

# ROTEL *hi fi*

## RDA 980

### Digital Surround Sound Adapter



## Owners Manual

Please write the serial number, purchase date and **Rotel*hi fi* AUTHORIZED DEALER** name in the spaces provided, for your records.

Serial Number \_\_\_\_\_ Purchase date \_\_\_\_\_

**ROTEL*hi fi* AUTHORIZED DEALER** \_\_\_\_\_

# SAFETY INSTRUCTIONS

**WARNING:** TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.



**CAUTION:** TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

- 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. Heed Warnings** - All warnings on the appliance and in the operating instructions should be adhered to.
- 4. Follow Instructions** - All operating and use instructions should be followed.
- 5. Water and Moisture** - The appliance should not be used near water - for example, near a bathtub, 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.
- 6A.** An appliance and cart combination should be moved with care. Quick stops, excessive force and uneven surfaces may cause the appliance and cart combination to overturn.
- 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 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, heat registers, stoves or other appliances (including amplifiers) that produce heat.

## PORTABLE CART WARNING



## Explanation of Graphical Symbols

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user 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 the user to the presence of important operating and maintenance instructions in the literature accompanying the appliance.



- 10. Power Sources** - 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. Grounding or Polarization** - The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
- 12. 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 and plugs, convenience receptacles and the point where they exit from the appliance.
- 13. Cleaning** - The appliance should be cleaned only as recommended by the manufacturer.
- 14. Nonuse Periods** - The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
- 15. Object and Liquid Entry** - Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through the openings.
- 16. Damage Requiring Service** - The appliance should be serviced by qualified factory-authorized service personnel when:
  - The power-supply cord or the plug has been damaged; or
  - Objects have fallen, or liquid has been spilled into the appliance; or
  - The appliance has been exposed to rain; or
  - The appliance does not appear to operate normally or exhibits a marked change in performance; or
  - The appliance has been dropped, or the enclosure damaged.
- 17. Servicing** - The user should not attempt to service the appliance beyond that described in the operating instructions. All other servicing should be referred to qualified factory-authorized service personnel.

**APPLICABLE FOR U.S.A., CANADA OR WHERE APPROVED TO THE USAGE.**

**CAUTION:** TO PREVENT ELECTRIC SHOCK, MATCH WIDE BLADE OF PLUG TO WIDE SLOT, FULLY INSERT.

**ATTENTION:** POUR ÉVITER LES CHOCS ÉLECTRIQUES, INTRODUIRE LA LAME LA PLUS LARGE DE LA FICHE DANS LA BORNE CORRESPONDANTE DE LA PRISE ET POUSSER JUSQU'AU FOND.

## **A NOTE FROM ROTEL: READING THIS MANUAL IS ESSENTIAL FOR PROPER SET UP AND OPERATION OF THE RDA 980!**

Thank you for buying the RDA 980. This Dolby Digital ® surround sound adapter will accurately reproduce your digital movie soundtracks. It is a natural extension of our well-known passion for good sound. We are committed to making the finest quality surround sound audio components. We have been designing and manufacturing high quality, high performance audio electronics for more than 35 years. We believe that the music and video programs played through your surround sound system will be a source of enjoyment to your family and friends for many years to come.

The RDA 980 has been designed to be easy to use and to accurately recreate the original input signal or soundtrack. It will provide faithful reproduction of the information encoded in Laser Discs, DVD discs, or digital satellite TV broadcasts. All of these are excellent source material for the RDA 980. Please read this manual carefully to ensure proper setup and installation. We appreciate being a part of your life!

### **FEATURES OF THE RDA 980**

We have included dual high performance DSP chips to decode Dolby Digital sound, control the bass management, adjust the dynamic range and the time alignment of your speakers. The Motorola 56004 IC chip shares duty with the Zoran 38500 IC chip to ensure high performance. We have 3 Digital inputs, including an RF input for a Laser Disc player RF output signal. The 5.1 channel output signal for Dolby Digital surround uses RCA jacks or a DB 25 cable for connection to your companion surround sound processor. With the creation of the RDA 980, we have attempted to offer an excellent adapter to make it easy to add the excitement and realism of Dolby Digital discrete surround sound to your system.

### **WHERE TO FIND INFORMATION IN THIS OWNERS MANUAL**

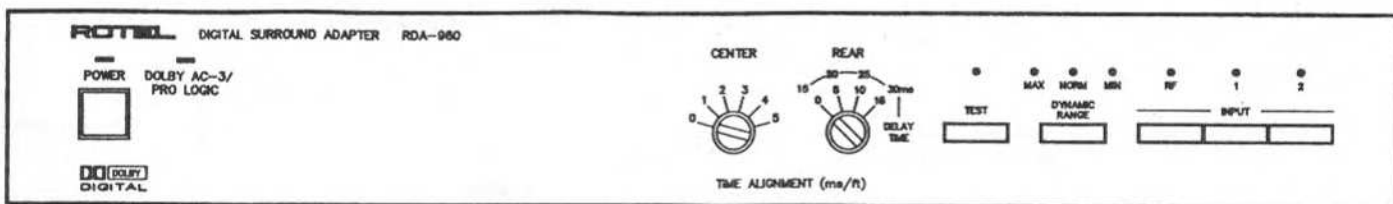
<b>SETTING SPEAKER CONFIGURATION SWITCHES</b>	<b>PAGE 3</b>
<b>FRONT PANEL CONTROLS</b>	<b>PAGE 3</b>
<b>THE TEST BUTTON (BALANCE CHECK)</b>	<b>PAGE 4</b>
<b>INSTALLATION</b>	<b>PAGE 5</b>
<b>5.1 CHANNEL OUTPUT</b>	<b>PAGE 5</b>
<b>REAR PANEL CONNECTIONS</b>	<b>PAGE 5</b>
<b>SPECIFICATIONS</b>	<b>PAGE 7</b>
<b>TROUBLESHOOTING HINTS</b>	<b>PAGE 7</b>

## SETTING THE RDA 980 SPEAKER CONFIGURATION SWITCHES

The back panel **SPEAKER CONFIGURATION SWITCHES** are labeled **FRONT, CENTER, SURROUND, SUBWOOFER** and then **LARGE, SMALL** or **NONE**. A **LARGE** speaker is defined as a speaker with excellent low frequency bass response or a speaker capable of playing powerful bass notes at high volume levels below 100 Hz without potential damage. A **SMALL** speaker is defined as a speaker with poor bass response or a speaker that might be damaged by powerful bass notes at high volume levels below 100 Hz. **NONE** is defined as the absence of a speaker. If you do not use a **CENTER** or **SURROUND** speakers in your system, set the **CENTER** or **SURROUND** speaker switch to **NONE**. If you use a **CENTER** or a **SURROUND** speaker, choose the **LARGE** or **SMALL** setting. **SUBWOOFER: YES** or **NO** should be set to **YES** if you have a subwoofer, **NO** if you do not have a subwoofer. Use of a subwoofer in your system is highly recommended.

The actual physical size of each speaker is not as important as the frequency response and power handling capability of the speaker. READ THE OWNERS MANUAL FOR YOUR SPEAKERS IF YOU ARE IN DOUBT ABOUT ANY OF THESE SETTINGS. During installation, the **SPEAKER CONFIGURATION SWITCHES** on the back panel should be set for the speakers currently used in your surround sound system. If you change speakers in your system, study the owners' manual for the new speakers and consult this manual to see if changes are needed in the chosen settings. Careful listening should be the final judge for the correct setting of the speaker configuration switches.

## CONTROLS ON THE FRONT PANEL



Please refer to this drawing of the front panel for **CONTROL** location.

The **POWER** button is on the left side of the front panel. Press it once to turn the power and indicator light **ON**. When you press it a second time, the power and the indicator light will turn **OFF**.

The **Dolby Digital/Pro Logic** indicator light will illuminate *constantly* when a Dolby Digital encoded signal is detected. When a Dolby Digital encoded signal carrying a 2 channel Dolby Surround signal is detected the indicator light will "*blink*" by cycling on for two seconds and off for two seconds to indicate Dolby Pro Logic mode. If no Dolby Digital encoded signal is detected, the light will not illuminate.

**CENTER CHANNEL DELAY TIME** should be set at this time. This control should be set to match the equivalent distance from the listening position to the **CENTER** and the **FRONT LEFT** and **FRONT RIGHT** speakers. (1 ft. = 1 ms.) If the **CENTER** channel is 3 feet (~0.9m.) closer to you than the **FRONT LEFT** or **FRONT RIGHT** speakers, set the **CENTER CHANNEL DELAY** control to 3. This adjusts the **Time Alignment** so that the arrival time for all front channel sounds will be the same. We suggest that you measure this with a tape measure and adjust the control for the most accurate time alignment possible. This will definitely make a difference in the perceived quality of the sound.

**REAR (SURROUND) DELAY TIME** settings should be set at this time. Default setting for Dolby Digital sound is the "0" time setting. If you are equidistant from the **FRONT** and **SURROUND** speakers, choose the "0/15" millisecond delay time, for Dolby Digital/Pro Logic use. Even though this says "0" it includes a pre-set time delay of 15 milliseconds when in Dolby Digital mode. If you are sitting nearer to the surround speakers, choose a longer **DELAY** time. Add approximately 1 ms for every foot the surround speakers are closer to you. Longer time settings available are an additional 5, 10, and 15 milliseconds, added to the pre-set 15 millisecond delay. The equivalent settings for Dolby Pro Logic matrix decoding operation are 15, 20, 25 and 30 milliseconds. Both sets of numbers are printed on the front panel next to the **DELAY TIME** control.

The delay time is needed to establish the main and center speakers as the primary signals. The "Haas precedence effect" is used to emphasize the front speakers. Because of the delayed signal to the surround channels, you hear the front speakers first. They take precedence and localize the sound images as coming from the front of the room. In Dolby Pro Logic matrix operation, a small amount of low level leakage signal from the front to the surround speakers is inherent in the system. The delay time "masks" this small amount of signal from

the front appearing in the surround channels. This helps make the surround sound experience more believable and enjoyable.

The **TEST** switch activates the **BALANCE CHECK** mode. This should be done during initial set up or whenever a change is made in the components or speakers used in your system. **The TEST function will only work when a carrier frequency is received from the selected input source, such as a Laser Disc or DVD player. (See below, TEST)**

The **DYNAMIC RANGE** adjustment switch will cycle the RDA 980 through **MIN**, **NORM** or **MAX** settings.

**MINIMUM** dynamic range should be chosen if you wish to considerably restrict the range from soft to loud in your system. **MINIMUM** has high level compression, low level boost and dialog normalization, all of which are controlled by the Dolby AC 3 bitstream. This would be useful during late night viewing if you wish to avoid offending other family members or your neighbors. The **NORMAL** setting is useful for general viewing of your favorite video sources, with full dynamic range (no compression) and dialog normalization. **MAXIMUM** is direct output and is for those times when you want the full dynamic range that the Dolby Digital system is capable of producing. The **MAXIMUM** position is capable of very large changes in apparent volume level from your system, from very quiet to very loud. *If you are using a small power amplifier with inefficient speakers, you may find it clipping (running out of power) often with this setting.* **The MAXIMUM setting is best with high performance, high power surround sound systems such as the suggested companion components from ROTEL: the RSP 980 surround sound preamplifier, the RB 985 five channel power amplifier or the RMB 100 MOSFET mono power amplifier, all THX® certified for home use.**

We have provided **INPUT** selector buttons with front panel indicator lights labeled **RF**, **1**, and **2**. These select the digital input source. **The INPUT source must be ON for TEST mode.**

## THE TEST BUTTON (SETTING CHANNEL BALANCE)

For best results, we suggest using a sound pressure level (SPL) meter when making the **BALANCE CHECK** settings. An inexpensive ANALOG sound level meter (from Radio Shack®, for example) will be excellent for this purpose. **Listening by ear will not be as accurate.** The meter controls should be set to "slow" and "C-weighting." Holding the sound level meter head high at arms' length, set all channels to 75 dB SPL. **The accurate setting of channel balance is very important and will affect the potential for realistic playback from your system.**

**Begin by turning on the source component** and choosing the **5.1 channel INPUT** on your surround sound processor. **Next, press the TEST button on the RDA 980 front panel. The balance signal will begin.** This will automatically cycle through all the speakers in your system, starting with the LEFT FRONT speaker. Adjust the VOLUME buttons on the remote control for your surround sound processor to make the volume levels balanced. The volume for each successive channel should be adjusted by using the remote control while sitting down in your favorite place. **All of the channels should be the same volume level from the main listening position. This does not mean that the volume setting will always be the same value for all the channels. When you have properly adjusted all the channels, push the TEST button again to turn it OFF.**

## WHAT IS DOLBY DIGITAL SURROUND SOUND?

Dolby Digital sound is a digital format designed to allow **discrete** signals for all of the channels in your surround sound system. Discrete sound is referred to as **5.1** sound by many movie industry people. This is because the sound stage in a movie studio is mixing 5 discrete channels of sound and it uses the .1 channel for the low frequency effects or bass played by the subwoofer in your system. This has the advantage of offering **stereo** surround sound channels in addition to the discrete output for the low frequency effects or subwoofer channel. The Dolby Surround matrix encoded system has a mono surround sound signal.

## PLAYBACK OF DOLBY DIGITAL SOUNDTRACKS

There are three different ways that a Dolby Digital soundtrack will be received and decoded:

- 1) A 5.1 channel program is Dolby AC-3 encoded and delivered by Laser Disc or DVD disc.
- 2) A 2 channel stereo or 2 channel Dolby Surround encoded program is Dolby AC-3 encoded and delivered by Laser Disc, DVD disc or broadcast medium, such as a TV satellite. The Dolby AC-3 bitstream must be decoded to reproduce the 2 channel output signal. If this 2 channel signal is Dolby Surround matrix encoded, it may be decoded by a Dolby Pro Logic decoder.

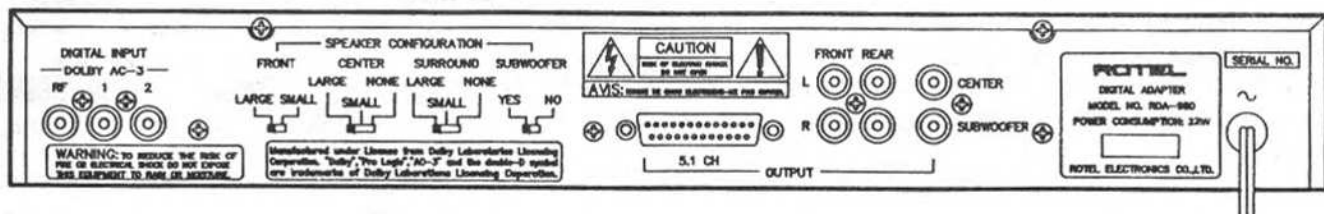
3) A 5.1 channel program is Dolby AC-3 encoded and delivered by DVD or broadcast medium, such as satellite TV. The receiving decoder is capable of only producing 2 output channels. In this case, the 5.1 channels are "downmixed" to produce the 2 channel output without losing any information. The downmixed 2 channel output may be stereo or it may be a Dolby Surround compatible output signal, capable of being decoded by a Pro Logic decoder to produce 4 channel surround sound. If your system is capable of reproducing all 5.1 channels, this case will not apply.

The RDA 980 offers full 5.1 channel decoding of multichannel Dolby Digital soundtracks. Please remember that some Dolby Digital soundtracks, not 5.1 encoded, may carry a 2 channel Dolby Digital signal with a Dolby Surround matrix encoded program. In this case, Dolby Pro Logic decoding should be performed to reproduce all 4 channels of the Dolby Surround signal. The Zoran ZR 38500 IC chip incorporated in the RDA 980 is capable of 2 channel Dolby Digital decoding followed by Dolby Pro Logic decoding to provide you with the greatest flexibility in reproducing all the channels contained within the soundtrack.

## INSTALLATION

Please place the unit on a DRY, level surface away from direct sunlight. Avoid placing objects on top of the cabinet. Do not allow water to fall onto it as this could damage the circuitry. Avoid installing in a location where excessive heat, direct sunlight, humidity, vibration or moisture will be a problem. **We recommend installation in furniture designed to house audio and video components. This will allow the RDA 980 to be installed on a separate shelf, not stacked with another component.** This will minimize potential interference or heat build up from other components in your system. Ask your **ROTELhi fi AUTHORIZED DEALER** for advice about component furniture and proper installation of audio and video components. A little planning and careful installation will have great benefits in the way your system sounds and functions. A properly installed system will be a source of great pleasure and entertainment to your family and friends for years to come. Care and planning during installation will be well rewarded.

## CONNECTIONS ON THE REAR PANEL



Please refer to this drawing of the rear panel when making connections.

The **5.1 OUTPUT** connectors use a **DB 25** connecting cable from the RDA 980 to the **5.1 CH INPUT** on the back panel of compatible ROTEL surround sound controllers. If you use the RDA 980 with a brand of surround sound controller without a DB 25 input, the **RCA jacks** should be used for connection. **Please observe correct channel designations to avoid incorrect channel layout in your system.**

The **INPUT** connections **RF, 1, and 2** on the rear panel, will allow you to connect as many as three digital inputs to the RDA 980. **RF INPUT** is for the RF output connection from a Laser Disc player. **INPUT number 1 and 2** connections are for digital bit-stream signal with an RCA pin jack cable from a DVD player, a future digital satellite or digital tape system.

## CABLES FOR A SURROUND SOUND SYSTEM

High performance **COMPOSITE VIDEO** and **AUDIO** patch cables will improve the sights and sounds of your system and we recommend them. Composite video or digital cables should have a characteristic impedance of 75 ohms and should be well shielded for the best video or digital performance. Audio, video and AC power cables should be kept separate from each other to avoid potential interference or hum that will degrade sound or picture quality. Ask your **ROTELhi fi AUTHORIZED DEALER** for advice about high quality cables for analog, video and digital signals in your sound system. **The quality of the cables will make a difference and high quality cables will yield the best results.**

## ELECTRICAL REQUIREMENTS

The RDA 980 is designed to work on AC voltage and the correct voltage is displayed on the back panel. **Do not attempt to operate on incorrect voltage as this will damage the circuitry and void your warranty.** If you are

in doubt about the correct voltage we suggest that you read the label on the back panel or consult your ROTELhi fi AUTHORIZED DEALER for confirmation of the correct voltage.

Connect the Power Cord to your wall socket for AC power. When you wish to disconnect the power cord from the wall, always hold the plug firmly and pull the plug out of the wall socket. **Do not unplug the power cord from the wall by pulling the cord only. This may damage the power cord and create a hazardous condition.** We recommend connection to the mains' wall socket or an AC power line filter, not to an extension cord.

There is **NO** user serviceable part inside the RDA 980. **Please do not open the cabinet as this will expose you to the risk of potentially dangerous high voltage and the risk of shock.** This could also damage the circuits and possibly void your warranty.

## **CLEANING THE CABINET**

If you wish to clean the cabinet, we suggest that you clean it with a soft, DRY cloth. *Never use cleaning compounds or solvents to clean the cabinet as they may damage the finish or remove the labels.* Cleaning compounds or liquids could damage the circuitry if any residue falls inside.

## **A FINAL WORD FROM ROTEL**

We have designed the RDA 980 for high performance using test equipment *and* our ears. We believe both these methods are very useful in the design of digital and audio electronics. *This is a time consuming process but we feel that the music and movie soundtracks will benefit from this care and attention to detail.* This is a highly sophisticated digital device but we wanted it to be easy to use. We hope that you have fun watching the latest movies while listening through this Dolby Digital surround sound adapter.

***Enjoy the sights and sounds!***

## SPECIFICATIONS: RDA 980

### AUDIO

Frequency Response	5-20,000 Hz, $\pm$ 1.0 dB
Signal to Noise Ratio	90 dB, IHF A @ 1 kHz
Input Impedance	75 Ohm
Output Impedance	1 k Ohm
Total Harmonic Distortion	0.008 % (1 kHz)
Output	1.4 volts, large speaker @ 1 kHz, 0 dB FS
Power Consumption	22 watts

Power Requirements (AC)	115 volts 50/60 Hz <b>or</b> 230 volts 50/60 Hz
-------------------------	--

Weight	4.6 Kg, 10.12 Lb.
Dimensions	440 x 73 x 270 mm    (W x H x D) 17.38 x 2.87 x 10.63"    (W x H x D)

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

ROTEL® and the ROTEL*hi fi* logo are the registered trademarks of The Rotel Co. Ltd., Tokyo, Japan. The Rotel Electronics Co. Ltd., of Taiwan R.O.C., is ISO 9002 certified.

THX® is a registered trademark of Lucasfilm Ltd.

Manufactured under license from Dolby Laboratories Licensing Corporation. "Dolby", "AC-3", "Pro Logic", and the double-D symbol are trademarks of Dolby Laboratories Licensing Corporation. Copyright 1992 Dolby Laboratories, Inc. All rights reserved.

RDA 980 OM, VER 6, 09/04/96 GCD

### TROUBLESHOOTING HINTS

NO POWER	CHECK THE AC OUTLET IS THE AC CORD CONNECTED TO A SWITCHED OUTLET? IS THE SWITCHED OUTLET TURNED ON?
NO TEST SIGNAL	TURN ON THE SOURCE COMPONENT SELECT THE CORRECT INPUT: RF, 1, 2 5.1 INPUT SELECTED ON SURROUND PROCESSOR?
NO SOUND	5.1 INPUT SELECTED ON SURROUND PROCESSOR? POWER AMPLIFIER TURNED ON?
NO BASS	SPEAKER CONFIGURATION SWITCHES SET CORRECTLY? SUBWOOFER AMPLIFIER TURNED ON? POWERED SUBWOOFER TURNED ON?
DISTORTED BASS	SPEAKER CONFIGURATION SWITCHES SET CORRECTLY?
POOR BALANCE	CHECK CHANNEL BALANCE WITH A SOUND LEVEL METER
CONTINUED PROBLEMS? ASK YOUR <i>AUTHORIZED ROTELhi fi</i> DEALER FOR HELP.	
YOUR <i>AUTHORIZED ROTELhi fi</i> DEALERS' PHONE NUMBER IS _____.	