

ROTEL *hi fi*

RHCD 10 RH Series CD Player

OWNERS MANUAL

Please write the purchase date, serial number and the **Rotel *hi fi* Authorized Dealer** in the spaces provided, for your future reference.

Purchase date _____.

Serial number _____.

Rotel *hi fi* Authorized Dealer _____.

SAFETY INSTRUCTIONS



EXCLUSIVE NOTE FOR U.K.

If your unit comes with a 3-core cable without a plug, make certain live and neutral leads are connected to the proper terminals. Check that the terminals are screwed down firmly and no loose strands of wire are present.

IMPORTANT: The wires in this mains lead are coloured in accordance with the following code:

BLUE: NEUTRAL
BROWN: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows. The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLUE or BLACK. The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or colour BROWN or RED.

• Explanation of Graphical Symbols



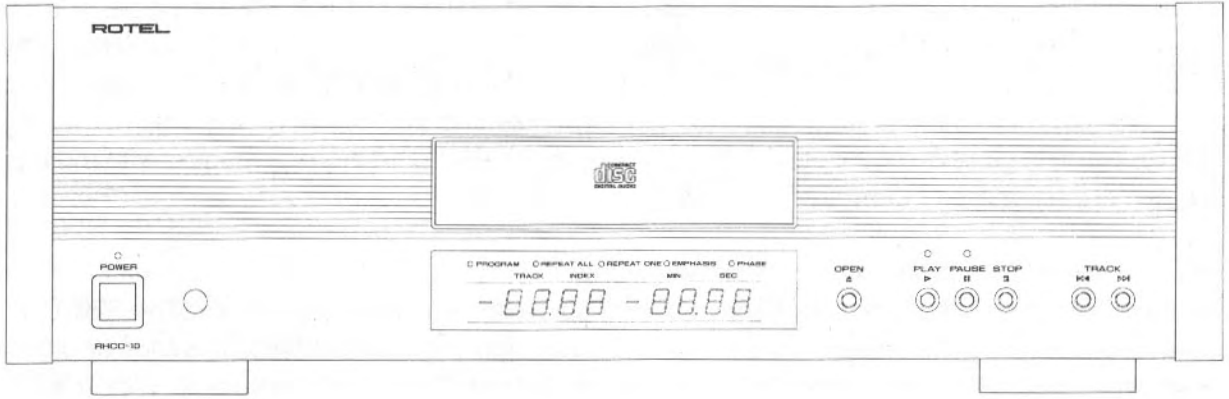
The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert you to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



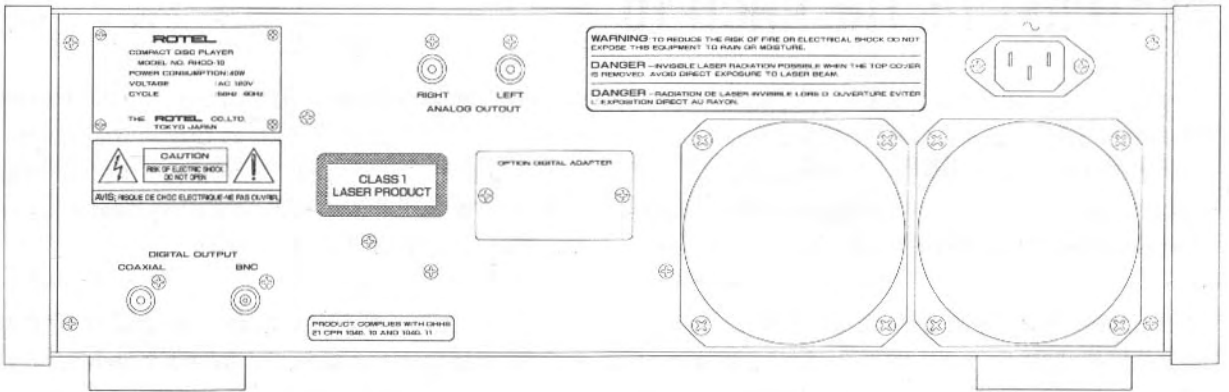
The exclamation point within an equilateral triangle is intended to alert you to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

1. Read Instructions — All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions — The safety and operating instructions should be retained for future reference.
3. Read Warnings — All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions — All operating and other instructions should be followed.
5. Water and Moisture — The appliance should not be used near water — for example, near a bathtub, washbowl, kitchen sink, laundry tub, in a wet basement, or near a swimming pool, etc.
6. Carts and Stands — The appliance should be used only with a cart or stand that is recommended by the manufacturer.
7. Wall or Ceiling Mounting — The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. Ventilation — The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. Heat — The appliance should be situated away from heat sources such as radiators, stoves, or other appliances that produce heat.
10. Power Source — The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. Power-Cord Protection — Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
12. Cleaning — The appliance should be cleaned only as recommended by the manufacturer.
13. Nonuse Periods — The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
14. Object and Liquid Entry — Care should be taken so that objects do not fall into and liquids not spilled into the inside of the appliance.
15. Damage Requiring Service — The appliance should be serviced by qualified service personnel when:
 - A. The power-supply cord or the plug has been damaged; or
 - B. Objects have fallen, or liquid has been spilled into the appliance; or
 - C. The appliance has been exposed to rain; or
 - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
 - E. The appliance has been dropped, or the cabinet damaged.
16. Servicing — The user should not attempt to service the appliance beyond those means described in the operating instructions. All other servicing should be referred to qualified service personnel.
17. Grounding or Polarization — The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.

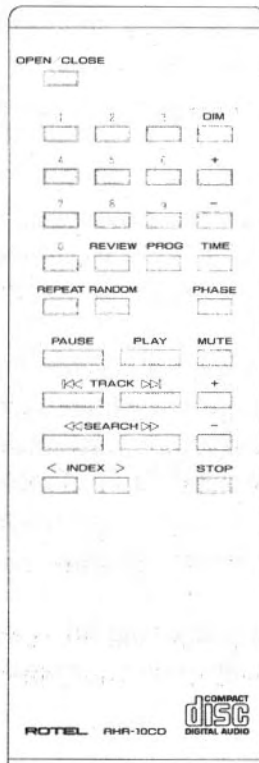
FRONT PANEL



REAR PANEL



REMOTE CONTROL



GREETINGS FROM ALL OF US AT ROTEL

Thank you for buying our RHCD 10 CD player. We believe this to be the finest single cabinet Compact Disc player available. Our engineers have designed this machine to reflect the experience gained by manufacturing high performance audio and digital electronics for more than 30 years. We have brought our technical expertise and our love of music together during the design and creation of the RHCD 10. We believe the RHCD 10 will provide you with musical enjoyment for years to come.

We are well known for the high performance and value of our 900 Series components. These are excellent products that offer superb sound and excellent value for money. The RHCD 10 was designed by the same skilled craftsmen that design our more affordable series of digital electronic components. In the RHCD 10 we have given them the freedom to create a CD player without the normal cost constraints we apply to our regular line of equipment. The resulting CD player is an extremely high performance machine that will delight you with its technical and musical adroitness.

FEATURES OF THE RHCD 10

The drive mechanism is the Philips CDM 9 PRO with an aluminum turntable, nickel brass frame and a brushless DC motor. Previously this has only been used in studio grade machines. RHCD 10 is the only use of this design in a consumer grade CD player. We chose the CDM 9 PRO for its stability, performance and reliability. This has a radial arm with a single beam laser and the latest servo control system to improve tracking of warped or scratched discs.

The power supply is provided by two, externally mounted, toroidal transformers and is highly regulated. The audio and servo power supplies are completely separate to avoid interference. Multiple sub-regulation stages insure that stable power is available at all points in the circuits. We use high quality capacitors in the power supply to improve propagation time and to reduce the equivalent series resistance. The resulting high speed design allows dynamic signals to be reproduced properly, without strain or limitation. This gives the servo control for the laser pick up a fast responding power supply that will keep the laser pick up properly focused, even on a warped disc. The power supply for the analog stages is free from any demands of the servo control circuit in the digital section.

The cabinet is made in layers to allow the power supply, analog and digital circuits to be separated from each other to minimize interference between digital and analog stages. This has been designed to isolate the various stages of the RHCD 10 for the lowest possible noise.

The digital to analog converters (2) are the Burr Brown PCM63K *select grade* chip. This is a 20 bit, mono, design. This DAC offers superb resolution and sound quality. Critical circuit points have precision metal film resistors and capacitors installed to assure precise tolerances are met. We have WIMA, RIFA, Black Gate and Great Supply capacitors, Vishay and Roederstein resistors in the RHCD 10. Each critical part was chosen by extensive listening tests. Some parts are 0.1% tolerance for exact adherence to specifications.

The display panel has variable intensity and can be turned off. This display panel is designed to be low noise, unlike most designs, and will have less audible influence on the sound when on.

This CD player has two digital filters built in. These are Finite Impulse Response (FIR) designs. The first rapidly removes the signals above 20 kHz. The alternate design allows some harmonics above 20 kHz to pass through. Some highly respected companies choose the latter design as being preferable to the filters commonly chosen. We feel it is fun to have a choice. Listen and decide for yourself which sounds best. (See **SPECIAL FEATURES** for more detailed information.)

Absolute phase may be inverted with this CD player by pressing the Phase button on the remote control.

The analog output level of the RHCD 10 is variable or may be muted. The digital outputs are available through a coaxial RCA jack, BNC connector or an optional AT&T ST connector, available in some countries.

The buffered, analog filter output stage of the RHCD 10 is made with discrete components, not the more common operational amplifier IC chip used in most machines. This provides excellent speed and detail, as well as higher current output capability.

INSTALLING THE RHCD 10

We recommend that this CD player be installed in high quality, audio component furniture. This will allow the RHCD 10 to be placed on a separate shelf. Do not stack the CD player on another component or stack another component on the top of the RHCD 10 CD player. This will minimize potential interference from other components in the system, such as a tuner, digital satellite receiver, laser disc player or a VCR. Audio component furniture will minimize or suppress vibrations. This will benefit the sound quality of all audio components as vibration has an adverse effect on sensitive electronic components. A CD player will benefit because the servo assembly will not have vibration constantly causing the laser pick up to move and need re-focusing on the playing surface of the disc.

Interconnect cables and power cables should be kept apart in any hi fi system. Audio furniture frequently has provisions for this. Audio patch cables should not be laid next to power cables since the large currents flowing in the power cord can adversely affect the sound of the low level signals in the interconnecting cables. Digital signal cables should be carefully placed to avoid interference from power cables, patch cables and hum fields from large power cords or power transformers in a power amplifier.

The RCA patch cables, included, will connect the RHCD 10 to your system. Observe the correct connections, for the left (**L**) and right (**R**) channels, to avoid reversing the channels. Higher quality patch cables will improve your system and we recommend auditioning them. *The sound of a well set up system will be a source of great pleasure to you and your friends.* Installation should be done with care and planning to optimize the potential of the system in your listening room. Your **ROTEL hi fi AUTHORIZED DEALER** will be happy to offer advice about installation or audio and digital patch cables.

Please keep the box and the packing material for the RHCD 10 so that the CD player can be packed for shipping if it ever needs service. It is also a good idea to pack the CD player in its original box for transport if you move to a new location. This will protect the finish and delicate mechanisms inside.

ELECTRICAL REQUIREMENTS

The RHCD 10 requires AC voltage. The correct voltage for your CD player is printed on the back panel. Please don't try to operate the RHCD 10 on incorrect voltage. This can damage or destroy the sensitive circuits inside your CD player. If you are in doubt about the correct voltage for this CD player we suggest that you check the label on the rear panel. Consult your **ROTEL hi fi AUTHORIZED DEALER** if you have any further questions about the proper installation or voltage needed for your CD player.

There is **NO** user serviceable part inside the RHCD 10. *Please do not open the cabinet. This will expose you to the hazard of high voltages. There is a **laser** inside the CD player that can be potentially dangerous to your eyesight and health.* The cabinet should only be opened by **Rotel hi fi AUTHORIZED SERVICE** personnel.

CLEANING THE CABINET OF THE RHCD 10

The 8 layer, red lacquer end caps and the anodized finish of the cabinet should only be cleaned with a clean, soft, dry cloth or chamois. Do not use cleaning solvents or harsh chemicals on the cabinet as they will damage the finish. This could also remove the labels. If liquid falls into the cabinet of the RHCD 10 it will damage the circuitry. This is why we recommend a clean, dry cloth *only* for cleaning.

FRONT PANEL DISPLAY AND CONTROLS OF THE RHCD 10

We have included essential controls on the front panel of the RHCD 10. This simple and appealing design offers frequently used controls only. We have included **OPEN (CLOSE)**, **PLAY**, **PAUSE**, **STOP**, and **TRACK (I<<, >>I)** buttons. *All functions are usable by remote control, using the RHR 10CD remote control included with the RHCD 10.*

The **DISPLAY** will provide information related to operation with the front panel buttons or the remote control. It will read out the Track number, Index number and Time during normal operation. Some of the features or functions will illuminate small indicator lights in the display panel during operation. The small **INDICATOR** lights will show when **PROGRAM**, **REPEAT**, **RANDOM**, **EMPHASIS** and **PHASE** have been selected. (All of these will be discussed in other sections except **EMPHASIS**, which is explained below.)

Some CD discs have had signal processing during recording to emphasize the higher frequencies. This processing or Pre-emphasis is done to improve the signal to noise ratio of the recorded material. When one of these discs is played in the RHCD 10 the **EMPHASIS** light will illuminate. (See **SPECIAL FEATURES** for more detailed information about this.)

THE RHR 10CD REMOTE CONTROL

The attractive grey aluminum **RHR 10CD** remote control requires 2 AAA (RU3/UM-4) batteries, included, for operation. These should be installed in the battery compartment in the rear panel. Open the sliding panel, **∇OPEN**, and insert the batteries. **Please be careful to observe the correct polarity of the batteries.** Slide the cover back into place afterwards.

The RHR 10CD remote control has all the function buttons on it. These include the PROGRAM, DIM (+, -), TIME, PHASE, MUTE (+, -), INDEX, RANDOM, REVIEW, REPEAT and SEARCH and DIRECT ACCESS track buttons. The buttons are **color coded** for ease of use. The DIM, MUTE, TRACK, SEARCH and Direct Access Track Number keys are **black**. The INDEX, PAUSE, + and - (for MUTE and DIM), REPEAT, RANDOM, PHASE, REVIEW, PROG, TIME, and OPEN/CLOSE buttons are **grey**. The STOP button is **red**. The PLAY button is **orange**.

USING THE RHR 10CD REMOTE CONTROL

The **OPEN/CLOSE** button on the RHR 10CD remote control controls the loading tray on the RHCD 10. Press it once to OPEN the tray. Press it again to CLOSE the tray. If pressed during PLAY, this will stop all functions and open the tray. (Push the tray closed by hand and RHCD 10 will PLAY.)

The **DIM** button controls the illumination of the display panel. Press DIM once and the display will extinguish. Press DIM again and the display will come on. The intensity level of the display is adjustable from 0–31 with the remote control. The preset level will be ~20. To vary the intensity is easy. Press the + button, below to the DIM button, and the display will become brighter. Press the - button, below the DIM button, and the display will become dimmer. If you choose to turn the display OFF, ALL indicator lights will extinguish. If you press any button when the display is extinguished the display will come on for a few seconds and then extinguish again.

The **DIRECT ACCESS** track buttons will select the song you want directly, by number. To select a track number higher than 10, press the first digit of the number and then the second digit soon afterwards. To begin PLAY, press the DIRECT ACCESS track number you want and then press PLAY. During PLAY, press the DIRECT ACCESS number you wish to hear and the RHCD 10 will begin to play it after a couple of seconds. The slight delay is built in to accommodate the possible selection of a dual digit track number.

The **REVIEW** button is used during programming to check what songs have been programmed. It will show the track numbers in the sequence in which they have been programmed. Each programmed track number will be visible for approximately a second.

The **PROG** button is to PROGRAM a song into the memory. Press the TRACK advance button (I<<, >>I), or Direct Access keys, until you read the track number desired in the display. Now press the PROG button. The track will be programmed and the letter P will appear after the track number. During programming or play, the PROGRAM indicator light will be illuminated. Wait a second and the total number of tracks on the disc will be displayed. Repeat for all tracks you wish to enter, up to a maximum of 30 tracks. To remove a song from your program, push the track advance button until the track number, with the letter P, is shown in the display. Press the PROG button and the letter P will extinguish. This track has been removed from the program. (This precludes the ability to include a track *twice* in a program.)

The **TIME** button will allow you to see the elapsed time, time remaining in a track or total time and tracks remaining on a disc. The TIME button will show elapsed time or time remaining in a track when used during programming. It will not show total time remaining or total tracks remaining during program or random operation. Press the TIME button to see the function you wish. Time remaining in a song or total time and tracks remaining will be preceded by a minus (-) sign. The time will *countdown* in this mode.

The **REPEAT** button will cause the RHCD 10 to continually play the whole CD or a program repeatedly. It will play until you press STOP or REPEAT a second time. The REPEAT indicator light will be illuminated when this is selected. This may be combined with RANDOM or PROGRAM play.

RANDOM play will select all the songs in a random manner on the disc or in a program. When all the songs have played once, it will stop. If combined with REPEAT, it will play all the songs on the disc before repeating a track number again.

When live music is being played, the initial sound of a drum being struck creates a positive pressure wave in the air. If this is inverted during the recording process, the initial sound coming from your stereo system will not be a positive pressure wave from your speaker. Many people claim to hear a subtle difference when the *absolute phase* of a music or test signal is inverted. For this reason, we have included a **PHASE** button on RHCD 10. Pressing the PHASE button will change the absolute phase of the signal from 0° to -180°. We are aware that there is some controversy about the audibility of this effect. Feel free to experiment with the PHASE button. (*This is not the same as incorrect phase when connecting speakers to an amplifier.*) The indicator light will illuminate when the PHASE is -180°, or INVERTED phase.

We have included a **MUTE** button on the RHR 10CD remote control. Pressing this button will cause the analog output to mute completely. Below the MUTE button are two related buttons. These are denoted with a plus (+) and a minus (-) sign. These denote attenuation (Attn) of the output from the RHCD 10. The output may be attenuated from 0 dB to 60 dB, in 5 dB steps. As this is measuring the amount of attenuation *it will work the opposite of the way it would seem*. Pressing the + key will increase the attenuation, *which is the same as saying it will reduce the output voltage*. Pressing the - key will decrease the amount of attenuation, which means there will be more output voltage (volume) from the RHCD 10.

The **PLAY** button will start the CD player drive. It will read the table of contents (**toc**) and begin playing the disc. During PLAY, *pressing the button a second time will cause the same track to start again*. If the tray is open, pressing the PLAY button will close the tray and cause the CD player to start playing the disc. Pressing STOP will cancel PLAY and RHCD 10 will show the total track numbers and total time on the disc in the tray.

During PLAY, pressing the **PAUSE** button will cause the CD player to stay at the same time on the disc. The disc will still spin but no sound will be heard. Pressing PAUSE a second time will resume play. Pressing STOP will cancel the PAUSE setting and stop play.

The **TRACK** buttons will advance to the next track (**>>|**) or skip back to the previous track (**|<<**) on a disc. Each time you press one of these buttons will equal one track forward or backward on the disc. The TRACK buttons are used during PROGRAM to select the tracks for the program entered into memory.

During PLAY, the **SEARCH** buttons will cause the RHCD 10 to fast forward (**>>**) or fast reverse (**<<**) in the current song. SEARCH begins slowly and speeds up if held down continually.

The **STOP** button will stop all functions. *If pressed twice*, it will cancel a PROGRAM in memory.

The **INDEX** buttons are useful for compact discs that have index points added in the sub code. To advance to the next INDEX, press the **>** button, to return to the previous INDEX, press the **<** button. Discs with INDEX points are usually classical music discs with long musical selections or movements. INDEX will allow you to reach a particular place in time *inside* a long musical movement. There are other types of musical or test discs with index points as well. The DISPLAY on the RHCD 10 will show the current INDEX number of the song and the current time in the song. If the disc does not include INDEX points, the DISPLAY for INDEX will read 1 (only) during play.

SPECIAL FEATURES OF THE RHCD 10

NOTE:

We have included this section for those audiophiles who wish to have more in depth information about the RHCD 10. *This is not required reading but the section about Special Feature settings can be interesting for setting RHCD 10 to different configurations of digital out or digital filters. (See below.)*

The RHCD 10 includes two different types of digital filters. Type 1 and Type 2 are both three stage linear phase Finite Impulse Response filters. The 1st stage is a frequency sampled (fs) to 2 fs design, the 2nd is a 2 fs to 4 fs stage and the 3rd is a 4 fs to 8 fs stage. This uses a 21 bit x 22 bit parallel type multiplier and a 25 bit accumulator.

The **Type 1** design's first stage is a 153rd order filter, the second stage is a 29th order filter and the third stage is a 17th order filter. This suppresses frequencies above 20 kHz at the rate of ~110 dB per octave.

The **Type 2** design's first stage is a 25th order filter, the second stage is a 29th order filter and the third is a 17th order filter. This suppresses the frequencies above 20 kHz at the rate of ~77 dB per octave.

The Type 1 and Type 2 filters are user switch able. To access this feature will require a simple procedure. To begin: Turn the POWER OFF to the RHCD 10. Press the PLAY and the STOP buttons, *at the same time*. While pressing the PLAY and the STOP buttons, turn the POWER ON. You will now enter the user switch able **SPECIAL FEATURES** mode for the RHCD 10.

The DISPLAY will show **1.d.out OFF**. **The means that the digital output is turned OFF.** To turn the digital output ON, press the PAUSE button *one time*. The DISPLAY will show **1.d.out ON**. **The Digital output is now ON.**

To change from the Type 1 digital filter to the Type 2 digital filter is easy. Press the **TRACK** advance button (**>>I**) *one time*. The DISPLAY will show **2.d.FIL 1**. **The Type 1 digital filter is now ON.** To set the digital filter to Type 2, press the PAUSE button *one time*. The DISPLAY will show **2.d.FIL 2**. **The Type 2 filter is now ON.** (Digital out may be on or off, as desired.)

Press the POWER button again and RHCD 10 will go OFF. **When you press the POWER button again RHCD 10 will come ON in NORMAL mode. It will remember the Special Feature settings,** until you choose to change them.

Some other items in the RHCD 10 that may be of interest to audiophiles will be the various components and designs used to manufacture our finest CD player.

We have chosen the Burr Brown PCM63K Select Grade Sine Magnitude type 20 bit D/A Converter for the RHCD 10. This is a high precision device, with an excellent signal to noise ratio. It is a non zero cross distortion, glitchless design created to be one of the finest available DAC chips. The high speed discrete I/V converter, immediately following the Burr Brown DACs, sends its output to the analog output stage and filter. This is a 3 order Bessel filter for greater linearity and unity phase. This circuit uses precision Vishay metal film resistors and Rifa film capacitors.

All printed circuit boards are fiberglass epoxy with symmetrical circuits, where appropriate. We have built in large copper bus bars to ensure adequate current flow in the power supply. We have 6 current regulation stages per channel, for a total of twelve. There are individual and local regulator power supplies for the DAC and analog stages, the digital section and the servo control for the laser pick up. The total capacitance in the power supply is 60,830 micro farads, most of these being the finest available capacitors from the respective manufacturers. *This is more than many 100 watt per channel power amplifiers have for their power supply.* This generous, highly regulated power supply is driven by twin toroidal power transformers of our own design. We mounted these on the rear panel, outside the CD player. This somewhat unusual step was taken to optimize the performance of the circuits and to eliminate as much interference as possible from the power supply into the CD player. We considered a separate power supply but decided against it. It would not be convenient for installation and we have essentially the same performance without the trouble of trying to locate another cabinet and power cable in the system.

The de-emphasis processing in the RHCD 10 is done in the digital domain by an Infinite Impulse Response (IIR) filter. The signal is reduced in level by approximately 0.3 dB at 1 kHz, by ~4.5 dB at 5 kHz and by ~9.0 dB at 16 kHz. This follows the curve for de-emphasis closely and ensures emphasized discs will be played back properly by the RHCD 10.

At various critical places in circuitry of the RHCD 10 we have installed the best grades of WIMA polypropylene film capacitors or RIFA polystyrene and polypropylene film capacitors. The power supply electrolytics are the finest Black Gate by Rubicon or Great Supply by Nichicon.

We have chosen either Roederstein 1% metal film resistors or Vishay 1%, 0.5% or 0.1% tolerance metal film resistors. These parts were chosen by checking the sound quality of the circuit and then tuning to increase the overall feeling of involvement and enjoyment of the music. This is time consuming but it serves the music, which is very important to us at ROTEL.

WHAT DOES ALL THIS MEAN, ANYWAY?

*The final point to make is, perhaps, the simplest; we have tried to recreate music as accurately as possible with this CD player. We are not ultimately talking (or writing) about mechanical parts, circuits and designs. We are talking about reproducing music and the sheer pleasure it can provide. No matter what high precision parts we have chosen for production and no matter what this CD player looks like, **"The final goal of all our efforts is the enjoyment of one of the oldest, most amazing skills that man has, the ability to make music."** We have focused all of our design and manufacturing expertise to achieve the recreation of this incredible, wonderful skill.*

Thank you for reading this owners manual and thank you very much for buying this CD player. We appreciate being a part of your life.

SPECIFICATIONS: RHCD 10

| | |
|------------------------------|-----------------------------|
| Frequency Response | 5–20,000 Hz, +/- 0.5 dB |
| Dynamic Range | > 100 dB |
| Separation | > 120 dB, full bandwidth |
| Signal to Noise Ratio | > 115 dB, (A wtd.) |
| Total Harmonic Distortion | < 0.003% |
| Linearity (w/o dither) | +/- 1.0 dB at -90 dB |
| (with dither) | +/- 0.5 dB at -90 dB |
| Analog Output Impedance | 100 Ohms |
| Analog Output Level | 2 Volts |
| Digital Filter | 8 x Oversampling |
| Digital to Analog Convertors | 20 Bit Precision DACs |
| Digital Output Impedance | 75 Ohms (BNC, RCA Coax) |
| Digital Output Level | 0.5 Volts, peak to peak |
| Dimensions (mm) | 470 (w) x 151 (h) x 344 (w) |
| (inches) | 18-1/2 x 5-31/32 x 13-1/2 |
| Weight (kg) | 10.7 |
| (lbs) | 23.5 |

All specifications are accurate at the time of printing. Rotel reserve the right to make improvements without notice.