUTPUT AND DIGITAL OUTPUT

At the rear, the black heat sink is carefully damped to avoid any ringing that might be caused by internal resonance. Thus, vibration in one power transistor does not disturb the current flow in another.

The high VA power transformer has four independent secondary windings; one each for:

- the mechanical control system
- the digital signal processing circuits
- the analogue signal processing circuits
- the display circuits

This prevents peak demand in one circuit from causing performance-degrading power drain in another. And it also reduces the possibility of one power supply causing interference to another.

50Hz mains hum is audible, but it is not music. To suppress it, mains wiring is kept to one corner of the chassis. Even the power on switch is mounted in that corner, and operated through a long poly-carbonate rod.

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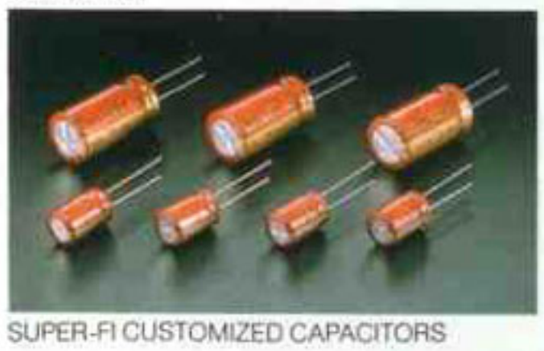
PCB LAYOUT DESIGN PREVENTS INTERFERENCE AND CROSS-COUPLING

HIGH VA POWER TRANSFORMER AND CUSTOMIZED MAIN ELECTROLYTIC CAPACITOR



SUPER-FI CUSTOMIZED CAPACITORS

Carefully chosen customized components guarantee the highest achievable sound quality. In addition to the high-VA power transformer, noteworthy components include high value ELNA electrolytic capacitors with ceramic powder filling and the damped copper styrol film capacitors in the Bessel filter stages. The capacitor leads are of tinned oxygen-free copper, not the usual tinned steel. Everything possible has been done to ensure the quality of the sound signal at the gold-plated output terminals.

All the complex functions of signal decoding and error correction are

DIECAST CHASSIS

concentrated in one single VLSI chip. This is specially designed to take full advantage of the powerful error detection and correction code offered by the Compact Disc Digital Audio system, but only partially used in many players.

With its digital output facilities the CD-94 can be directly connected to other digital signal processors, including the CDA-94 Digital-to-Analogue converter. A standard 75-ohm electronic output is provided (via a gold-plated phono socket). But for the best possible transmission, optical output coupler is fitted. The high-precision disc tray loading has separate motors for tray drive and disc positioning, with magnetic clamping to ensure stability during rotation.

The FTS FAVOURITE TRACK SELECTION memory stores preselected track numbers or timed passages from a complete Compact Disc collection. Once the favourite tracks on a particular disc have been stored, they can be played at any time without the need for any further programming (although the selection can be changed at any time). The exact number of dics that can be programmed depends on the programmes chosen. As an example 155 discs can be programmed, to play an average of 5 tracks per disc.

Fully remotely controlled, the CD-94 has lacquered wooden sides, a discretely elegant display and gold-plated keypad buttons. A flip-down cover conceals all except the principal front-panel controls until they are needed. The display is clear, without being disturbing. The styling is classical Marantz; distinguished and refined.

LARGE DISPLAY

SWITCHES INSIDE THE FLAP

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CDA94

DIGITAL-TO-ANALOGUE CONVERTER

- **Digital source selector**
- **Autochange multisampling at 32, 44.1 and 48kHz**
- **16-bit 4 times oversampling Digital Filter**
- **Twin 16-bit Digital-to-Analogue converter**
- **Optical coupling and electronic digital inputs**
- **L-R independent output Amplifier**
- **Precision analogue filters**
- **Balanced, variable and fixed analogue outputs**
- **Digital monitor input/output**
- **3 separate power supplies**
- **Customized components**

THE NEW POSSIBILITIES OF DIGITAL AUDIO

The CDA-94 is the world's first digital-to-analogue converter with multisampling, for conversion of Compact Disc, DAT Digital Audio Tape and Broadcast Satellite signals with 16-bit 4 times oversampling accuracy, and with high-precision analogue circuitry.

One Toslink coupler and two 75ohm coaxial sockets provide digital input connections. In addition, there are digital tape input and output monitor sockets; standardized connections for all the present and envisaged digital audio sources.

The autochange circuit automatically adjusts the sampling frequency to suit the selected input: 44.1kHz for compact Disc, 48kHz and 32kHz for DAT and the anticipated Broadcast Satellite.

The high performance of the Marantz 16-bit 4 times oversampling digital filter and twin 16-bit D/A converter are further accentuated by optical coupling between the digital filter and the D/A converter, by high precision analogue filter and by L/R independent amplifier circuits.

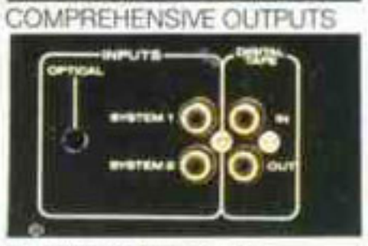
The circuits are based on Marantz high-technology audio engineering know-how.
Three separate printed circuit boards carry the Digital input-output section, the D/A converter section and the analogue amplifiers.

SWITCHES INSIDE FLAP

LARGE TRANSFORMERS

SUPER-FI CUSTOMIZED CAPACITORS

COMPREHENSIVE OUTPUTS



DIGITAL MONITORING TERMINALS FOR DATs

These circuits are supported by three separate power transformers for total circuit separation and protection from interference and cross-coupling. The analogue circuit transformer is a special high-efficiency toroid. Furthermore, carefully chosen customized components ensure the very highest performance. They include ELNA

LARGE DISPLAY

electrolytic capacitors with ceramic powder filling and damped copper styrol film damped capacitors for the analogue circuits. Capacitor leads are not of tinned steel, but oxygen-free copper.

The chassis, of non-magnetic diecast aluminium, provides the high rigidity to ensure absence of acoustic feedback. It also suppresses eddy current coupling.

ANALOGUE OUTPUTS

Three different forms of analogue output are provided:
- Balanced output using 600 ohm output line transformer
- Fixed output
- Variable output (controlled by high-precision conductive plastic potentiometer) for direct connection to power amplifier.

ABSOLUTE PHASE CONTROL

It is possible, for a variety of reasons, for the absolute phase of the original music to become inverted by some part of the recording process.
The Absolute Phase Control allows such an inversion to be corrected digitally, to restore the original harmony of the music. This is especially valuable for vocal performances.