

# ROTEL *hi fi*

## RTC 970

AM/FM Dolby Pro Logic®  
Surround Sound Processor


## 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 \_\_\_\_\_.

**WARNING:** To reduce the risk of fire or electric shock, do not expose this appliance to rain or moisture.



**CAUTION**

**RISK OF ELECTRIC SHOCK**

**DO NOT OPEN**



**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.

### 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.



## SAFETY INSTRUCTIONS

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.



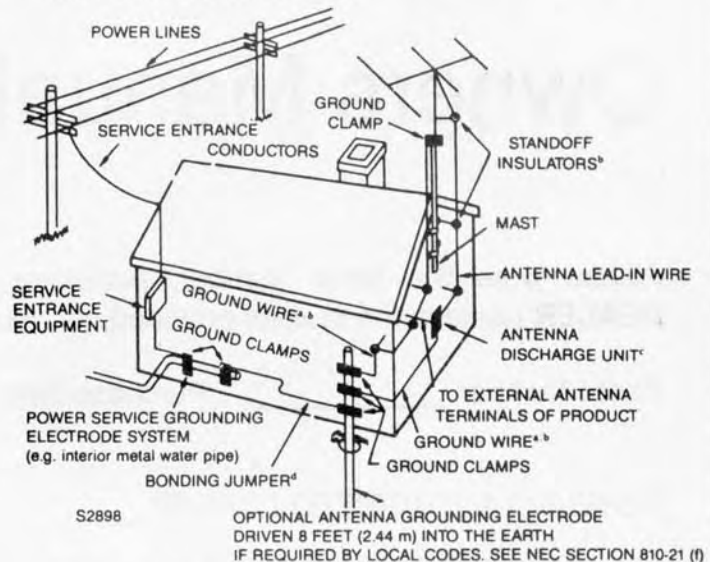
10. **Power Sources** - The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. **Grounding or Polarization** - The precautions that should be taken so that the grounding or polarization means of an appliance is not 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:
  - 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 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.

**Power Lines** — An outdoor antenna should be located away from power lines.

**Outdoor Antenna Grounding** — If an outside antenna is connected to the receiver, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70—1984, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna-discharge unit, connection to grounding electrodes, and requirements from the grounding electrode. See Figure.

- a - Use No. 10 AWG (5.3 mm<sup>2</sup>) copper, No. 8 AWG (8.4 mm<sup>2</sup>) aluminum, No. 17 AWG (1.0 mm<sup>2</sup>) copper-clad steel or bronze wire, of larger, as a ground wire.
- b - Secure antenna lead-in and ground wires to house with stand-off insulators spaced from 4—6 feet (1.22 — 1.83 m) apart.
- c - Mount antenna discharge unit as close as possible to where lead-in enters house.
- d - Use jumper wire not smaller than No. 6 AWG (13.3 mm<sup>2</sup>) copper, or the equivalent, when a separate antenna-grounding electrode is used.

### EXAMPLE OF ANTENNA GROUNDING AS PER NATIONAL ELECTRICAL CODE INSTRUCTIONS



FOR U.S.A. ONLY

## **A REQUEST FROM ALL OF US AT ROTEL: PLEASE READ THIS USERS MANUAL!**

Thank you for buying our RTC 970. This Dolby Pro Logic® surround sound processor and tuner preamplifier will accurately reproduce your music and movie soundtracks. It is a natural extension of our well-known passion for good sound and love of music. We are committed to making quality surround sound components to enhance your life. 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 RTC 970 has been designed to be easy to use and *to accurately recreate the original input signal or soundtrack*. It will provide musical reproduction of the information in radio broadcasts, Laser Discs, DVD discs, video tapes, audio tapes or Compact Discs. Many programs on satellite, broadcast or cable television include surround sound information in the soundtrack. Some music and drama shows on radio include surround sound information as well. All of these are excellent source material for the RTC 970. Please read this manual carefully to ensure proper setup and installation. We appreciate being a part of your life.

### **FEATURES OF THE RTC 970 SURROUND SOUND PROCESSOR**

- Rotel long term reliability
- Highly regulated power supply
- Comprehensive input switching
- High quality AM/FM stereo tuner
- User friendly "ON SCREEN" display
- 5.1 channel input for Dolby AC-3 Digital Surround (from Rotel RDA 980)
- Ambience extracting music modes for surround sound music listening
- Second zone output switching and volume control, for custom installations
- Comprehensive input and output connections on the back panel for audio and video

With the creation of the RTC 970, we have attempted to offer you an excellent, future ready, Dolby Pro Logic surround sound tuner preamplifier at a very reasonable price.

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

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## SPEAKER CONFIGURATION SETTINGS DURING INITIAL SET UP

The **CENTER MODE** switch should be set to match your speaker configuration. The **NORMAL** mode setting turns the CENTER channel speaker ON. This setting removes the bass below 100 Hz from the CENTER speaker and makes it available to the FRONT LEFT and FRONT RIGHT speakers.

The **PHANTOM** mode setting instructs the RTC 970 to turn the CENTER channel speaker OFF and divide the CENTER channel signal equally between the FRONT LEFT and RIGHT channels. **This setting is to be used only when no center channel speaker is used.**

The **WIDE** setting turns the CENTER channel speaker ON and instructs the RTC 970 to provide full range frequency response, including bass below 100 Hz, to the CENTER channel. This full frequency range signal will overload a small center channel speaker. **WIDE should only be chosen with a CENTER channel speaker that is a full frequency range design, capable of playing powerful bass notes without overloading.**

If you use a **SUBWOOFER** in your system, it should have a *variable* or defeatable crossover so that it can be adjusted to match the front speakers at the crossover frequency. The SUBWOOFER low pass filter output is -3 dB at 120 Hz. Bass below 120 Hz is offered to the two SUBWOOFER outputs on the back panel.

It is impossible to make an accurate suggestion for all combinations of speakers and subwoofer settings in an owners' manual. We highly recommend that you listen to the sound quality for potential bass overload from smaller CENTER channel speakers if bass is played through them. You may also want to discuss this aspect of your installation and speaker selection with your ROTELhi fi AUTHORIZED DEALER.

## SETTING CHANNEL BALANCE IN YOUR SURROUND SOUND SYSTEM

Using the remote control, choose **DOLBY PRO LOGIC SURROUND MODE** and then press the **BAL CHK** button. The speaker settings will be displayed ON SCREEN. Each time the BAL CHK button is pushed, the SPEAKER channel to be adjusted will change, sequentially. The selected channel will "flash" on and off in the ON SCREEN display. During BALANCE CHECK, the range of volume adjustment available is from 0 to -12 dB for each channel. Press the VOLUME ( < , > ) buttons to make the volume level change as needed. The level settings will be displayed ON SCREEN as you change them. **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 ON SCREEN number shown will always be the same value for all channels.** When you have adjusted all the channels, or cycled through the settings, the display ON SCREEN will go off.

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.

**DELAY TIME** settings should be set at this time. If you are sitting near the surround speakers, choose a longer DELAY time. If you are equidistant from the FRONT and SURROUND speakers, choose the 15 millisecond delay time. Add approximately 1 ms for every foot the surround speakers are closer to you. Settings available are 15, 20, 25 and 30 milliseconds. The delay time is included 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. Some leakage of the front channels into the surrounds 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.

Sometimes the main signal will come from the SURROUND speakers during special effects. Typically though, most of the sound will be from the FRONT LEFT, CENTER and FRONT RIGHT speakers. With most Dolby Surround or Dolby AC 3 Digital movie soundtracks, the SURROUND speakers will not be on all of the time. They will be on most or all of the time when listening to music surround modes.

## WHAT IS DOLBY SURROUND SOUND?

Thousands of popular movies have been released with Dolby Surround encoding in the soundtrack. Many compact discs have music with Dolby Surround or other surround sound encoding on them also. Dolby Surround is a

process where the 2 stereo channels contain matrix encoded information for the front, center and rear channels. This information can be extracted by a Dolby Surround decoder during playback of the encoded source material.

We have incorporated an audiophile quality Dolby Pro Logic decoder for the best possible reproduction of this information. This has logic steering circuits that make separation of the channels and localization of the sound image more precise. This will make the surround sound effects more realistic and entertaining. Dolby Surround encoded music, movies or sports broadcasts are all compatible with stereo or mono playback. They offer a much more entertaining rendition of the source material when decoded by a Dolby Pro Logic decoder though.

## INSTALLATION

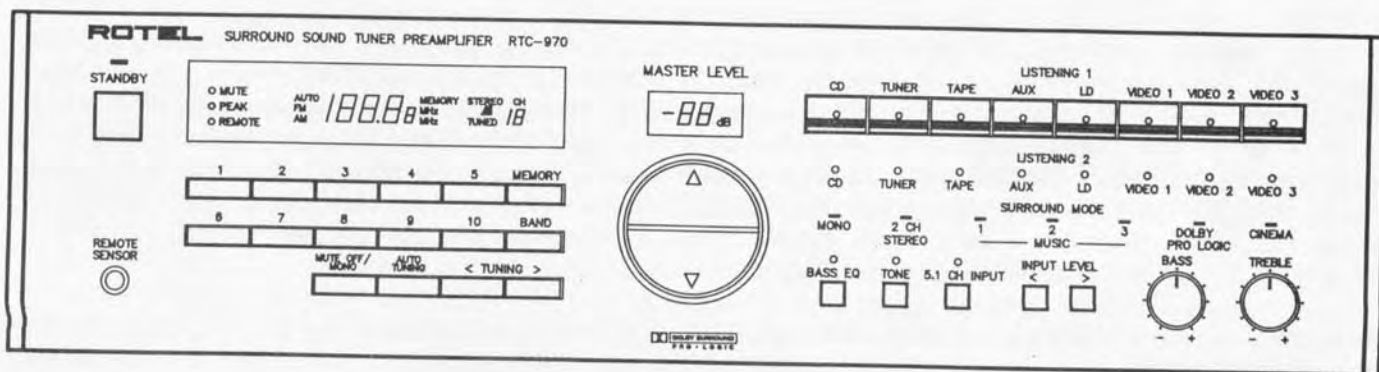
Please place the unit on a DRY, level surface away from direct sunlight. Avoid placing objects on top of the cabinet. Do not allow water to fall onto it as this could damage the circuitry. Avoid installing in a location where excessive heat, direct sunlight, humidity, vibration or moisture will be a problem.

We recommend installation in furniture designed to house audio and video components. This will allow the it to be installed on a separate shelf, *not stacked on another component or with something stacked on it*. This will minimize potential interference or heat build up from other components in your system. Component furniture has the added benefit of reducing or suppressing vibration and *all audio and video components will provide improved sound when free from vibration*. Component furniture will improve the looks of many system installations, provide adequate ventilation for amplifiers and isolation for other components. It is also easier to dress the wires to reduce interference between sensitive audio and video cables, speaker cables and power cords for components.

Ask your **ROTEL hi 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.

The **POWER INDICATOR LIGHT** will illuminate at all times *during* **STANDBY** mode when **AC power is available to the RTC 970**. The power light will extinguish when the RTC 970 is in use. When in **STANDBY** mode, the RTC 970 will remember the previously chosen input and output selections.

## CONTROLS ON THE FRONT PANEL



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

The **STANDBY** button will turn the **SWITCHED OUTLETS** and the **SOUND ON** and **OFF**. Push it *once* and the switched outlets and sound will turn **ON**. Press the **STANDBY** button again and the switched outlets and the sound will be **OFF**. The front panel includes the **REMOTE SENSOR** for receiving the infra red signals from the remote control handset. Please be certain not to block this as the remote control will not function if this sensor is covered or blocked.

The **MASTER VOLUME** control adjusts all the channels, including the subwoofer, at the same time. Channel balance *between* channels is established by using the **BALANCE CHECK** during **INITIAL SET UP**. The **ON** of the volume control (  $\Delta$  ) *increases* the volume and pushing the lower half of the volume control (  $\nabla$  ) *decreases* the volume in all channels. The **MUTE** button, *on the remote control only*, will silence the sound output. Press it once to **MUTE** the **PREOUT** output connections. Press the **MUTE** button again to hear sound output. The **ON**

SCREEN display (and an indicator light on the front panel) will show the word MUTE when you press the MUTE button.

We have provided INPUT selector buttons, labeled **LISTENING**, on the front panel. **LISTENING** selects the audio or video source in the main room *and* for RECORD OUT from TAPE OUT connections on the back panel. The LISTENING input selected is displayed by a front panel Light Emitting Diode (LED) *and* in the ON SCREEN display. LISTENING inputs may be chosen by using the front panel buttons or the remote control.

We have indicator lights for the **ZONE 2** input selected, labeled LISTENING 2. These will indicate what *audio* output is selected for listening by the person in the secondary listening area. **(See page 7 for more information)**

The **INPUT LEVEL** controls will allow you to match the volume levels of various inputs to the same volume level. To set these, choose the input you wish to adjust and then push the < or the > button to adjust the level. After you set the levels, it is easy to memorize these settings for individual inputs. Press the INPUT selector you wish to memorize and hold it in for more than 2 seconds. The ON SCREEN display will flash the word MEMORIZED. Changing the level is easy and can be reset to any level from 0 dB to -12 dB. **If the INPUT selected is being overloaded by a strong signal, a small OVERLOAD symbol will be displayed ON SCREEN. This symbol looks a little like a light bulb with light rays coming from it.** Adjust the INPUT LEVEL control until this symbol turns off. The PEAK light on the front panel next to the tuner display will also flash if the level is too high, in addition to the on screen display.

**BASS** and **TREBLE** tone controls are provided to allow you to adjust the tonal balance of your system during STEREO MODE operation. Turning the knob *clockwise* will *increase* the BASS or TREBLE. Turning the knob *counterclockwise* will *decrease* the BASS or TREBLE. **The tone controls are defeated during surround sound or 5.1 INPUT operation.** The **TONE** button is a tone on/tone defeat button, displayed on screen as TONE when you press it ON. **BASS EQ** is provided when the BASS EQ button is pushed. This boosts the bass response by 6 dB at 40 Hz. BASS EQ works in all modes of stereo or surround sound operation. BASS EQ will also function during 5.1 INPUT operation.

The **5.1 CH INPUT** will select the output signal from the *optional* RDA 980 Digital Adapter for DOLBY AC-3 DIGITAL surround sound. When this button is pressed, the MASTER VOLUME LEVEL display will show in the on screen display with the settings that are ON shown, such as BASS EQ or TONE. **When using the 5.1 CH INPUT, all SURROUND SOUND MODE selectors on the front panel are deactivated.** The channel balance, bass management, dynamic range adjustment and speaker time alignment for Dolby AC-3 surround sound decoding are all controlled by the RDA 980 when the 5.1 channel input is chosen.

**PRESET TUNER** controls are provided for tuning or presetting into memory your favorite 29 AM or 29 FM stations. To enter a station into MEMORY is an easy process. Tune in the station you want to memorize by using the < or > tuning control buttons. Choose the PRESET number, press the MEMORY button and you have memorized the PRESET station number. **To choose a PRESET station or enter a station into memory by number, press the number you wish from 1 to 10. If the PRESET number is higher than 10, begin by pressing the number of the last digit and then press it once or twice again to add +10 or +20 to the digit. Press MEMORY to enter the number into the PRESET stations.** For example: to recall or set PRESET 23, press 3 and then press it two more times, quickly. Other tuner related controls are the TUNING (DOWN) <, TUNING (UP) >, AUTO TUNING, MUTE OFF/MONO mode.

If you are using **AUTO TUNING**, pressing the TUNING UP or DOWN button will cause the tuner to advance to the next available station. If you press the MUTE OFF/MONO button, the muting circuit that cancels the inter-station hiss in FM mode will turn OFF. Weak or distant stations that are not strong enough to be received in STEREO operation may be received in this mode. AM or FM reception will be improved if you use an external AM/FM antenna on your roof or connect to cable FM service. Choose the AM or FM band by pressing the **BAND** button. All actions are shown in the ON SCREEN display and the **CH** display on the front panel.

The **MUTE**, **PEAK** and **REMOTE** lights next to the tuner display are provided as informative indicators to confirm proper operation or need for adjustment. The MUTE light will illuminate when the MUTE function is in use. The PEAK level light shows when the input is being overloaded. This is related to the OVERLOAD indicator light that is displayed on screen and is controlled by the INPUT LEVEL controls. The REMOTE indicator light flashes to confirm reception of a remote control command from the remote control handset.

The **VOLUME LEVEL** display, on the front panel above the VOLUME control, shows a numerical value for the VOLUME LEVEL setting. This numerical readout is provided as a convenience to show a visual indication of the relative volume level setting.

If your neighbors complain about the wide dynamic range of your favorite soundtracks, consider inviting them over to enjoy the movie! *You can ask them to bring the popcorn!*

## SURROUND MODE LED DISPLAY / ON SCREEN DISPLAY

**IMPORTANT USER NOTE:** The SURROUND MODE and the INPUT selection can be linked together if you wish. To set an INPUT for a particular SURROUND MODE is easy. Choose the INPUT you wish to link to a SURROUND MODE. Press the SURROUND MODE button on the remote control until you have selected the SURROUND MODE you want. Now, press the INPUT button *continuously* until the VOLUME readout display shows two small horizontal bars. This indicates that the setting has been entered into MEMORY. **For example:** To link the CD input to STEREO mode, begin by choosing CD as the input. Next, choose the STEREO mode with the SURROUND MODE button on the remote control. Then, press the CD mode button until the two small horizontal bars appear in the VOLUME readout display. Now you will automatically enter STEREO mode when you select the CD INPUT.

The front panel has LED lights for indicating the **SURROUND MODE** in use. The remote control will cycle through the SURROUND MODES *in sequence*, from right to left. We have included MONO, 2 CH STEREO, MUSIC MODES, DOLBY PRO LOGIC and CINEMA sound modes. (**See user note above**)

**MONO** is for AM radio, older recordings, movies or TV programs that are monophonic. *If a center channel speaker is used in your system*, MONO mode will send sound to the CENTER speaker only. *If no CENTER speaker is used*, MONO mode will send the sound to the FRONT LEFT and FRONT RIGHT speakers only. All other channels are muted.

The **2 CH STEREO** mode is a *bypass* mode. The FRONT LEFT and FRONT RIGHT speakers are ON. All other channels are muted.

**MUSIC MODES 1, 2 or 3** delay times are variable from 15 to 20, 25 and 30 milliseconds. The apparent reflectivity and absorption of the surfaces inside the surround sound acoustical spaces vary according to the mode setting and delay time chosen. Music 1 will show CLUB, MUSIC 2 will show STADIUM and MUSIC 3 will show HALL in the on screen display. The MUSIC modes have been written *to extract ambient information* from the source material. The labels in the ON SCREEN display are *only an approximation* of the acoustical size, reflectivity or absorption of the venue offered by the MUSIC settings. Please experiment to see which setting is most pleasant to you with various music or video sources that are not DOLBY SURROUND encoded. In the MUSIC SURROUND modes ALL the speakers in your system are ON.

The **DOLBY PRO LOGIC** setting is for CD discs, video rental movies, Laser Discs, radio broadcasts or for viewing films broadcast on stereo TV with DOLBY SURROUND encoding. All encoded source material will prominently display the DOLBY SURROUND logo on the package. Many television shows are broadcast with DOLBY SURROUND soundtracks and display the DOLBY SURROUND logo at the beginning of the program. **Any DOLBY SURROUND encoded movie, radio or television show that is broadcast in stereo is capable of being decoded by the DOLBY PRO LOGIC decoder.** The full directional and spatial effects of the DOLBY SURROUND encoded source material will be reproduced in your listening room with this setting. The DELAY TIME settings are 15, 20, 25 and 30 milliseconds. *If you are sitting nearer to the surround speakers than the front channels, a longer delay time will be the best choice.* This will ensure that the "precedence effect" works properly. In DOLBY PRO LOGIC mode, ALL the speakers are ON.

The **CINEMA** mode is for use with mono, stereo, or stereo hi fi movies that are *not* Dolby Surround encoded. CINEMA mode has normal stereo left and right channels in front, mono left plus right in the center and the surround channels are mono with delay times of 15, 20, 25 or 30 milliseconds, as with Dolby Pro Logic. We have tailored the frequency response of this setting to make it similar to some of the movie filter designs suggested by various movie engineers over the years. The bass response is full range, the mid range is boosted subtly to enhance vocal intelligibility and the high frequencies are rolled off, or reduced, to eliminate excessive brightness. If you are watching an older film that seems "bright" due to excessive high frequency response, you might find that the CINEMA mode helps you to enjoy your film more.

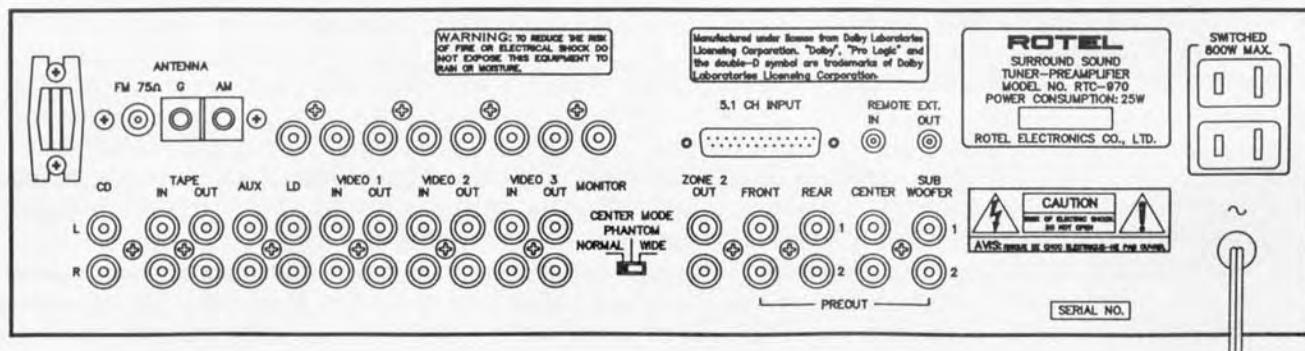
The **ON SCREEN** display for the modes of operation will be displayed on your TV screen when the input selector buttons on the remote control or the front panel are pushed. The display will show the current INPUT, SRND MODE, DELAY TIME, TONE and the MASTER VOL LEVEL setting. This will be ON SCREEN for approximately 5 seconds. Any changes to the MASTER VOLUME setting or the LISTENING input selected will activate the ON SCREEN display. The ON SCREEN display has a blue screen background. If no video signal is offered, it will use the blue background during changes of settings and turn the blue screen off afterwards.

## CONTROLS ON THE RR 970 REMOTE CONTROL HANDSET

The **RR 970** system remote control is designed to operate all Rotel remote capable components. The RR 970 will control the functions for the RTC 970. We have included STANDBY, MUTE, INPUT selections, TUNER, ON SCREEN display call button, SURROUND MODE selection, DELAY TIME, BALANCE CHECK, VOLUME UP and

DOWN and ZONE VOLUME buttons. **RR 970 has some extra function and selector buttons that do not apply to the RTC 970.** These extra buttons are to operate compatible Rotel source components such as a CD player or a cassette deck.

## CONNECTIONS AND CONTROLS ON THE REAR PANEL



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

The **ANTENNA** connections are to provide signal to the built in AM/FM tuner. We have included small AM and FM antennas in the box. The **FM ANTENNA** input is designed to use a 75 ohm cable input. If you wish to use a 300 ohm antenna connection, an adapter from 75 to 300 ohms will be necessary. The **AM ANTENNA** connections are to connect the supplied AM antenna to the RTC 970.

**5.1 DIGITAL SURROUND SOUND** is available from the *optional* RDA 980 DIGITAL ADAPTER. This connects with a DB 25 connecting cable from the RDA 980 to the 5.1 CH INPUT on the back panel. The RDA 980 is designed to decode DOLBY AC-3 Digital Surround from a Laser Disc, DVD or other source such as future digital video tape formats.

**YELLOW** connectors on the rear panel are for **COMPOSITE VIDEO INPUTS and OUTPUTS**. **WHITE** connectors are for **LEFT CHANNEL AUDIO INPUTS and OUTPUTS**. **RED** connectors are for **RIGHT CHANNEL AUDIO INPUTS and OUTPUTS**. Please observe correct connections of the audio and video connections to ensure a trouble free installation. **MONITOR** is the composite video output from the RTC 970 to your television video input. We have labeled the **INPUT** and **OUTPUT** selectors for CD, TUNER, TAPE IN and OUT, AUX, LD, VIDEO 1, 2 and 3. All inputs and outputs are at line level. If you wish to use a turntable with the RTC 970, please connect an external phono equalizer such as the Rotel RQ 970 to the AUX inputs.

Video signals have very wide band frequency response. *We sometimes refer to video signals as being from DC to light*, which implies extremely wide frequency response when compared to the audio frequencies that people can hear. Excellent, well shielded 75 ohm video cable is a necessity for the best reproduction of your video source material. Poor cables (with poor frequency bandwidth) will reduce the highest video frequencies and result in less sharp color reproduction and detail.

The **TAPE IN and OUT** connections are for use with an analog or digital recorder. The **IN** connections are designed to receive a signal *from* your recorder. The **OUT** connections send a signal *to* your recorder.

The **ZONE 2 OUT** connections are for use with the **LISTENING 2** input selection. These are designed to allow the RTC 970 to offer an *audio* output signal to a listener in another room. LISTENING 2 has a front panel LED showing the input selected for ZONE 2 operation. ZONE 2 is on at all times that the RTC 970 is on. The ZONE 2 user is not able to initiate **STANDBY** or **ON** mode. ZONE 2 is able to adjust volume and LISTENING 2 input selection *only*. ZONE 2 is designed to be used from a different room *or* the same room as the main system. The ZONE 2 OUT connections require an external power amplifier to drive the speakers in the ZONE 2 room. *After pressing the REC/ZONE button on the remote, select an input or change the volume level within 3 or 4 seconds.*

**REMOTE EXT. IN and OUT** connections are designed to control Rotel CD players, cassette decks or tuners *that have a compatible remote connector on the back panel*. This is designed to be a convenience in a custom home installation. These are for use with the ZONE 2 OUT amplifier outputs. *Any infra red repeaters or relays needed to work with the EXT. IN or OUT connections should be purchased separately from your installing dealer.* Several different brands of these devices are available on the market. Rotel does not offer these separately.



**FRONT, CENTER, SURROUND (REAR) and SUBWOOFER** connections are for connecting to your 5 channel power amplifier or multiple mono power amplifiers. Please be certain to connect the channels correctly for proper set up and enjoyment of your surround sound system. The THX certified Rotel RMB 100 MOSFET mono power amplifier would be an excellent choice for the main room speakers in your installation. The THX certified RB 985 is an excellent 5 channel power amplifier. For Dolby Surround or 5.1 digital surround system use, an RMB 100 and an RB 985 offers a superb solution to powering the 5 main speakers and a subwoofer.

The **SWITCHED AC OUTLETS** provide AC power to source components only. The rating for power consumption is 800 watts maximum. The outlets would be an excellent place to connect the CONTROL CORD from a Rotel RLC 900 AC Power Line Conditioner. (N. America only) This would allow the source components or power amplifiers connected to the RLC 900 to be turned ON and OFF by the SWITCHED OUTLET. CD players or cassette decks can be controlled by the switched outlets if you do not use an RLC 900. **PLEASE DO NOT CONNECT A POWER AMPLIFIER TO THE SWITCHED OUTLETS!**

## **TONAL BALANCE OF SPEAKERS FOR A SURROUND SOUND SYSTEM**

**Speakers chosen for your surround sound system should be matched for tonal balance carefully.** The criteria we use at Rotel include wide frequency response, with or without a subwoofer, smooth octave to octave tonal balance, low distortion at normal operating levels, clarity and definition. They should be closely matched to each other in tonal balance, have good sound quality for voice or music and be capable of playing at medium to loud volume levels with low apparent distortion. **Careful auditioning is in order.**

**We strongly suggest that the tonal balance for the front and center speakers be as similar as possible. Ideally, they should have exactly the same tonal balance.** The surround speakers should have a smooth tonal balance, similar to the other speakers in your system. Choosing surround speakers with a similar tonal balance will enhance the overall effect of this circuit. This helps the surround speakers blend more convincingly with the front and center channels. If careful tonal balance matching is done, the resulting sound field will sound "seamless" and offer superb reproduction of the music and soundtracks that you own or rent. *If the sounds "pan" across the front channels, the image will not change apparent size or tonal balance in a properly matched system.* This aspect of speaker selection does not receive enough emphasis, we believe. **We feel that matching the tonal balance of all the speakers in a surround sound system is crucial to the final results.** It can be the difference between an OK surround sound system and a *great surround sound system.* Ask your knowledgeable audiophile or videophile friends for advice about this or your ROTEL hi fi AUTHORIZED DEALER.

## **SPEAKER PLACEMENT FOR A SURROUND SOUND SYSTEM )**

**Ideally, all the FRONT speakers should be exactly the same distance from your main listening position.** This necessitates placing the FRONT LEFT, CENTER and FRONT RIGHT speakers in a slight arc; *not in a straight line across the front of the room.* If they are installed in a slight arc, greater precision in imaging and better integration of the vocals and front stereo effects will be audibly apparent. (When in 5.1 mode, individual speaker arrival time is adjustable with controls on the optional RDA 980 digital adapter for Dolby AC 3 Digital sound.)

The **CENTER** channel speaker can be above or below the video monitor, depending on your installation. *If a video projector and an acoustically transparent screen are used, the center channel speaker can be behind the screen.* **SURROUND (REAR)** speakers should be placed to the sides of the listener, *not behind.* They should be elevated above ear level if possible.

The **SUBWOOFER(S)** will require some experimentation for the best placement. A corner may be the easiest ~~placement but a corner may not provide the best sound integration with the other speakers.~~ One advantage of corner placement is reinforcement of the low frequencies by being in proximity to the walls and floor. Corner placement will boost the apparent sensitivity of the subwoofer by as much as 6 dB, which will save amplifier power. It may also boost mid bass output, which could be undesirable. (Read the owners manual included with your subwoofer for further information.)

**CUSTOMER SUBWOOFER TUNING NOTE:** An easy way to "tune" for extended low frequency bass response is to **place the SUBWOOFER in your favorite listening spot** and move around the room listening for the "room modes" in the low frequencies. Some parts of a room will accentuate bass response and some will diminish it, depending on the shape and size of your room. Low bass will be affected the most but all frequencies are affected to some extent. **You should crawl around on the floor at speaker level to find the location that gives the smoothest low frequency response. (Sorry!)** A test CD with warble tones from 20-40 Hz is ideal as a source for this test. Sine wave test tones can also be used but will be subject to "standing waves" or pressure and null zones. Play test tones at a moderate level only, not at a loud level. If played at a high volume level with a subwoofer, you may find that your walls rattle and your neighbors ring the doorbell to complain. Neither is an especially desirable result.

When you have placed the subwoofer(s) in a promising location, play some music with strong bass content and listen for extended low frequency bass response and definition. Minor placement adjustments may be needed to find the optimum location. The result of proper placement of the subwoofer will be excellent low bass as well as mid bass. It should smoothly "blend in" with the main speakers for good sound quality. With proper placement, combined with well-placed front and surround sound speakers, you can achieve a thoroughly convincing sound field in your listening room. Multiple subwoofers are potentially capable of smoothing the low frequency response in a room a little more due to interaction with the room modes from more than one location. **Proper set up of your speakers will take some time. This is time and energy very well spent. When you enjoy music or movies with your family and friends, you will be glad you invested the time in proper set up and location of your speakers and 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 **ROTEL hi fi AUTHORIZED DEALER** for advice about high quality cables for analog, video and digital signals in your sound system. *They do make a difference* and high quality cable will yield the best results.

## ELECTRICAL REQUIREMENTS AND CLEANING

The RTC 970 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 **ROTEL hi 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 are two *switched* AC outlets on the back panel of the RTC 970. Please do not exceed the power rating (800 watts total) printed next to the outlets. The switched AC outlets are provided for a source component or the CONTROL CORD of the Rotel RLC 900, *not a power amplifier.*

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.

There is **NO** user serviceable part inside the RTC 970. **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.

## A FINAL WORD FROM ROTEL

We have designed the RTC 970 for high performance using test equipment, our eyes and our ears. We believe all these methods are useful in the design of audio video electronics. *This is a time consuming process but we feel that the music and movies benefit from this care and attention to detail.* We tried to make the unit easy to understand and operate and believe we have succeeded. We realize that there are many surround sound processors to choose from these days. We thank you again for choosing a Rotel tuner preamplifier processor as the centerpiece and control center in your surround sound audio video system. We appreciate this very much. **Enjoy the sights and sounds!**

## SPECIFICATIONS: RTC 970 SURROUND SOUND PROCESSOR

### AUDIO

Frequency Response	5-20,000 Hz, $\pm$ 0.5 dB
Signal to Noise Ratio, Front / Surround	85 dB, IHF A / 70 dB, IHF A
Input Impedance	20 k Ohms
Output Impedance	< 500 ohms
Total Harmonic Distortion	0.03 % (1 kHz)
Intermodulation Distortion	0.03 % (400 Hz / 7 kHz, 4:1)
Output (maximum)	$\geq$ 6 volts
(Dolby, 300 mV in)	1.2 volt

## AM/FM TUNER

Sensitivity, FM (50 dB S/N)	4 microvolts, 25 dBf
Selectivity, Alternate Channel	65 dB @ 400 kHz
Frequency response, FM	30-15,000 Hz $\pm$ 0.5 dB
Capture ratio	2 dB
Total Harmonic Distortion	0.3 % Stereo, 0.15% Mono
Image rejection	76 dB
Channel Separation	> 40 dB @ 1 kHz
Sensitivity AM	900 $\mu$ V

## VIDEO

Frequency Response	3 Hz-10 MHz, - 3 dB
Signal to Noise Ratio	70 dB
Input Impedance (Composite)	75 ohms
Output Impedance (Composite)	75 ohms
Output (Composite)	1 volt, peak to peak, 75 ohm load
Power Consumption	25 watts
Power Requirements (AC)	115 volts 50/60 Hz <i>or</i> 230 volts 50/60 Hz
Weight	5.8 Kg, 12.76 Lb.
Dimensions	440 x 121 x 337 mm (W x H x D) 17-3/8" x 4-13/16" x 13-5/16" (W x H x D)

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

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RTC 970 OM, rev 1, 07/12/96 GCD

The drawing below suggests proper speaker placement for surround sound listening. Surround speakers are shown to the sides of the main seating area, *not* the rear. The Center speaker would be above or below the TV (not shown) in this arrangement. *All* Front speakers should be *equidistant* from the main seating position. Other arrangements, such as in-wall speakers, are possible in a custom installation. We believe the lay out shown will provide an excellent sound field with all current or future surround sound systems.

