

APPENDIX H
: USER'S MANUAL

Installation and Operating Guide | Warranty

Model Numbers | Z44SZ80/Z52SZ80 | DLP PROJECTION



Warning/Caution



WARNING/CAUTION:

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



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 (servicing) instructions in the literature accompanying the appliance.

WARNING/CAUTION:

TO PREVENT FIRE OR SHOCK HAZARDS, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.

POWER CORD POLARIZATION:

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.

NOTE TO CABLE/TV INSTALLER:

This reminder is provided to call the CATV system installer's attention to Article 820-40 of the National Electric Code (U.S.A.). The code provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to the grounding system of the building, as close to the point of the cable entry as practical.

REGULATORY INFORMATION:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

CAUTION:

Do not attempt to modify this product in any way without written authorization from LG Electronics. Unauthorized modification could void the user's authority to operate this product.

COMPLIANCE:

The responsible party for this product's compliance is:

Zenith Electronics Corporation

1-201-816-2000

Marked and Distributed in the United States by LG Electronics U.S.A., Inc.

1000 Sylvan Avenue, Englewood Cliffs, NJ 07632

<http://www.zenith.com>

Safety Instructions

IMPORTANT SAFETY INSTRUCTIONS

Important safety instructions shall be provided with each apparatus. This information shall be given in a separate booklet or sheet, or be located before any operating instructions in an instruction for installation for use and supplied with the apparatus. This information shall be given in a language acceptable to the country where the apparatus is intended to be used. The important safety instructions shall be entitled "Important Safety Instructions". The following safety instructions shall be included where applicable, and, when used, shall be verbatim as follows. Additional safety information may be included by adding statements after the end of the following safety instruction list. At the manufacturer's option, a picture or drawing that illustrates the intent of a specific safety instruction may be placed immediately adjacent to that safety instruction :

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.



13. Unplug this apparatus during lightning storms or when unused for long periods of time.

14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has exposed to rain or moisture, does not operate normally, or has been dropped.

15. CAUTION concerning the Power Cord :

Most appliances recommend they be placed upon a dedicated circuit; that is, a single outlet circuit which powers only that appliance and has no additional outlets or branch circuits. Check the specification page of this owner's manual to be certain.

Do not overload wall outlets. Overloaded wall outlets, loose or damaged wall outlets, extension cords, frayed power cords, or damaged or cracked wire insulation are dangerous. Any of these conditions could result in electric shock or fire. Periodically examine the cord of your appliance, and if its appearance indicates damage or deterioration, unplug it, discontinue use of the appliance, and have the cord replaced with an exact replacement part by an authorized servicer.

Protect the power cord from physical or mechanical abuse, such as being twisted, kinked, pinched, closed in a door, or walked upon. Pay particular attention to plugs, wall outlets, and the point where the cord exits the appliance.

16. Outdoor Use Marking :

WARNING - To Reduce The Risk Of Fire Or Electric Shock, Do Not Expose This Appliance To Rain Or Moisture.

17. Wet Location :

Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus.

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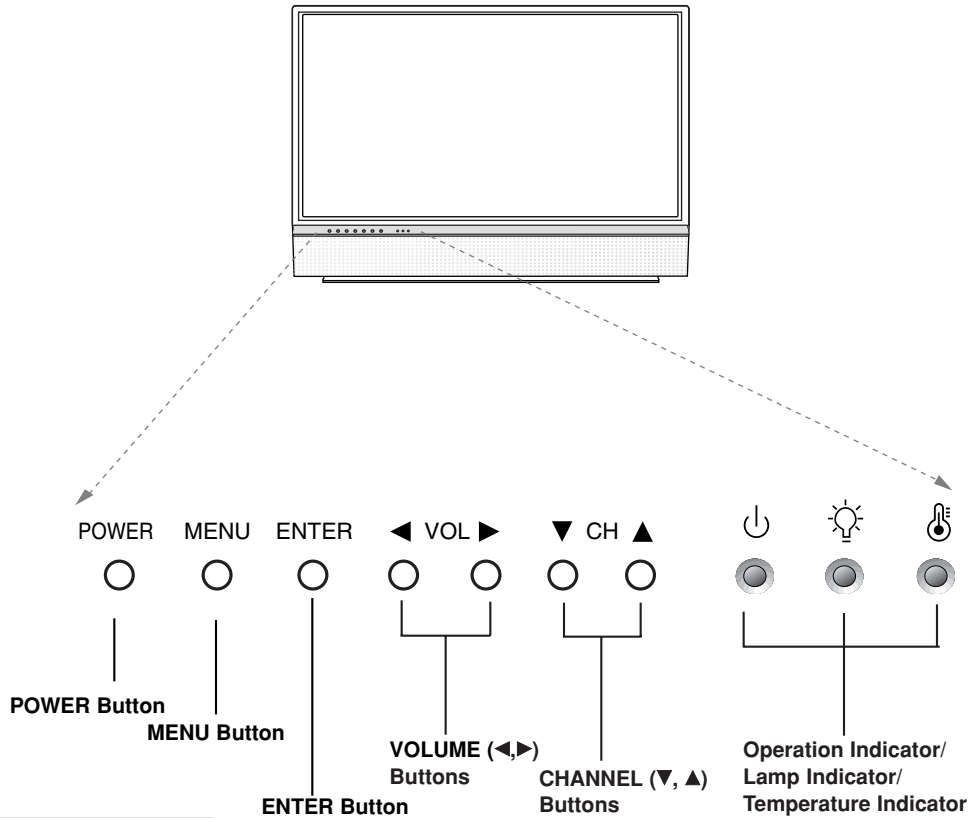
After reading this manual, keep it handy for future reference.

Introduction

Controls

- This is a simplified representation of a front panel.
- Here shown may be somewhat different from your TV.

Front Panel Controls



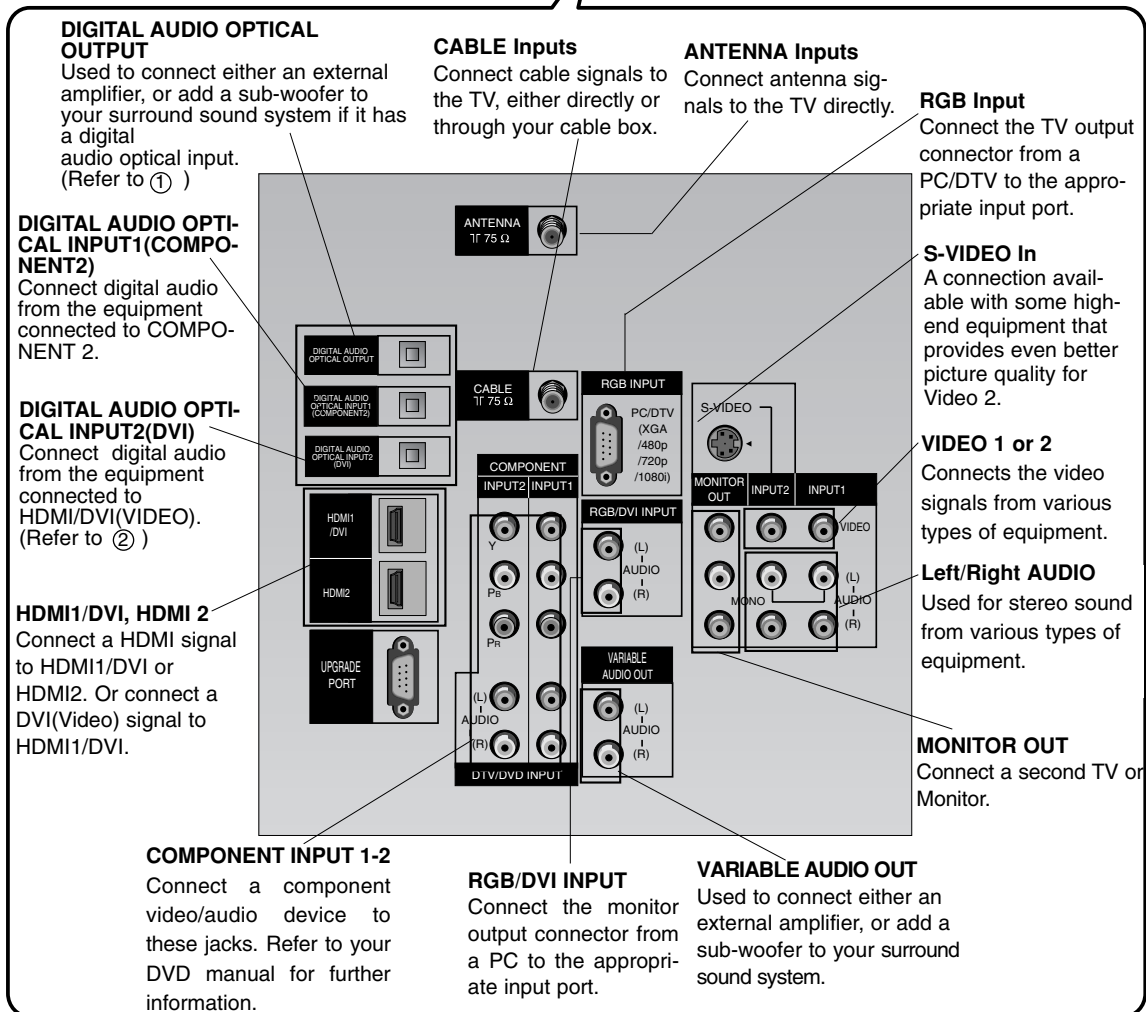
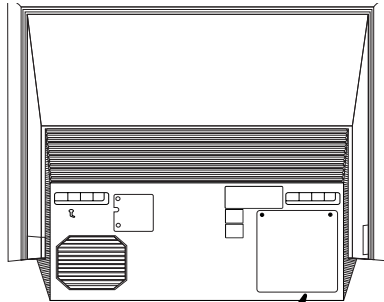
Function Status Indicators

- Lamp indicator, operation indicator, and temperature indicator located below the front panel controls, reveal the operating status of the DLP projection TV.

Operation Indicator	Off	Power cord is not connected.
	Red	Power Cord is connected, TV is in standby mode.
	Green	TV turns on.
	Orange (flashing)	Preparing operation in standby mode.
Lamp Indicator	Orange	Projection lamp is reaching the end of its life and needs to be replaced with a new lamp. Contact your service center.
	Red (flashing)	There is a problem with the lamp or around it. Contact an authorized service center.
	Green (flashing)	The lamp cover is not closed.
Temperature Indicator	Orange	The projection TV is overheating. Check the blocked vents of the projection TV and the accumulated dust in the dust filter.
	Red	The projection TV shut down due to overheating.
	Red (flashing)	The projection TV shut down, check the cooling fan. Contact your service center.

Connection Options

Back Connection Panel



Notes: ① In standby mode, these port will not work.

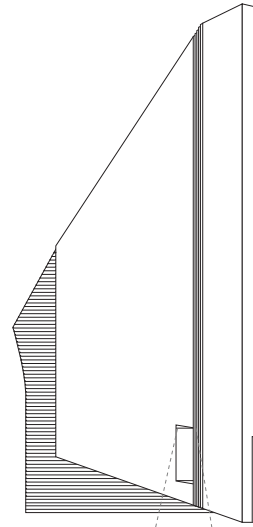
② If the video is connected through HDMI-TO-HDMI cable, you don't need to connect digital audio. This port is used only when the video connected through DVI-TO-HDMI cable.

Front Connection Panel

There are four jacks on the left side on your projection TV that make connecting Audio/Video devices like video games and camcorders very simple.

The jacks are like those found on the back jack connection panel. This means that most equipment that connects to those types of jacks on the rear jackpack, may be connected to the front connection panel.

To use the side jacks as the signal source, select them using Main Input menu as described on page 61. They will be named "Front Video" in the Main Input menu.



If you input both Front Video and S-Video, only the S-Video will work.



If you're connecting a video game device, make sure to change the picture settings with the EZ Picture option in the Video menu (see page 62).

LEFT/RIGHT AUDIO

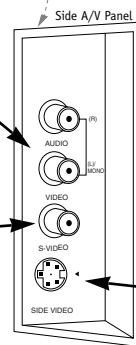
Used for stereo sound from various types of equipment.

VIDEO

Connects the video signals from any piece of equipment.

S-VIDEO

A connection available on some very high-end equipment that provides better picture quality than video input.



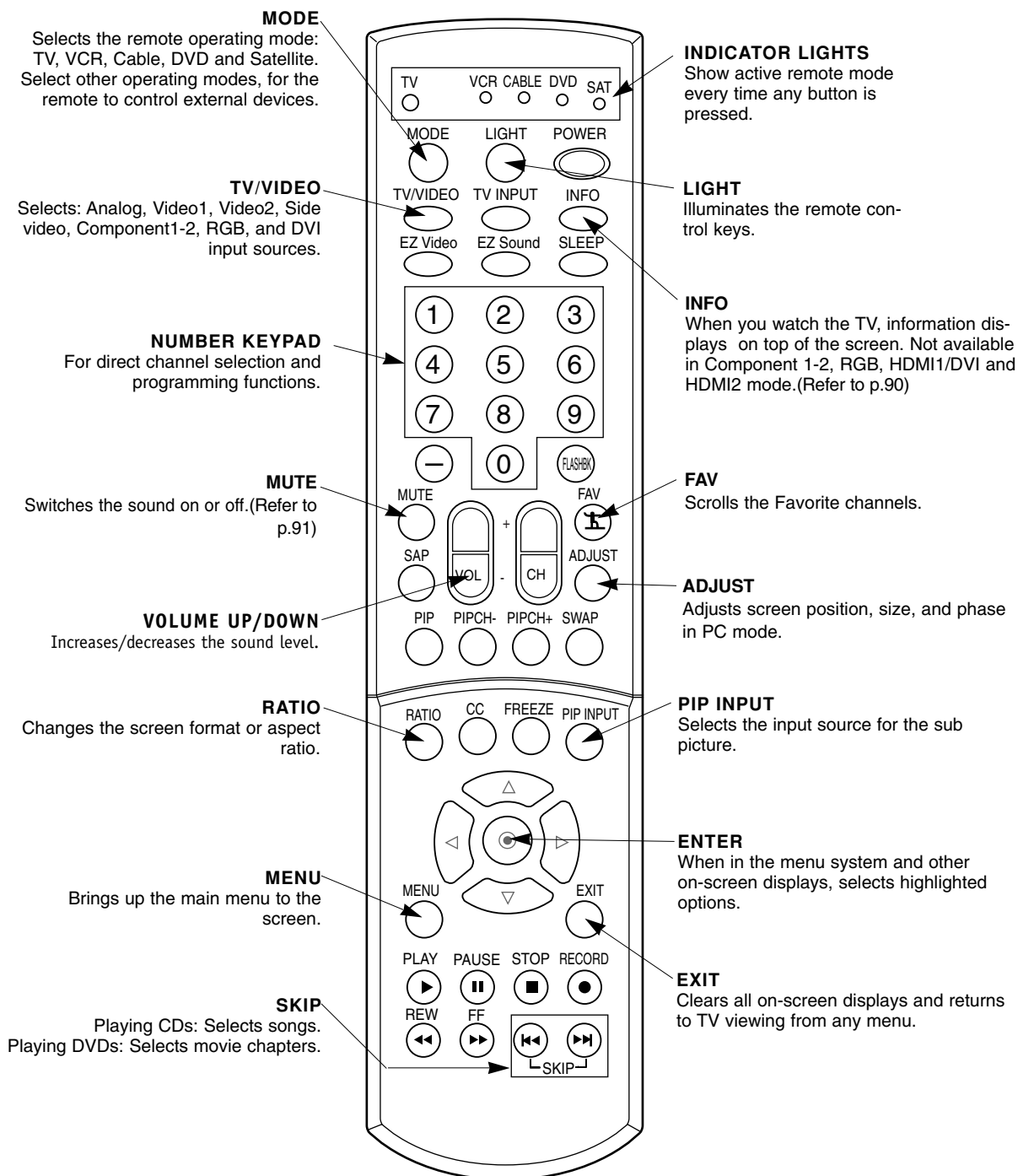
Mini glossary

A/V CABLES Audio/Video cables. Three cable connector—Right audio (red), Left audio (white), and Video (yellow). A/V cables are used for stereo playback of videocassettes and for higher quality picture and sound from other A/V devices.

A/V DEVICE Any device that produces video or sound (VCR, DVD, cable box, or television).

Remote Control Key Functions

- When using the remote control, aim it at the remote control sensor on the TV.



Remote Control Key Functions

TV INPUT
 • Rotates the input mode between Antenna and Cable.
 • Video 1-2, Front Video, Component 1-2, RGB-DTV (or RGB-PC), HDMI1/DVI, HDMI2 and IEEE1394 input sources, TV will return to the last TV channel.

TV/VIDEO
 Rotates the input mode between Antenna and Cable.

TV INPUT
 Rotates the input mode between Antenna and Cable.

INFO
 Displays program information.

EZ Video
 Adjusts the factory preset picture depending on the viewing environment.

EZ Sound
 Selects the sound appropriate for the program's character.

SLEEP
 Puts the TV into sleep mode.

FLASHBK
 Tunes to the last channel viewed.

CHANNEL UP/DOWN
 Scrolls through available channels in EZ Scan memory.

SAP
 Selects MTS sound: Mono, Stereo, and SAP in Analog mode. Change the audio language in DTV mode.

SWAP
 Switches the picture from PIP, POP, or twin picture to the main screen.

PIP
 Toggles between PIP, POP (Picture-out-of-Picture) and Twin picture mode.

PIPCH-
 Changes to next lower PIP channel.

PIPCH+
 Changes to next higher PIP channel.

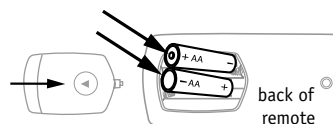
FREEZE
 Captures and freezes the currently-viewed main picture in PIP mode.

THUMBSTICK
 Allows you to navigate the on-screen menus and to adjust the system settings and preferences, by moving to an option with \leftarrow \uparrow \rightarrow \downarrow and selecting the highlighted option with \odot .

RECORD, PAUSE, REW, FFWD, PLAY, STOP
 Control the functions on your VCR.

Installing Batteries

- Open the battery compartment cover on the back side and install the batteries matching correct polarity (+ with +, - with -).
- Install two 1.5V AA batteries. Don't mix old or used batteries with new ones. Close cover.



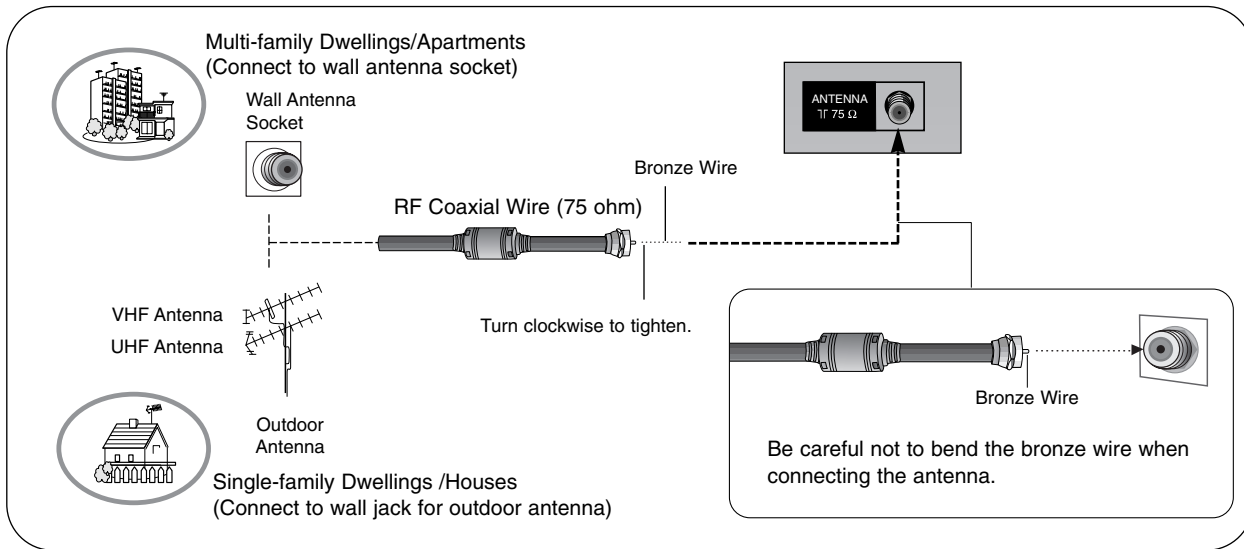
Installation

External Equipment Connections

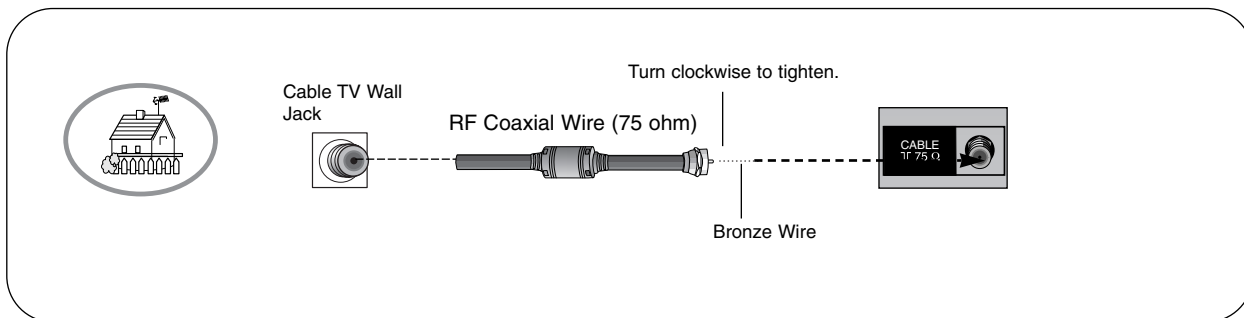
Antenna or Cable Connection

1. Analog and Digital TV signals provided on antenna

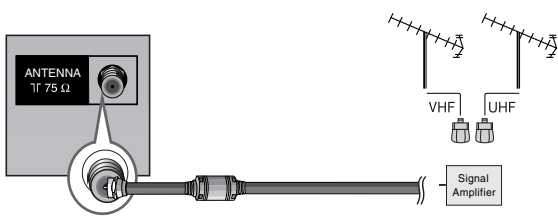
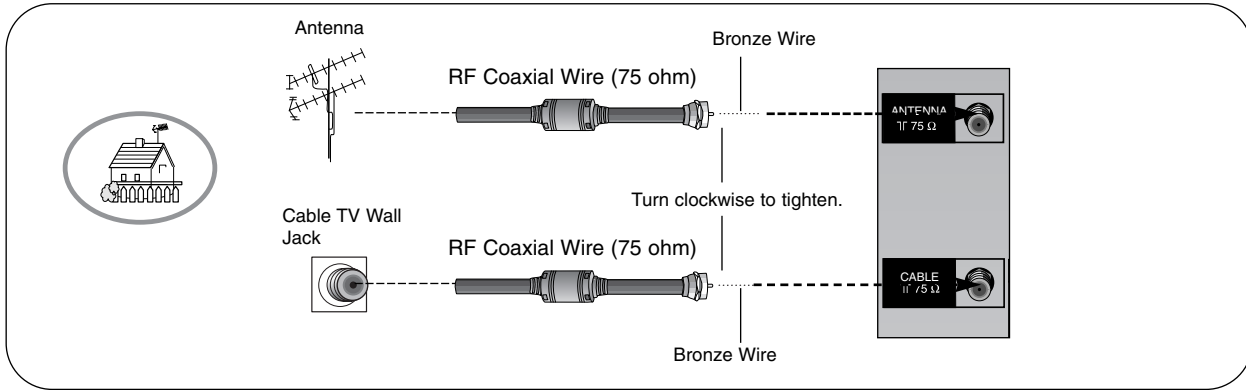
- Wall Antenna Socket or Outdoor Antenna without a Cable Box Connections
- For optimum picture quality, adjust antenna direction if needed.



2. Analog and Digital TV signals provided on cable



3. Analog and Digital TV signals provided on cable and antenna



- To improve the picture quality in a poor signal area, please purchase a signal amplifier and install properly.
- If the antenna needs to be split for two TV's, install a "2-Way Signal Splitter" in the connections.
- If the antenna is not installed properly, contact your dealer for assistance.

Note: The TV will let you know when the TV(analog antenna), DTV(digital antenna), CATV(analog cable) and CADTV(digital cable) channel scans are complete.

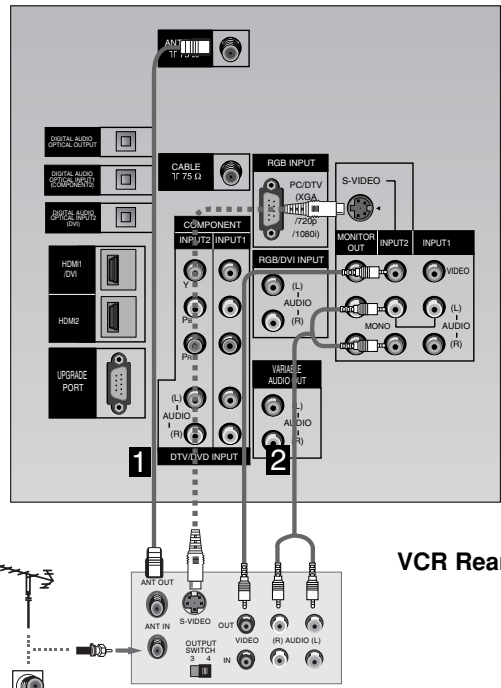
VCR Setup

Connection Option 1

Set VCR output switch to channel 3 or 4 and then tune the TV to the same channel number.

Connection Option 2

1. Connect the audio and video cables from the VCR's output jacks to the TV input jacks, as shown in the figure. When connecting the TV to VCR, match the jack colors (Video = yellow, Audio Left = white, and Audio Right = red). If you connect an S-VIDEO output from VCR to the S-VIDEO input, the picture quality is improved; compared to connecting only the Video input.
2. Insert a video tape into the VCR and press PLAY on the VCR. (Refer to the VCR owner's manual.)
3. Select the input source with using the **TV/VIDEO** button on the remote control. Note that this TV finds the connected input sources automatically for Video, Front Video and Component 1-2. It is presumed that RGB, HDMI1/DVI and HDMI2 sources are connected.



VCR Rear



Do not connect to both Video and S-Video at the same time. In the event that you connect both Video and the S-Video cables, only the S-Video will work.)

External A/V Source Setup

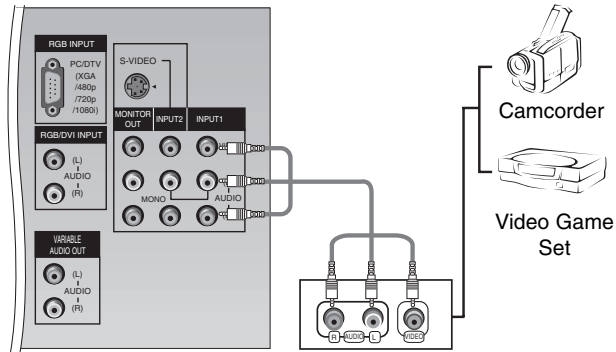
How to connect

Connect the audio and video cables from the external equipment's output jacks to the TV input jacks, as shown in the figure.

When connecting the TV to external equipment, match the jack colors (Video = yellow, Audio Left = white, and Audio Right = red).

How to use

1. Select the input source by using the **TV/VIDEO** button on the remote control. Note that this TV finds the connected input sources automatically for Video 1-2 and Component 1-2. It is presumed that RGB, HDMI1/DVI and HDMI2 sources are connected.
2. Operate the corresponding external equipment. For connection instructions for operating the TV Guide On Screen system, see page 21-22.



DVD Setup

How to connect

1. Connect the DVD video outputs (Y, P_B, P_R) to the COMPONENT (Y, P_B, P_R) INPUT jacks on the TV and connect the DVD audio outputs to the AUDIO INPUT jacks on the TV, as shown in the figure.
2. If your DVD only has an S-Video output jack, connect this to the S-VIDEO input on the TV and connect the DVD audio outputs to the AUDIO INPUT jacks on the TV, as shown in the figure.

Note: If your DVD player does not have component video output, use S-Video.

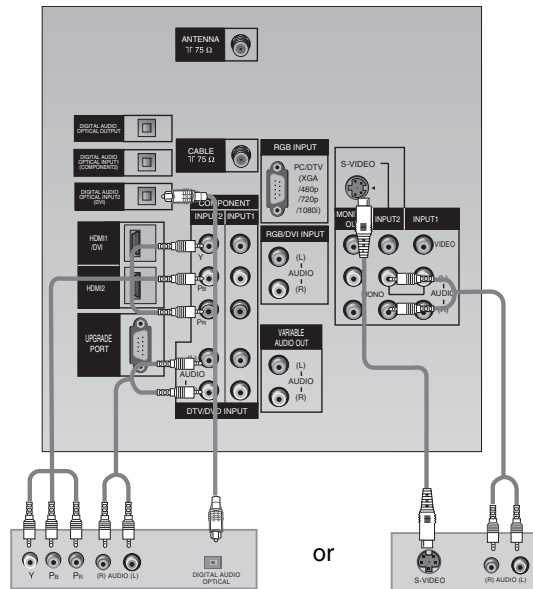
How to use

1. Turn on the DVD player, insert a DVD.
2. Use the **TV/VIDEO** button on the remote control to select **Component 1** or **Component 2**. (If connected to S-VIDEO, select the **Video** or **Front Video** external input source.)
3. Refer to the DVD player's manual for operating instructions.

Component Input ports

To get better picture quality, connect a DVD player to the component input ports as shown below.

Component ports on the TV	Y	P _B	P _R
Video output ports on DVD player	Y	P _B	P _R
	Y	B-Y	R-Y
	Y	Cb	Cr
	Y	P _B	P _R



DVD

Notes:

- Digital Audio will not work for Component 1 input source.
- Digital Audio operation has priority if Digital Audio and AUDIO L/R are connected at the same time.

HDSTB Setup

- This TV can receive Digital Over-the-air/Cable signals without an external digital set-top box. However, if you do receive Digital signals from a digital set-top box or other digital external device, refer to the figure as shown below.
- This TV supports HDCP (High-bandwidth Digital Contents Protection) protocol for Digital Contents (480p,720p,1080i).

How to connect

Use the TV's COMPONENT (Y, P_B, P_R) INPUT, RGB, HDMI1/DVI or HDMI2 jack for video connections, depending on your set-top box connector. Then, make the corresponding audio connections.

Note: *HDMI(High Definition Multimedia Interface): Input that accepts uncompressed digital signal and multi channel digital audio signal.*

Signal	Component 1/2	RGB-DTV,HDMI1/DVI,HDMI2
480i	Yes	No
480p	Yes	Yes
720p	Yes	Yes
1080i	Yes	Yes

How to use

1. Turn on the digital set-top box. (Refer to the owner's manual for the digital set-top box.)
2. Use **TV/VIDEO** on the remote control to select **Component 1**, **Component 2**, **RGB-DTV**, **HDMI1/DVI** or **HDMI2** source.

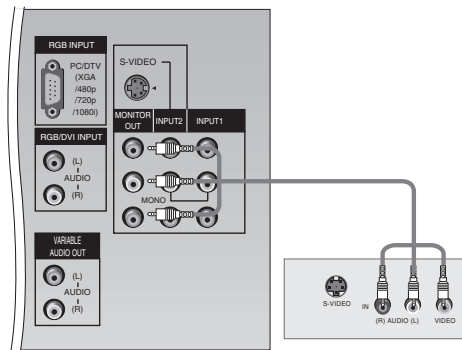
Monitor Out Setup

The TV has a special signal output capability which allows you to hook up a second TV or monitor.

Connect the second TV or monitor to the TV's MONITOR OUTPUT. See the Operating Manual of the second TV or monitor for further details regarding that device's input settings.

Note

- *Component, RGB-PC/RGB-DTV, HDMI1/DVI,HDMI2, DTV input sources cannot be used for Monitor out.*



PC Setup

- This TV provides Plug and Play capability, meaning that the PC adjusts automatically to the TV's settings.
- The TV perceives 640x480, 60Hz as DTV 480p based on the PC graphic card, change the screen scanning rate for the graphic card accordingly.

<When the PC supports DVI>

How to connect

1. Connect the PC to HDMI1/DVI port of this TV with an HDMI-to-DVI cable(not supplied with this product).
If you do not need to connect audio, HDMI2 port is also available for the DVI video connection.
2. If the PC(or the sound card of the PC) has a fiber optic digital audio output connector, connect the PC's audio output to DIGITAL AUDIO(OPTICAL) port for DVI INPUT.
3. If the PC(or the sound card of the PC) has an analog audio output connector, connect the PC's audio output to AUDIO INPUT port located on the right side of RGB INPUT port.

How To Use

1. To get the best picture quality, adjust the PC graphics card to 1024x768, 60Hz.
2. Select HDMI1/DVI input source in main input option of SETUP menu.(Refer to P.61)
TV/VIDEO button is also available for this purpose.
3. Check the image on your TV. There may be noise associated with the resolution, vertical pattern, contrast or brightness in PC mode. If noise is present, change the PC output to another resolution, change the refresh rate to another rate or adjust the brightness and contrast on the VIDEO menu until the picture is clear. If the refresh rate of the PC graphic card can not be changed, change the PC graphic card or consult the manufacturer of the PC graphic card.

<When the PC supports RGB>

How to connect

1. Connect the PC to RGB INPUT port of this TV with a RGB cable(not supplied with this product).
2. If the PC(or the sound card of the PC) has an analog audio output connector, connect the PC's audio output to AUDIO INPUT port located on the right side of RGB INPUT port.

How To Use

1. To get the best picture quality, adjust the PC graphics card to 1024x768, 60 Hz.
2. Select **RGB-PC** input source in main input option of SETUP menu.(Refer to P.61)
Once you select **RGB-PC** in main input option of SETUP menu, **TV/VIDEO** button is also available for this purpose.
3. Check the image on your TV. There may be noise associated with the resolution, vertical pattern, contrast or brightness in PC mode. If noise is present, change the PC output to another resolution, change the refresh rate to another rate or adjust the brightness and contrast on the VIDEO menu until the picture is clear. If the refresh rate of the PC graphic card can not be changed, change the PC graphic card or consult the manufacturer of the PC graphic card.

Monitor Display Specifications (RGB-PC or HDMI/DVI Mode)

Resolution	Horizontal Frequency(KHz)	Vertical Frequency(Hz)
640x350	31.468	70.09
640x480	31.469	59.94
	37.861	72.80
800x600	37.500	75.00
	35.156	56.25
	37.879	60.31
	48.077	72.18
1024x768	46.875	75.00
	48.363	60.00
	56.476	70.06
	60.023	75.02

Digital Audio Output

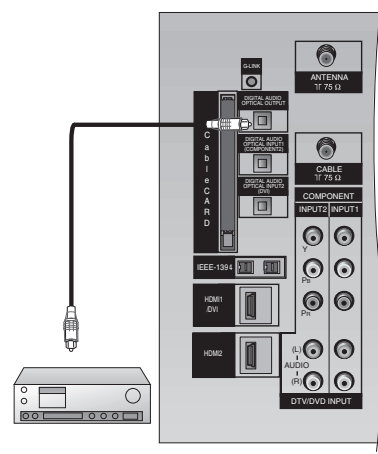
Send the TV's audio to external audio equipment (stereo system) via the Digital Audio Output (Optical) port.

How to connect

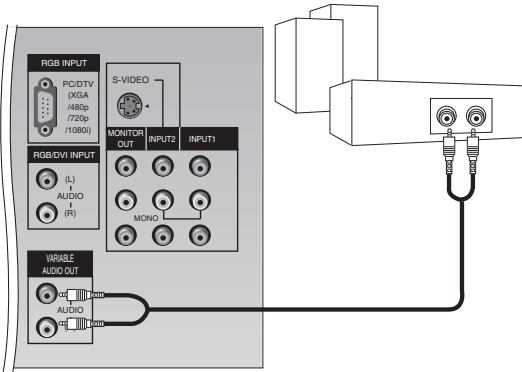
1. Connect one end of an optical cable to the TV Digital Audio (Optical) Output port.
2. Connect the other end of the optical cable to the digital audio (optical) input on the audio equipment.
3. Set the "**TV Speaker** option - **Off**" in the AUDIO menu. Refer to page 64.
See the external audio equipment instruction manual for operation.



Caution: Do not look into the optical output port. Looking at the laser beam may damage your vision.



External Stereo



Hook up Variable Audio Output, L-Audio-R to Amplifier system for Left/Right front speaker sound.

How to connect

1. Locate the Variable Audio Out jacks on the back of your TV and the Input jacks on the back of your stereo's amplifier.
2. Connect the two jacks, making sure that the right and left channels are connected correctly.
3. Set up your speakers through your analog stereo amplifier, according to the instructions provided with the amplifier.

HDMI



- HDMI™, the HDMI logo and High-Definition Multimedia Interface is a trademark or registered trademark of HDMI Licensing.
- This TV can receive the High-Definition Multimedia Interface(HDMI) or the Digital Visual Interface(DVI).
- This TV supports HDCP(High-bandwidth Digital Contents Protection) Protocol for 720x480p, 1280x720p, and 1920x1080i resolution.
- When you connect this TV with a source device(DVD player, Set Top Box or PC) supporting Auto HDMI/DVI function, the output resolution of the source device will be automatically set to 1280x720p.
- If the source device does not support Auto HDMI/DVI, you need to set the output resolution appropriately.
To get the best picture quality, adjust the DVD Player or Set Top Box's output resolution to 1280x720p, and the PC graphics card's output resolution to 1024x768, 60Hz.
- If the source device has an HDMI output, no other audio connection is necessary because HDMI-to-HDMI connection includes both video and audio.
- If the source device has a DVI output and no HDMI output, a separated audio connection is necessary.

<When the source device(DVD player or Set Top Box) supports HDMI>

How To Connect

1. Connect the source device to HDMI1/DVI or HDMI2 port of this TV with an HDMI cable(not supplied with this product).
2. No separated audio connection is necessary.

How To Use

- If the source device supports Auto HDMI function, the output resolution of the source device will be automatically set to 1280x720p.
- If the source device does not support Auto HDMI, you need to set the output resolution appropriately.
To get the best picture quality, adjust the output resolution of the source device to 1280x720p.
- Select HDMI1/DVI or HDMI2 input source in main input option on the SETUP menu.(Refer to P.61)
TV/VIDEO button is also available for this purpose.

<When the source device(DVD player or Set Top Box) supports DVI>

How To Connect

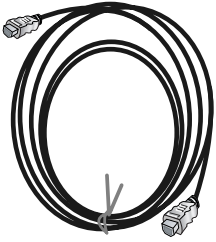
1. Connect the source device to HDMI1/DVI port of this TV with a HDMI-to-DVI cable(not supplied with this product).
Do not use HDMI2 port for DVI connection if you want to connect audio.
2. A separated audio connection is necessary.
3. If the source device has a fiber optic digital audio output, connect the audio output to DIGITAL AUDIO(OPTICAL) port for DVI INPUT.
4. , connect the PC's audio output to AUDIO INPUT port located on the right side of RGB INPUT port.

How To Use

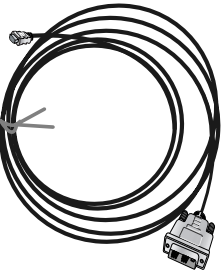
- If the source device supports Auto DVI function, the output resolution of the source device will be automatically set to 1280x720p.
- If the source device does not support Auto DVI, you need to set the output resolution appropriately.
To get the best picture quality, adjust the output resolution of the source device to 1280x720p.
- Select HDMI1/DVI input source in main input option on the SETUP menu.(Refer to P.61)
TV/VIDEO button is also available for this purpose.

Reference

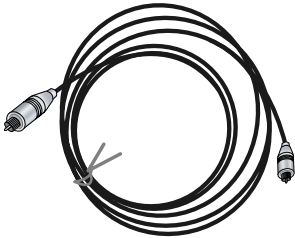
Cable sample



HDMI Cable
(not supplied with the product)



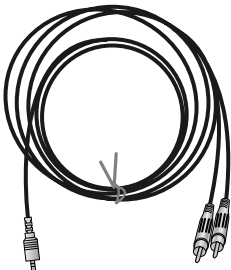
HDMI to DVI Cable
(not supplied with the product)



Fiber Optic Digital Audio Cable
(not supplied with the product)



Analog Audio Cable(RCA type)
(not supplied with the product)



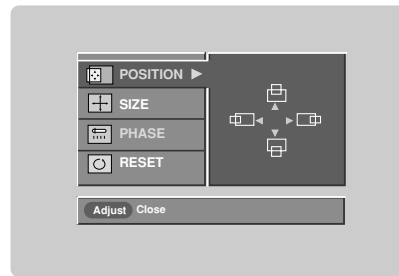
Analog Audio Cable(Stereo to RCA type)
(not supplied with the product)

How to use

1. Connect the HDMI1/DVI Source Devices(DVD Player or Set Top Box or PC) and the TV SET.
2. Turn on the display by pressing the POWER button on the TV SET and HDMI1/DVI Source Devices remote control.
3. Select HDMI1/DVI Input source in Main Input option on the SETUP menu.(Refer to P.61)
4. Check the image on your TV SET. There may be noise associated with the resolution, vertical pattern, contrast or brightness in HDMI1/DVI Source Devices. If noise is present, change the HDMI1/DVI Source Devices to another resolution, change the refresh rate or adjust the brightness and contrast on the menu until the picture is clear. If the refresh rate of the PC graphics card can not be changed, change the PC graphics card or consult the manufacturer of the PC graphics card.

Notes:

- Depending on the graphics card, DOS mode may not work if a HDMI to DVI Cable is in use.
- Avoid keeping a fixed image on the screen for a long period of time. The fixed image may become permanently imprinted on the screen.
- When Source Devices connected with HDMI1/DVI Input, output PC Resolution(VGA, SVGA, XGA), Position and Size may not fit to Screen. As shown in the picture below, press the **ADJUST** button to adjust the screen Position of TV SET and contact an PC graphics card service center.
- When Source Devices connected with HDMI1/DVI Input, output TV SET Resolution(480p, 720p, 1080i) and TV SET Display fit EIA/CEA-861-B Specification to Screen. If not, refer to the Manual of HDMI1/DVI Source Devices or contact your service center.
- In case HDMI1/DVI Source Devices is not connected Cable or poor cable connection, "NO SIGNAL" OSD display in HDMI1/DVI Input. In case that Video Resolution is not supported TV SET output in HDMI1/DVI Source Devices, "INVALID FORMAT" OSD display. Refer to the Manual of HDMI1/DVI Source Devices or contact your service center.



PC mode

In This Mode, the Supported TV Set Resolution Specification

- 1920 x 1080 I @ 59.94Hz / 60Hz, 16:9
- 1280 x 720 P @ 59.94Hz / 60Hz, 16:9(preferred format)
- 720 x 480 P @ 59.94Hz / 60Hz, 16:9
- 720 x 480 P @ 59.94Hz / 60Hz, 4:3

In This Mode, the Supported PC Resolution Specification

- 640 x 350 @ 70Hz
- 640 x 480 @ 60Hz
- 640 x 480 @ 72Hz
- 640 x 480 @ 75Hz
- 800 x 600 @ 56Hz
- 800 x 600 @ 60Hz
- 800 x 600 @ 72Hz
- 800 x 600 @ 75Hz
- 1024 x 768 @ 60Hz(preferred format)
- 1024 x 768 @ 70Hz
- 1024 x 768 @ 75Hz

Operation

Turning the TV On

* In this manual, the OSD (On Screen Display) may be different from your TV's because it is just an example to help you with the TV operation.

Turning on the TV just after installation

1. Connect power cord correctly.
2. Press the **POWER** button on the TV. At this moment, the TV is switched to standby mode. Press the **TV INPUT, TV/VIDEO, CH (▲ / ▼), Number (0 ~ 9)** button on the remote control or press the **CH (▲ / ▼)** button on the TV front panel and then the TV will switch on.

Turning on the TV (power cord is still connected)

1. If the TV was turned off with indicators on the TV

- Check the power cable.

2. If the TV was turned off with the remote control and the **POWER** button on the TV

- Press the **POWER** button on the TV or press the **POWER, TV/VIDEO, CH (▲ / ▼), Number (0 ~ 9)** button on the remote control to turn the TV on.

Notes:

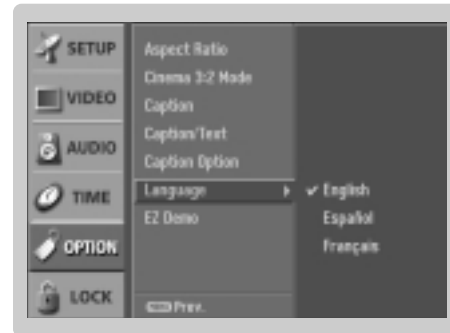
- If you intend to be away on vacation, disconnect the power plug from the wall power outlet.
- The TV Guide On Screen and any CableCARD™ Software upgrades work while the TV is in standby mode. If you pull the power plug cord the TV Guide On Screen will not update its listings and no CableCARD™ Software upgrades will occur.
- After turning on the TV, it could take up to a week for the TV Guide On Screen system to receive full listings data.

TV Setup

On-screen Menus Language Selection

- The menus can be shown on the screen in the selected language. First select your language.

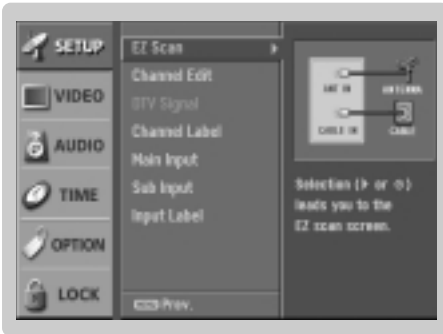
1. Press the **MENU** button and then use ▲ / ▼ button to select the **OPTION** menu.
2. Press the ► button and then use ▲ / ▼ button to select **Language**.
3. Press the ► button and then use ▲ / ▼ button to select your desired language. From this point on, the on-screen menus will be shown in the selected language.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Setup Menu Options

EZ Scan (Channel Search)

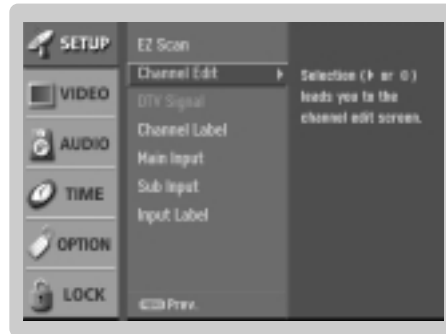
- Automatically finds all channels available through antenna or cable inputs, and stores them in memory on the channel list.
- Run EZ Scan again after any Antenna/Cable connection changes.
- A password is required to gain access to EZ Scan menu if the Lock System is turned on.



1. Press the **MENU** button and then use **▲ / ▼** button to select the **SETUP** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **EZ Scan**.
3. Press the **▶** button or **ENTER** button to begin the channel search.
Allow EZ Scan to complete the channel search cycle for TV, DTV, CATV, and CADTV.

Channel Edit

- Create two different types of channel lists in memory: "Custom List" and "Favorite List" from the default channel list created from the EZ Scan channel search.
- A Custom List can be created by toggling each channel on or off with **ENTER** button. The channels in the Custom List are displayed in black color, and the channels deleted from the Custom List are displayed in gray color. Once a channel is highlighted you can add or delete the channel by referring to the small window at the top-left corner of the screen. You can create your own Favorite List.
- Use the **FAV** button on the remote control when a channel is highlighted and then you can add or delete the channel to/from the Favorite List.



1. Press the **MENU** button and then use **▲ / ▼** button to select the **SETUP** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Channel Edit**.
3. Press the **▶** button. You will now see a screen filled with channel numbers and a preview picture.
4. Use **▲ / ▼ / ◀ / ▶** button to select a channel and then use the **ENTER** button to add or delete it. Press **FAV** to add or delete the channel to the Favorite List.
5. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.

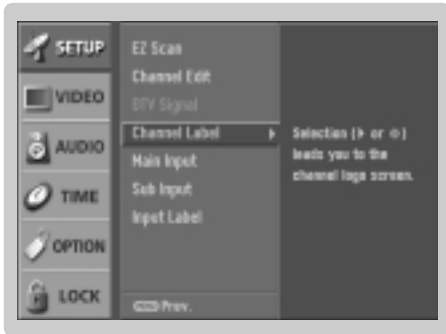


Note:

- When a cable box connects to the physical channel 2, 3, or 4 in TV Guide On Screen Setup, cable channels(CATV or CADTV) will not be editable by Channel Edit. Instead, use the cable box's Channel Edit if available.

Channel Label Setup

- Choose preset labels for your channels.
- If a channel label is provided on the signal from the broadcasting station, the TV displays a short name for a DTV channel - even if you didn't preset a label for the channel.



1. Press the **MENU** button and then use **▲ / ▼** button to select the **SETUP** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Channel Label**.
3. Press the **▶** button. You will now see a screen filled with Labels and a preview screen.
4. Use the **CH ▲ / ▼** button to select a channel to Label.
5. Use **▲ / ▼ / ◀ / ▶** button to select the appropriate label for the channel, then press **ENTER** button to set the Label to the selected channel.

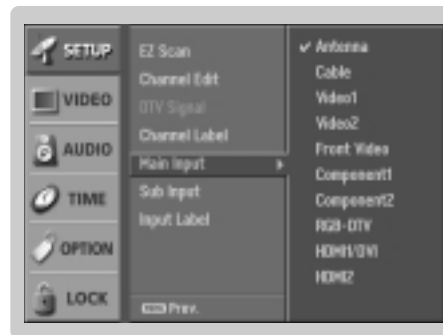
- If you press **ENTER** button in TV viewing mode, you will see the channel banner. -----▶



Main Picture Source Selection

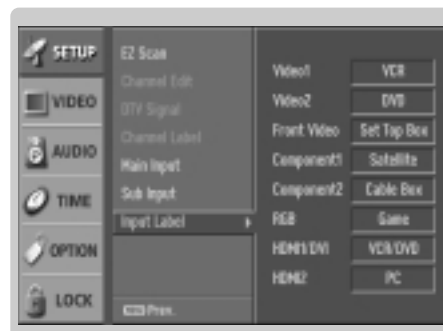
- Changes the picture source so you can watch your off-air TV, cable TV, VCR, DVD, or any other devices that are connected to your TV.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **SETUP** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Main Input**.
3. Press the **▶** button and then use **▲ / ▼** button to select the source: Antenna, Cable, Video1, Video2, Front Video, Component1, Component2, RGB-DTV (or RGB-PC), HDMI1/DVI, HDMI2.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Input Label

1. Press the **MENU** button and then use **▲ / ▼** button to select the **SETUP** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Input Label**.
3. Press the **▶** button and then use **▲ / ▼** button to select the source: Video1, Video2, Front Video, Component1, Component2, RGB, HDMI1/DVI or HDMI2.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Video Menu Options

EZ Picture

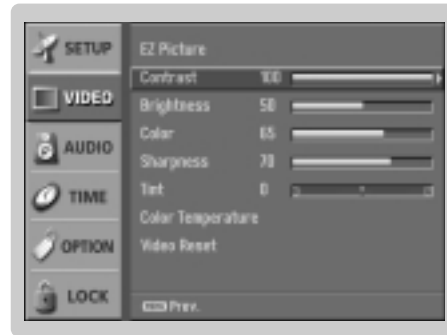
- EZ Picture adjusts the TV for the best picture appearance. Select the preset value in the EZ Picture menu based on the program category.
- When adjusting Video menu options (contrast, brightness, color, sharpness, tint, and color temperature) manually, EZ Picture automatically changes to **Custom**.
- **Daylight, Normal, Night Time, Movie, Video Game,** and **Sports** settings are preset for optimum picture quality at the factory and are not adjustable.

1. Press the **EZ PIC** button repeatedly to select the picture appearance setup option as shown below:
Custom (your own settings), **Daylight, Normal, Night Time, Movie, Video Game,** and **Sports**.
 • You can also use the **VIDEO** menu to adjust **EZ Picture**.
2. Press the **EXIT** button to save and return to TV viewing.

Manual Picture Control (**Custom** option)

- Adjust the picture appearance to suit your preference and viewing situations.

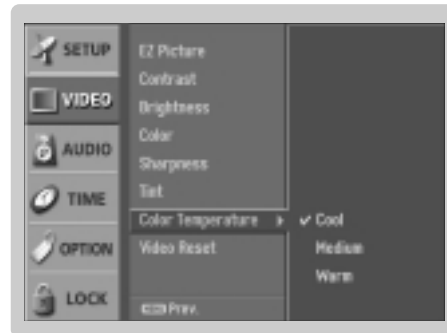
1. Press the **MENU** button and then use **▲ / ▼** button to select the **VIDEO** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select the desired picture option (**Contrast, Brightness, Color, Sharpness,** or **Tint**).
3. Press the **▶** button and then use **◀ / ▶** button to make appropriate adjustments.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Color Temperature Control

- Choose one of three automatic color adjustments. Set to warm to enhance hotter colors such as red, or set to cool to see less intense colors with more blue.

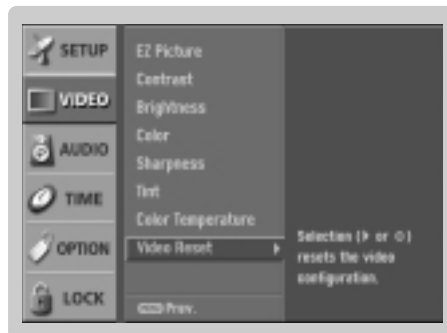
1. Press the **MENU** button and then use **▲ / ▼** button to select the **VIDEO** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Color Temperature**.
3. Press the **▶** button and then use **▲ / ▼** button to select either **Cool, Medium,** or **Warm**.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Video Reset

- Use to quickly reset all the Video menu options to their original factory preset values.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **VIDEO** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Video Reset**.
3. Press the **▶** button to reset the Video menu options to original values.



Audio Menu Options

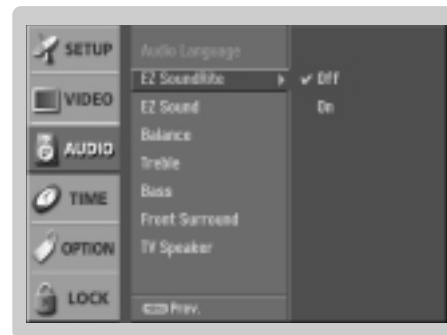
Audio Language

- Other languages may be available if a digital signal is provided by the broadcasting station.
1. Press the **MENU** button and then use ▲ / ▼ button to select the **AUDIO** menu.
 2. Press the ► button and then use ▲ / ▼ button to select **Audio Language**.
 3. Press the ► button and then use ▲ / ▼ button to select: English, Spanish, or French.
 4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



EZ SoundRite

- Scans for changes in sound level during commercials, then adjusts the sound to match the specified audio level. SoundRite makes sure that the volume level remains consistent whether you are watching a commercial or a regular TV program.
1. Press the **MENU** button and then use ▲ / ▼ button to select the **AUDIO** menu.
 2. Press the ► button and then use ▲ / ▼ button to select **EZ SoundRite**.
 3. Press the ► button and then use ▲ / ▼ button to select **On** or **Off**.
 4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.

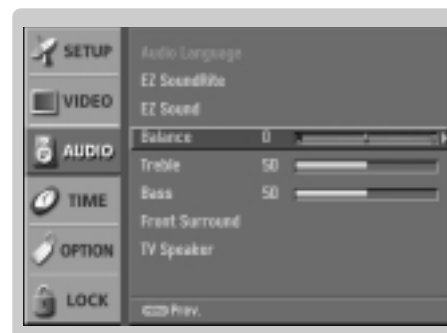


EZ Sound

- EZ Sound lets you enjoy the best sound without any special adjustment because the TV sets the appropriate sound options based on the program content.
 - When adjusting sound options (treble, bass, and front surround) manually, EZ Sound automatically switches **Custom**.
 - **Normal, Stadium, News, Music** and **Theater** are preset for good sound quality at the factory and are not adjustable.
1. Press the **EZ SOUND** button repeatedly to select the appropriate sound setup as shown below: **Custom** (your own settings), **Normal, Stadium, News, Music** and **Theater**.
 - You can also adjust **EZ Sound** in the **AUDIO** menu.
 2. Press **EXIT** button to save and return to TV viewing.


Manual Sound Control (Custom option)

- Adjust the sound to suit your taste and room situations.
1. Press the **MENU** button and then use ▲ / ▼ button to select the **AUDIO** menu.
 2. Press the ► button and then use ▲ / ▼ button to select the desired sound option (**Balance, Treble, or Bass**).
 3. Press the ► button and then use ◀ / ▶ button to make appropriate adjustments.
 4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Audio Menu Options

Front Surround

-  is a trademark of SRS Labs, Inc.
- TruSurround XT technology is incorporated under license from SRS Labs, Inc.
- Manufactured under license from Dolby Laboratories. “Dolby” and the double-D symbol are trademarks of Dolby Laboratories.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **AUDIO** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Front Surround**.
3. Press the **▶** button and then use **▲ / ▼** button to select **Off**, **3D EchoSound System** or **SRS (Sound Retrieval System) TruSurround XT**.

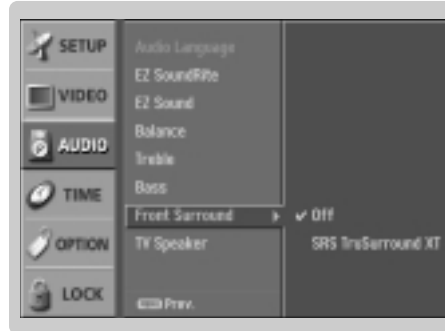
• 3D EchoSound System

Creates a stunning simulated stereo effects from any mono sound and a realistic three-dimensional sound with a very wide and deep sound stage into stereo sound

• SRS TruSurround XT

Takes advantage of any multi-channel format without needing to add extra speakers or equipment. Dialog clarity, bass enrichment, and the addition of stereo audio enhancement that produces an immersive sound experience from standard stereo material.

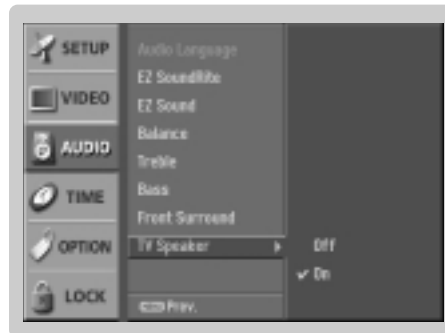
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



TV Speaker On/Off Setup

- Turn TV speaker off if using external audio equipment. Feature turns the TV Speaker option On or Off.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **AUDIO** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **TV Speaker**.
3. Press the **▶** button and then use **▲ / ▼** button to select **On** or **Off**.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Stereo/SAP Broadcasts Setup

- This TV can receive MTS stereo programs and any SAP (Secondary Audio Program) that accompanies the stereo program; if the station transmits an additional sound signal as well as the original one.
- When having selected Stereo or SAP button on the remote control, this TV can only receive the signal when the TV station transmits the proper signals.
- Mono sound is automatically received if the broadcast is only in Mono; even though Stereo or SAP has been selected.
- Select Mono if you want to listen to the mono sound in remote fringe areas during stereo/SAP broadcasting.
- Stereo or SAP can be received in Analog channel.

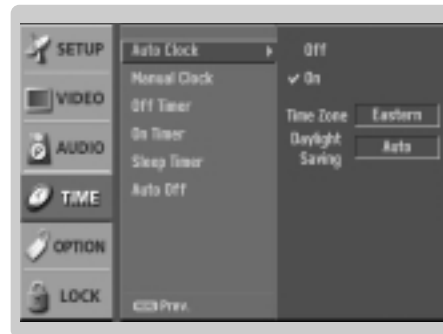
1. Use the **SAP** button to select your desired MTS mode in analog signal. Each time you press the **SAP** button, **Mono**, **Stereo**, or **SAP** appear in turn.
 - If other languages available on the digital signal, select them with the **SAP** button.
2. Press **EXIT** button to save and return to TV viewing.

Time Menu Options

Auto Clock Setup

- The time is set automatically from a digital channel signal.
- The digital channel signal includes information for the current time provided by the broadcasting station.
- Set the clock manually, if the current time is set incorrectly by the auto clock function.
- When you set up TV Guide, **Auto Clock** menu is not selected.

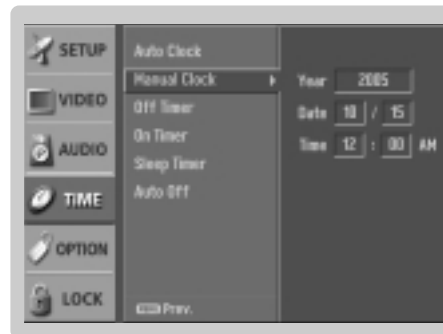
1. Press the **MENU** button and then use **▲ / ▼** button to select the **TIME** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Auto Clock**.
3. Press the **▶** button and then use **▲ / ▼** button to select **On**.
4. Press the **▶** button and then use **▲ / ▼** button to select your viewing area time zone: **Eastern, Central, Mountain, Pacific, Alaska, or Hawaii**.
5. Press the **▶** button and then use **▲ / ▼** button to set Daylight Saving **Auto, Off** or **On**, depending on whether or not your viewing area observes Daylight Savings Time.
6. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Manual Clock Setup

- If current time setting is wrong, reset the clock manually.
- When you set up TV Guide, **Manual Clock** menu is not set.

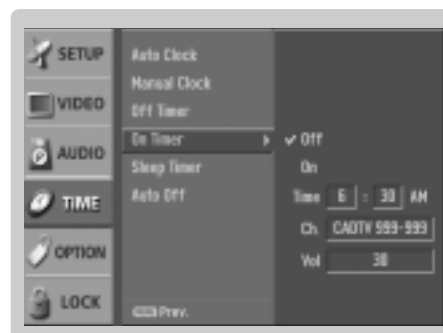
1. Press the **MENU** button and then use **▲ / ▼** button to select the **TIME** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Manual Clock**.
3. Press the **▶** button and then use **◀ / ▶** button to select either the year, date, or time option. Once selected, use the **▲ / ▼** button to set the year, date, and time options.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



On/Off Timer Setup

- Timer function operates only if current time has been set.
- Off-Timer function overrides On-Timer function if they are both set to the same time.
- The TV must be in standby mode for the On-Timer to work.
- If you do not press any button within 2 hours after the TV turns on with the On Timer function, the TV will automatically revert to standby mode.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **TIME** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Off Timer** or **On Timer**.
3. Press the **▶** button and then use **▲ / ▼** button to select **On**.
 - To cancel **On/Off timer** function, select **Off**.
4. Press the **▶** button and then use **▲ / ▼** button to set the hour.
5. Press the **▶** button and then use **▲ / ▼** button to set the minutes.
6. **For only On timer function**
 - Press the **▶** button and then use **▲ / ▼** button to select the channel at turn-on.
 - Press the **▶** button and then use **▲ / ▼** button to set the sound level at turn-on.
7. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Time Menu Options

Sleep Timer

- The Sleep Timer turns the TV off at the preset time. Note that this setting is cleared when the TV is turned off.
 - You can also set up the **Sleep Timer** in the **TIME** menu.
1. Press the **TIMER** button repeatedly to select the number of minutes. First the **Off** option appears on the screen, followed by the following sleep timer options: 10, 20, 30, 60, 90, 120, 180, and 240 minutes.
 2. When the number of minutes you want is displayed on the screen, press the **ENTER** button. The timer begins to count down from the number of minutes selected.
 3. To check the remaining minutes before the TV turns off, press the **TIMER** button once.
 4. To cancel the Sleep Timer, press the **TIMER** button repeatedly to select **Off**.

Auto Off

- If set to on and there is no input signal, the TV turns off automatically after 10 minutes.
1. Press the **MENU** button and then use **▲ / ▼** button to select the **TIME** menu.
 2. Press the **▶** button and then use **▲ / ▼** button to select **Auto Off**.
 3. Press the **▶** button and then use **▲ / ▼** button to select **On** or **Off**.
 4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Option Menu Options

Aspect Ratio Control

- Lets you choose the way an analog picture with a 4:3 aspect ratio is displayed on your TV with a 16:9 ratio picture format. When you receive an analog picture with a 4:3 aspect ratio on your 16:9 TV, you need to specify how the picture is to be displayed.
- If you are viewing a picture with a 16:9 aspect ratio, you can't use the Horizon aspect ratio option.
- Horizon aspect ratio is not available for Component 1-2 (720p/1080i)/RGB-DTV (720p/1080i)//HDMI1/DVI-DTV (720p/1080i)/DTV(720p/1080i), HDMI2-DTV(720p/1080i) input source.
- RGB-PC/DVI-PC input source use 4:3 or 16:9 aspect ratio.

1. Press the **RATIO** button repeatedly to select the desired picture format.
You can also adjust the **Aspect Ratio** in the **OPTION** menu.

• Set By Program

Selects the proper picture proportion to match the source's image. (4:3 → 4:3, 16:9 → 16:9)

• 4:3

Choose **4:3** when you want to view a picture with an original 4:3 aspect ratio, with black bars appearing at both the left and right sides.

• 16:9

Choose **16:9** when you want to adjust the picture horizontally, in a linear proportion to fill the entire screen.

• Horizon

Choose **Horizon** when you want to adjust the picture in a non-linear proportion, that is, more enlarged at both sides, to create a spectacular view.

• Zoom 1

Choose **Zoom 1** when you want to view the picture without any alteration. However, the top and bottom portions of the picture will be cropped.

• Zoom 2

Choose **Zoom 2** when you want the picture to be altered, both horizontally extended and vertically cropped. The picture taking a halfway trade off between alteration and screen coverage.

• Cinema Zoom

Choose **Cinema Zoom** when you want to enlarge the picture in correct proportion. Note: When enlarging or reducing the picture, the image may become distorted.

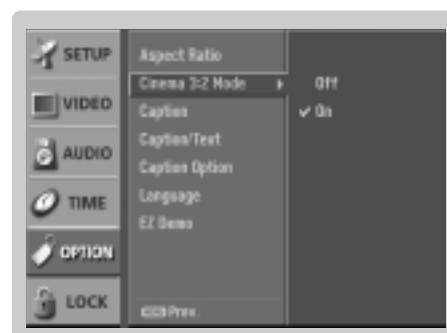
You can adjust the enlarge proportion of Cinema Zoom using ▲ / ▼ button. The adjustment range is 1~16.

Cinema 3:2 Mode Setup

- Most movies are 24 frames/sec, but TV signal is 30 frames/sec.
This option lets the TV do 3:2 pull-down operation for you to watch movies at the best motion appearance.

1. Press the **MENU** button and then use ▲ / ▼ button to select the **OPTION** menu.
2. Press the ► button and then use ▲ / ▼ button to select **Cinema 3:2 Mode**.
3. Press the ► button and then use ▲ / ▼ button to select **On** or **Off**.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.

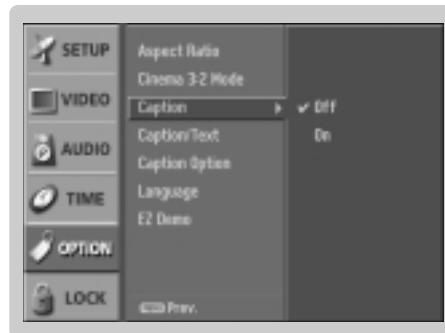
Note: This feature operates only in 480i mode.



Option Menu Options

Caption

1. Press the **MENU** button and then use **▲ / ▼** button to select the **OPTION** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Caption**.
3. Press the **▶** button and then use **▲ / ▼** button to select **On** or **Off**.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Caption/Text

Analog Broadcasting System Captions

- Select a caption mode for displaying captioning information if provided on a program.
- Analog caption displays information at any position on the screen usually the program's dialog.
- Text displays information, usually at the bottom position and is used for a data service, generally not program related.
- Caption/Text, if provided by the broadcaster, would be available for both digital and analog channels on the Antenna/Cable.
- This TV is programmed to remember the caption/text mode it was last set to, when you turn the power off.

1. Use the **CC** button repeatedly to select Caption **CC1, CC2, CC3, CC4, Text1, Text2, Text3, or Text4**.
 - **EZ Mute** shows the selected captions option (if available on program) when the TV sound is muted
2. Press **EXIT** button to save and return to TV viewing.

• You can also use the **OPTION** menu to select **Caption/Text**.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **OPTION** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Caption/Text**.
3. Press the **▶** button and then use **▲ / ▼** button to select caption: **CC1, CC2, CC3, CC4, Text1, Text2, Text3, or Text4**.

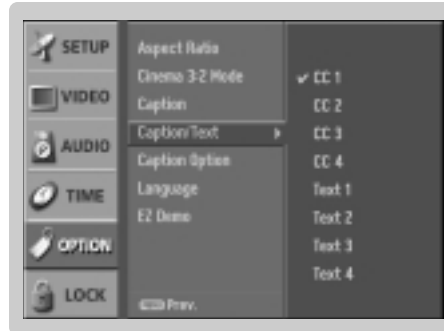
• CAPTION

The term for the words that scroll across the bottom of the TV screen; usually the audio portion of the program provided for the hearing impaired.

• TEXT

The term for the words that appear in a large black frame and almost cover the entire screen; usually messages provided by the broadcaster.

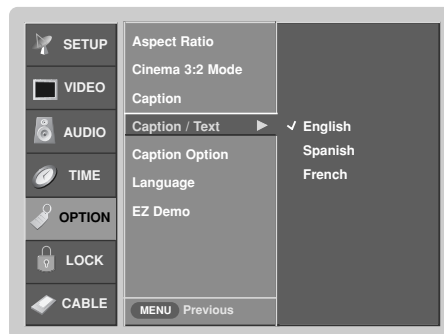
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



Digital Broadcasting System Captions

- Choose the language you want the DTV/CADTV Captions to appear in.
- Languages can be chosen for digital sources only if they are included on the program.

1. Press the **MENU** button and then use **▲ / ▼** button to select the **OPTION** menu.
2. Press the **▶** button and then use **▲ / ▼** button to select **Caption/Text**.
3. Press the **▶** button and then use **▲ / ▼** button to select available caption languages: **English, Spanish, or French**.
4. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.



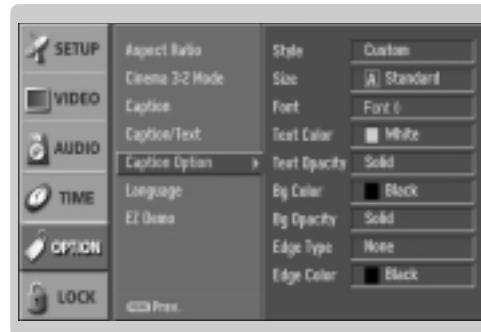
Caption Option

- Customize the DTV/CADTV captions that appear on your screen.

1. Press the **MENU** button and then use ▲ / ▼ button to select the **OPTION** menu.
2. Press the ► button and then use ▲ / ▼ button to select **Caption Option**.
3. Press the ► button and then use ◀ / ▶ button to select **Custom**.
4. Use ▲ / ▼ button to customize the Style, Font, etc., to your preference. A preview icon is provided at the bottom of the screen, use it to see the caption language.

- **Size:** Set the size the words will appear in.
- **Font:** Select a typeface for the words.
- **Text Color:** Choose a color for the text.
- **Text Opacity:** Specify the opacity for the text color.
- **Bg (Background) Color:** Select a background color.
- **Bg (Background) Opacity:** Select the opacity for the background color.
- **Edge Type:** Select an edge type.
- **Edge Color:** Select a color for the edges.

5. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.

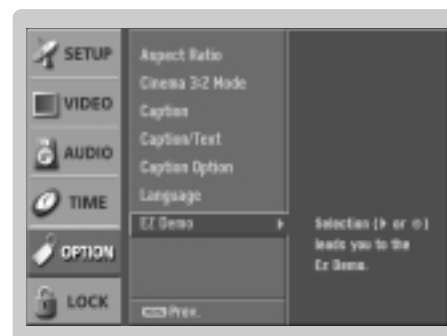


EZ Demo

Shows you how to navigate the TV's on-screen menus.

EZ Demo Use to scan the features and menu options available on your TV.

1. Press the **MENU** button and then use ▲ / ▼ button to select the **OPTION** menu.
2. Press the ► button and then use ▲ / ▼ button to select **EZ Demo**, then use the ► button to start EZ Demo.
3. Press **EXIT** button to stop EZ Demo.



Lock Menu Options

Parental Control can be used to block specific channels, ratings and other viewing sources.

The Parental Control Function (V-Chip) is used to block program viewing based on the ratings sent by the broadcasting station. The default setting is to allow all programs to be viewed. Viewing can be blocked by the type of program and by the categories chosen to be blocked. It is also possible to block all program viewing for a time period. To use this function, the following must be done :

1. Set ratings and categories to be blocked.
2. Specify a password
3. Enable the lock

V-Chip rating and categories

Rating guidelines are provided by broadcasting stations. Most television programs and television movies can be blocked by TV Rating and/or Individual Categories. Movies that have been shown at the theaters or direct-to-video movies use the Movie Rating System (MPAA) only.

Ratings for Movies previously shown in theaters:

Movie Ratings :

- Blocking Off (Permits all programs)
- G (General audience)
- PG (Parental guidance suggested)
- PG-13 (Parents strongly cautioned)
- R (Restricted)
- NC-17 (No one 17 and under admitted)
- X (Adult only)

If you set PG-13 : G and PG movies will be available , PG-13, R, NC-17 and X will be blocked.

Ratings for Television programs including made-for-TV movies :

- TV-G (General audience)
- TV-PG (Parental guidance suggested)
- TV-14 (Parents strongly cautioned)
- TV-MA (Mature audience only)
- TV-Y (All children)
- TV-Y7 (Children 7 years older)

TV Rating Children:

- Age (applies to TV-Y, TV-Y7)
- Fantasy Violence (applies to TV-Y7)

TV Rating General:

- Age (applies to TV-G, TV-PG, TV-14, TV-MA)
- Dialogue - sexual dialogue (applies to TV-PG, TV-14)
- Language - adult language (applies to TV-PG, TV-14, TV-MA)
- Sex - sexual situations (applies to TV-PG, TV-14, TV-MA)
- Violence (applies to TV-PG, TV-14, TV-MA)

Input Block

- Video 1, 2, Front Video (On, Off)
- Component 1, 2 (On, Off)
- RGB, HDMI1/DVI or HDMI2 (On, Off)

Parental Lock Setup

- Set up blocking schemes to block specific channels, ratings, and external viewing sources.
- A password is required to gain access to this menu.

1. Press the **MENU** button and then use **▲** / **▼** button to select the **LOCK** menu. Then, press the **▶** button

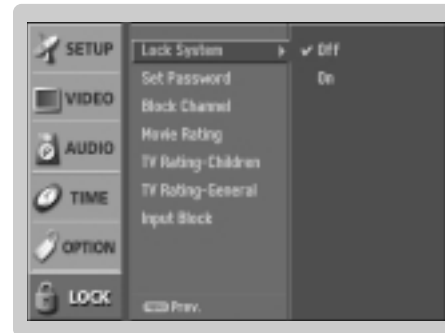
- Enter the password as requested.
- The TV is set up with the initial password "0-0-0-0".

2. Use the **▲** / **▼** button to choose from the following Lock Menu options. Once the option is selected, change the settings to your preference.

- **Lock System:** Activates or disables the blocking scheme you set up previously.
- **Set Password:** Change the password by inputting a new password twice.
- **Block Channel:** Blocks any channels that you do not want to watch or that you do not want your children to watch.
- **Movie Rating (MPAA):** Blocks movies according to the movie ratings limits specified, so children cannot view certain movies. You can set the ratings limit by blocking out all the movies with the ratings above a specified level. Keep in mind that the movie ratings limit only applies to movies shown on TV, not TV programs, such as soap operas.
- **TV Rating-Children:** Prevents children from watching certain children's TV programs, according to the ratings limit set. The children rating does not apply to other TV programs. Unless you block certain TV programs intended for mature audiences in the TV Rating - sub menu, your children can view those programs.
- **TV Rating-General:** Based on the ratings, blocks certain TV programs that you and your family do not want to view.
- **Input Block:** Enables you to select a source to block from the external source devices you have hooked up.

3. Press **EXIT** button to return to TV viewing or press **MENU** button to return to the previous menu.

Note : If you ever forget your password, key in '7', '7', '7', '7' on the remote control.



CableCARD™ Function

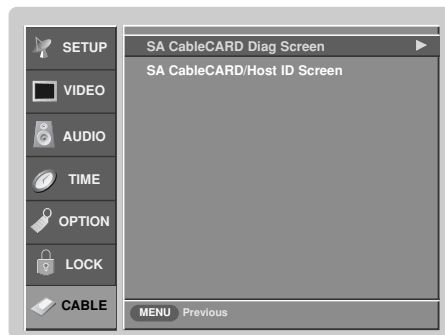
* In this manual, the OSD (On Screen Display) may be different from your TV's because it is just example to help the TV operation.

Cable menu options

- The Cable sub menu displays when inserting the CableCARD™ to the TV.
- The CableCARD™ type is Motorola, Scientific Atlanta (SA), or SCM etc. The OSD (On screen display) is different from your TV according to your CableCARD™ type.

1. Press the **MENU** button and then use ▲ / ▼ button to select the **CABLE** menu.
2. Press the ► button and then use ▲ / ▼ button to select your desired item.
3. Press the ► button.
4. Press **EXIT** button to return to TV viewing.

In case of Scientific Atlanta CableCARD™



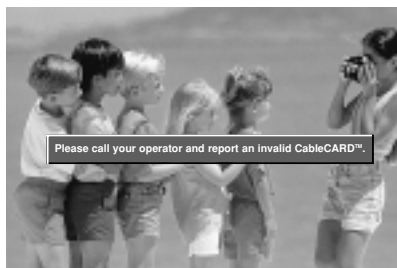
i.e) CableCARD™/ Host ID Screen



As shown, the pairing number means your TV and CableCARD™ ID. For further information regarding cable TV service, contact your local cable TV service provider(s).

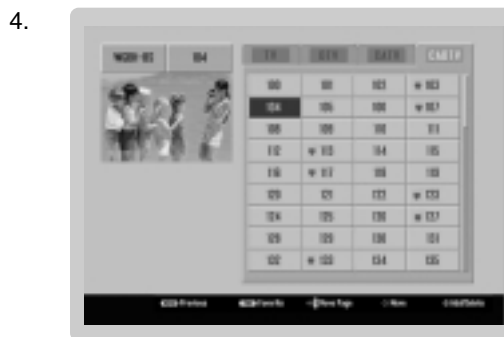
Scrambled channel

- Insert the CableCARD™. If you do it at first, it takes about 1 minute to exchange the data between the TV and the CableCARD™. Then, TV screen displays as shown right.
- Let your cable TV service provider know the CableCARD™ ID and Host ID.
- If your cable TV service provider has registered the CableCARD™ ID and Host ID, you can watch the premium or high value channel.
- If you ever registered to the cable TV service provider, you can watch the premium or high value channel without a message.



- If the certificate doesn't match between the TV and the cableCARD™, the OSD (On screen display) displays as shown left.

Cable Channel List



1. If you enter the **Channel Edit** after running the EZ Scan without CableCARD™, you can see the cable channel list as the picture 3 above.
2. Insert the CableCARD™. Then, the TV will receive a new cable channel list which is usually one part channel. It takes about 2~3 minutes to gather the cable channel list after inserting the CableCARD™ as the picture 4 above. (Occasionally more than that time)

Note:

- As data gathering is done by the CableCARD™, you may hear a fan run in standby mode.

Emergency Alert Message

- If an emergency situation occurs while watching the TV/DTV/CATV/CADTV, you can see a message from cable TV service provider(s).
- When receiving an emergency message, the message is displayed on the screen as shown below or the channel is changed automatically to a channel that maintains the emergency message. The message will automatically disappear.



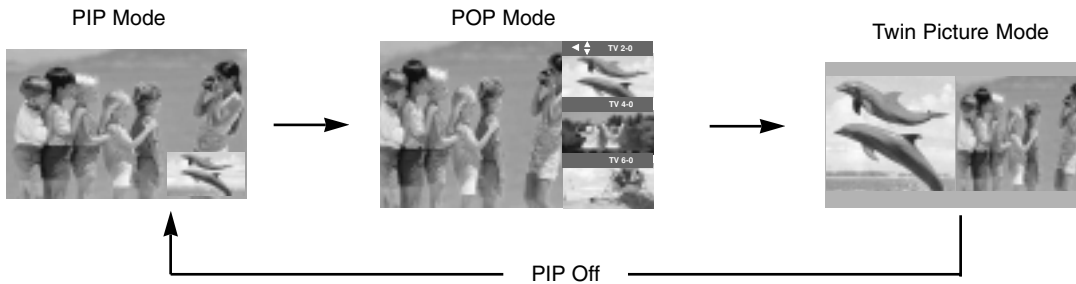
Remote Control

PIP (Picture-In-Picture) / Twin Picture

- PIP lets you view 2 different inputs (sources) on your TV screen at the same time. One source will be large, and the other source will show a smaller inset image.
- Twin Picture mode splits the screen into 2, allowing 2 picture sources to be shown on the TV screen at the same time. Each source is given half the screen.
- If you set the block/rating for Lock menu options in PIP/Twin Picture mode, "**Rating Blocked**" doesn't display on screen.

Watching PIP/Twin Picture

Press the PIP button to access the sub picture. Each press of PIP changes the PIP options as shown below.



Selecting an Input Signal Source for PIP/Twin Picture

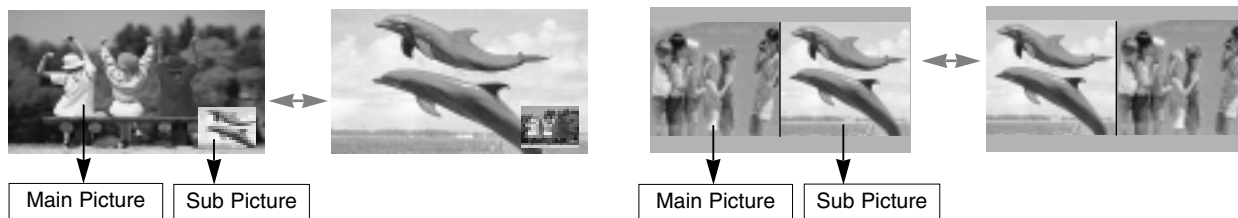
Use the **PIP INPUT** button to select the input source for the sub picture. Each press of **PIP INPUT** button changes the PIP source. You can also select sources for the **Sub Input** in the **SETUP** menu.

Main Picture Source	Available Sub Picture Sources
DTV	Analog, Video, and Front Video
Analog	DTV, Analog, Video, and Front Video

Swapping the PIP/Twin Picture

Repeatedly, use the **SWAP** button to switch the main and sub pictures.

- Component 1, Component 2, RGB-PC (or RGB-DTV), HDMI/DVI input sources for the main picture can't be used to swap the main and sub pictures.



TV Program selection for PIP

1. Press the **PIP** button.
2. Select the Antenna or Cable option on the Sub input menu or with the **PIP INPUT** button. Use the **PIPCH+** / **PIPCH-** button to select a channel for the sub picture. (You can't select DTV for main and sub picture simultaneously).

Moving the PIP sub picture

In PIP mode, press the ▲ / ▼ / ◀ / ▶ button to move the sub picture to a different location on the screen.



Adjusting Main and Sub Picture Sizes for Twin Picture

Use the ▲ / ▼ / ◀ / ▶ button to change main and sub picture sizes in Twin Picture mode.

i.e)



If screen is adjusted to the maximal size, the large screen appears the black part at both the up and down sides.

Brief Info.

- Operation:
- Watching TV/DTV/CATV/CADTV
 - Watching Video1, Video2, Video3
 - Watching IEEE 1394
 - In Component1, Component2, RGB, HDMI/DVI modes, **INFO** button is not working.

- Function:
- Show the present screen information.
 - On Watching with the upper Input signal, press the **INFO** button.
 - Press the **INFO** button or **EXIT** button to exit.

A: Banner information

B: Program title

C: Day, Month, Year






D: Program start time

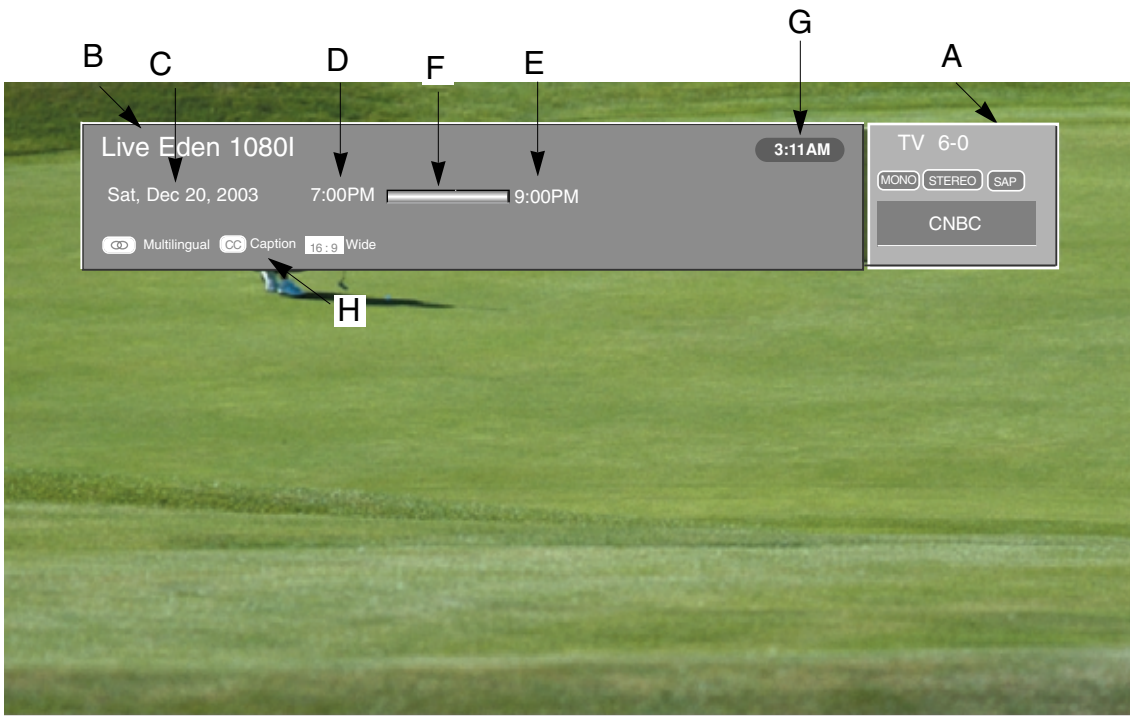
E: Program finish time

F: Show the processing rate

G: Present time

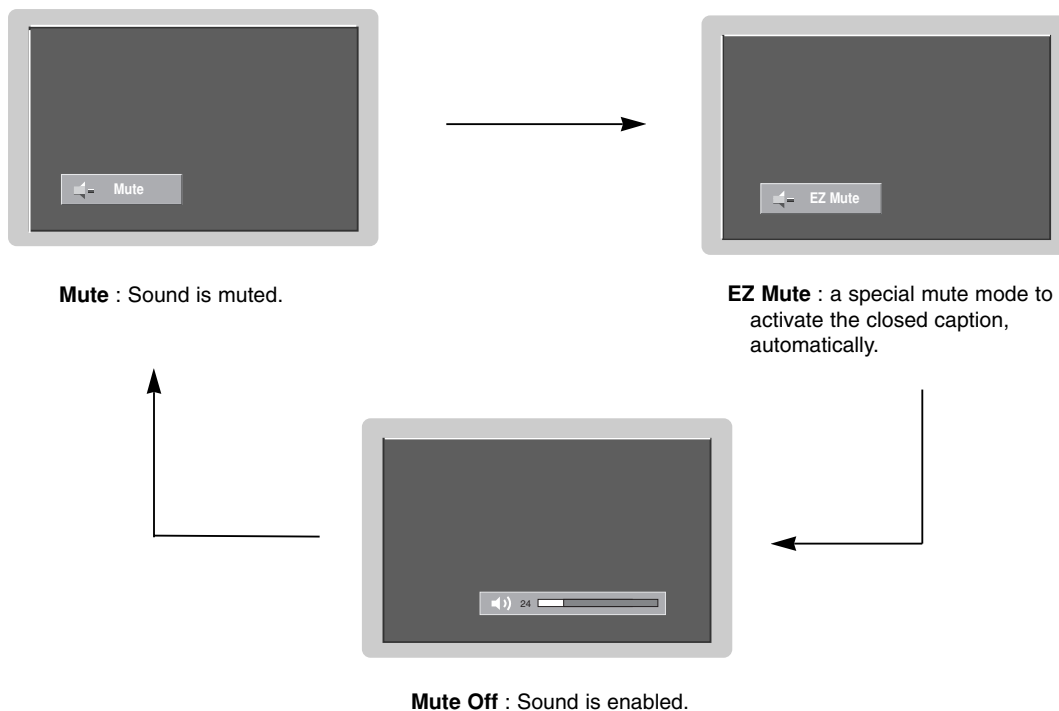
H: Added information. Refer to the icon explanation.

	Screen Ratio of Input Signal 4:3
	Screen Ratio of Input Signal 16:9
480i	Resolution of Input Signal 720x480i
480p	Resolution of Input Signal 720x480p
720p	Resolution of Input Signal 1280x720p
1080i	Resolution of Input Signal 1920x1080i
	Multilingual : Input Signal have over two Audio information. Press the SAP button to select wanted Audio.
	Caption: Input Signal have over one Close service. Press the CC button to select wanted Closed caption.
	Input Signal has rating information . Refer to the <Lock Menu>. D (Dialogue), L (Language), S (Sex), V (Violence), FV (Fantasy Violence)



EZ Mute

- If you set the Caption on, nothing to do with the **MUTE** button, Caption function operates as Caption on or off.
- When you repeatedly press the **MUTE** button, the screen is displayed in turn. (Refer to the lower picture)



Note: EZ Mute only operates in DTV/Analog/Video/Front Video.

Freeze & Magnify

- Enlarges the picture with correct proportions.
- When enlarging the picture, the image may become distorted.

1. Press the **FREEZE** button in DTV 720p, or 1080i modes.
2. Use the **▲** / **▼** / **◀** / **▶** buttons to select the screen split zoom section.
3. To return to normal viewing, press the **FREEZE** button again.



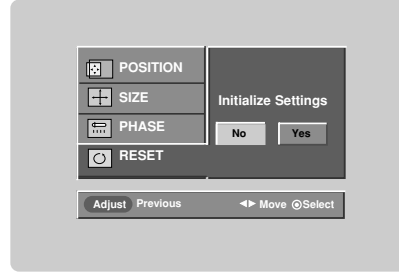
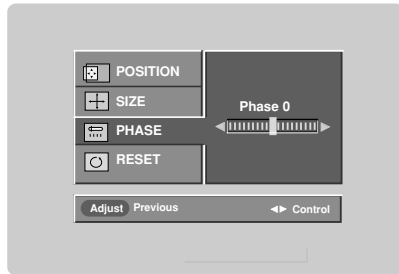
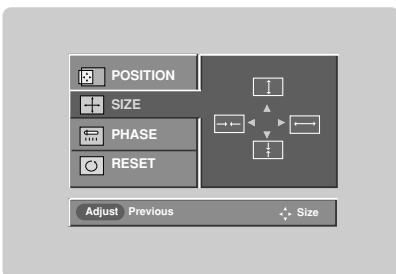
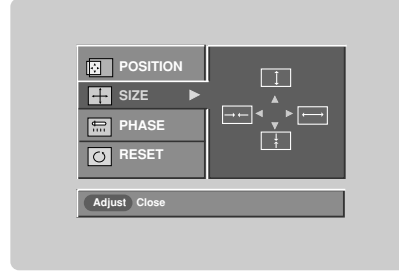
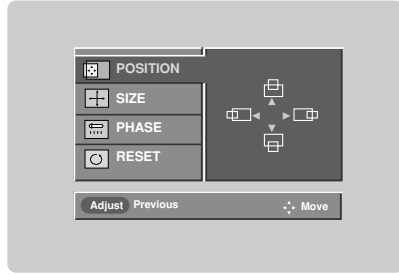
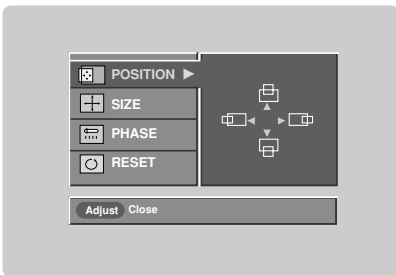
Screen Setup for PC mode

Operation

- When RGB connect to PC input and select the RGB-PC in Main Input, this function is used.
- When HDMI/DVI connect to PC input and select HDMI/DVI input, this function is used.
- In RGB-DTV mode, SIZE and PHASE is not available.

Adjustment for screen Position, Size, Phase, Reset

- After connecting RGB-PC or HDMI/DVI to PC input and checking the screen quality.
 - Display PC Adjust Menu using **ADJUST** button.
 - Position : Adjust the screen position. After displaying the Adjust, select the screen position.
 - Size : Adjust the screen size.
 - Phase : Adjust the phase of Pixel clock.
(Only available in RGB-PC mode)
 - Reset : Initializing Size, Position, Phase adjustment .



Programming the Remote

- ▶ The remote is a multi-brand or a universal remote . It can be programmed to operate most remote-controllable devices of other manufacturers.
Note that the remote may not control all models of other brands.

Programming a code into a remote mode

1. To find out whether your remote can operate the device without programming, turn on the device such as a VCR and press the corresponding device button on the remote.
After that, press the **POWER** button. If the device is turned off then it responds properly and the remote need not to be programmed. If not, the remote should be programmed to operate the device. The programming procedures are explained below.
2. Press the **MENU** and **MUTE** button continuously at the same time for 2 seconds, the current selected device button will be illuminated.
If you don't press any button for 20 seconds, the light on the device button will be turned off. In that case, you have to repeat from step 2.
3. Enter code numbers using the number button on the remote by referring the code table on the following pages. When pressing the button, the light blinks at a time. If the device turned off, the programming is successful.
4. Press the **MENU** button to store the code. After blinking twice, this code is stored.
5. Test the remote functions to see if the device responds properly. If not, repeat from step 2.

Programming Codes

VCRs

Brand	Codes	Brand	Codes	Brand	Codes	Brand	Codes
AIWA	034	KENWOOD	014 034 039 043	PORTLAND	108	TATUNG	039 043
AKAI	016 043 046 124		047 048	PULSAR	072	TEAC	034 039 043
	125 146	LG (GOLDSTAR)	001 012 013 020	QUARTZ	011 014	TECHNICS	031 033 070
AMPRO	072		101 106 114 123	QUASAR	033 066 075 145	TEKNIKA	019 031 033 034
ANAM	031 033 103	LLOYD	034	RCA	013 020 033 034		101
AUDIO DYNAMICS	012 023 039 043	LXI	003 009 013 014		040 041 062 063	THOMAS	034
BROKSONIC	035 037 129	MAGIN	017 034 101 106		107 109 140 144	TMK	006
CANON	028 031 033	MAGNAVOX	040	REALISTIC	145 147	TOSHIBA	008 013 042 047
CAPEHART	108		031 033 034 041		003 008 010 014		059 082 112 131
CRAIG	003 040 135	MARANTZ	012 031 033 067		031 033 034 040	TOTEVISION	040 101
CURTIS MATHES	031 033 041		069	RICO	053 054 101	UNITECH	040
DAEWOO	005 007 010 064	MARTA	101	RUNCO	058	VECTOR RESEARCH	012
	065 108 110 111	MATSUI	027 030	SALORA	148	VICTOR	048
	112 116 117 119	MEI	031 033	SAMSUNG	014	VIDEO CONCEPTS	012 034 046
DAYTRON	108	MEMOREX	003 010 014 031		032 040 102 104	VIDEOSONIC	040
DBX	012 023 039 043		033 034 053 072		105 107 109 112	WARDS	003 013 017 024
DYNATECH	034 053		101 102 134 139		113 115 120 122		031 033 034 040
ELECTROHOME	059	MGA	045 046 059	SANSUI	125		053 054 131
EMERSON	006 017 025 027	MINOLTA	013 020	SANYO	022 043 048 135	YAMAHA	012 034 039 043
	029 031 034 035	MITSUBISHI	013 020 045 046		003 007 010 014	ZENITH	034 048 056
	036 037 046 101		049 051 059 061	SCOTT	102 134		058 072 080 101
	129 131 138 153		151		017 037 112 129		
FISHER	003 008 009 010	MTC	034 040	SEARS	131		
FUNAI	034	MULTITECH	024 034		003 008 009 010		
GE	031 033 063 072	NEC	012 023 039 043		013 014 017 020		
	107 109 144 147		048	SHARP	031 042 073 081		
GO VIDEO	132 136	NORDMENDE	043	SHINTOM	101		
HARMAN KARDON	012 045	OPTONICA	053 054	SONY	003 009 031 052		
HITACHI	004 018 026 034	PANASONIC	066 070 074 083		056 057 058 076		
	043 063 137 150		133 140 145		077 078 149		
INSTANTREPLAY	031 033	PENTAX	013 020 031 033	SOUNDESIGN	034		
JCL	031 033		063	STS	013		
JCPENNY	012 013 015 033	PHILCO	031 034 067	SYLVANIA	031 033 034 059		
	040 066 101	PHILIPS	031 033 034 054		067		
JENSEN	043	PILOT	067 071 101	SYMPHONIC	034		
JVC	012 031 033 043	PIONEER	101	TANDY	010 034		
	048 050 055 060		013 021 048				
	130 150 152						

CATV

Brand	Codes	Brand	Codes	Brand	Codes	Brand	Codes
ABC	003 004 039 042	GOLDEN CHANNEL	030		065 085 090	SPRUCER	047 078
	046 052 053	HAMLIN	049 050 055	PIONEER	034 051 052 063	STARCOM	002 004 008 009
AJIN	112	HITACHI	052 055		076	STARGATE	008 030
ANTRONIK	014	HOSPITALITY	070 077	POST NEWS WEEK	016	TADIRAN	030
ARCHER	005 007 014 024	JERROLD	002 003 004 008	PRUCER	059	TAEKWANG	110
CABLE STAR	026		009 010 052 069	PTS	011 048 071 072	TAIHAN	105
CENTURION	092		074		073 074	TANDY	017
CENTURY	007	LG (GOLDSTAR)	001 106 101 005	PULSAR	100	TEXSCAN	029
CITIZEN	007	M-NET	037	RCA	047	TOCOM	039 040 056
COLOUR VOICE	065 090	MACOM	033	REGAL	049 050	TOSHIBA	100
COMBANO	080 081	MAGNAVOX	010 012 064 079	REGENCY	057	UNIKA	007 014 024
COMTRONICS	019 030	MEMOREX	100	REMBRANT	025	UNITED CABLE	004 053
DIAMOND	023	MOVIE TIME	028 032	SAMSUNG	102 107 030 068	UNIVERSAL	005 007 014 024
EAGLE	020 030 040	NSC	015 028 038 071	SCIENTIFIC ATLANTA	003 011 041 042		026 027 032 035
EASTERN	057 062 066		073		043 045 046	VIEWSTAR	012 015 018 086
ELECTRICORD	032	OAK	016 031 037 053	SHERITECH	022		087 088 089
GE	072	PANASONIC	044 047	SIGNAL	030	ZENITH	100 114 060 093
GEMINI	008 022 025 054	PARAGON	100	SIGNATURE	052		
GI	052 074	PHILIPS	006 012 013 020	SL MARX	030		

HDSTB

Brand	Codes	Brand	Codes	Brand	Codes	Brand	Codes
ALPHASTAR DSR	123		133 134	PACE SKY SATELLITE	143		088 090 107 130
AMPLICA	050	GENERAL INSTRUMENT	003 004 016 029	PANASONIC	060 142		137
BIRDVIEW	051 126 129		031 059 101	PANSAT	121	TOSHIBA	002 127
CHANNEL MASTER	013 014 015 018	HITACHI	139 140	PERSONAL CABLE	117	UNIDEN	016 025 042 043
	036 055	HOUSTON TRACKER	033 037 039 051	PHILIPS	071		044 045 048 049
CHAPARRAL	008 009 012 077		057 104	PICO	105		078 079 080 086
CITOH	054	HUGHES	068	PRESIDENT	019 102		101 135 136
CURTIS MATHES	050 145	JANIEL	060 147	PRIMESTAR	030 110 111	VIEWSTAR	115
DRAKE	005 006 007 010	JERROLD	061	PROSAT	072	WINEGARD	128 146
	011 052 112 116	KATHREIN	108	RCA	066 106	ZENITH	081 082 083 084
	141	LEGEND	057	REALISTIC	043 074		091 120
DX ANTENNA	024 046 056 076	LG	001	SAMSUNG	123		
ECHOSTAR	038 040 057 058	LUTRON	132	SATELLITE SERVICE CO	028 035 047 057		
	093 094 095 096	LUXOR	062 144		085		
	097 098 099 100	MACOM	010 059 063 064	SCIENTIFIC ATLANTA	032 138		
	122		065	SONY	103		
ELECTRO HOME	089	MEMOREX	057	STARCAST	041		
EUROPLUS	114	NEXTWAVE	028 124 125	SUPER GUIDE	020 124 125		
FUJITSU	017 021 022 027	NORSAT	069 070	TEECOM	023 026 075 087		

Audio

Brand	Codes	Brand	Codes	Brand	Codes	Brand	Codes
AIWA	014 028 070 096	JVC	004 013 141	PHILIPS	026 112 143	TOSHIBA	147 218
	125 129 139 229	KEC	185 186 187	PIONEER	039 042 043 063		137
	230	KENWOOD	038 050 067 089		065 091 093 094	THE	061
AKAI	163		170 171 197 206	QUASAR	115 123 127 250	VICTOR	088 131
ANAM	003 014 017 023		215 222	RCA	113	WARDS	089
	059 106 189 216	KOHEL	030	RCX	080	YAMAHA	054 055 066 092
	217 235 236	NAD	045 046	REALISTIC	092		199
BURMECTER	252	LOTTE	014 016 036 098	SAMSUNG	103 106		
CARVER	086		100 172 173 174		124 145 146 182		
CLARION	199		175 176 177 178		193 194 195 203		
DAEWOO	027 053 060 084		179 180 181 183	SANSUI	204 244 245 246		
	102 148 198 221		201 202 208 213	SANYO	011 135 138 144		
DENON	015 075 130 143		214 219 223 232	SCOTT	019 083 234		
FANTASIA	071		238 240	SHARP	106 186		
FINEARTS	022	LXI	103		031 032 051 052		
FISHER	089 099	MAGNAVOX	111		072 082 117 119		
LG(GOLDSTAR)	001 021 024 029	MARANTZ	002 018 020 025		156 184 199 200		
	087 107 108 110		034 041 081 090		206 209		
	190 191 192 210		097 112	SHERWOOD	005 006 158		
	211 212 239	MCINTOSH	049	SONY	044 045 109 114		
HAITAI	034 035 188 222	MCS	104		118 126 248 249		
HARMAN/KARDON	068	MEMOREX	107	TAEKWANG	012 020 073 074		
INKEL	037 058 062 069	NAD	046		076 077 105 161		
	078 079 095 121	ONKYO	013 040 041 047		162 163 164 165		
	122 149 150 151		048 056 057 132		166 167 168 169		
	152 153 154 155		133 140		205 231 233 242		
	157 158 159 160	OPTIMUS	158	TEAC	010 085 106 136		
	189 207 222 224	PANASONIC	007 033 064 113		185 187 237		
	225 226 227 243		142 220 241 251	TECHNICS	101 113 128 134		
	247	PENNEY	104				

DVD

Brand	Codes	Brand	Codes	Brand	Codes	Brand	Codes
APEX DIGITAL	022	MAGNAVOX	013	PHILIPS	013	SONY	007
DENON	020 014	MARANTZ	024	PIONEER	004 026	THOMPSON	005 006
GE	005 006	MITSUBISHI	002	PROCEED	021	TOSHIBA	019 008
HARMAN KARDON	027	NAD	023	PROSCAN	005 006	YAMAHA	009 018
JVC	012	ONKYO	008 017	RCA	005 006	ZENITH	010 016 025
LG	001 010 016 025	PANASONIC	003 009	SAMSUNG	011 015		

Troubleshooting Checklist

No picture & No sound

- Check whether the TV is turned on.
- Is the power cord inserted into wall power outlet?
- Test the wall power outlet, plug another product's power cord into the outlet where the TV's power cord was plugged in.

Picture OK & No sound

- Press the **VOLUME** (▶) button.
- Sound muted? Press **MUTE** button.

The remote control doesn't work

- Check to see if there is any object between the TV and the remote control causing obstruction.
- Are batteries installed with correct polarity (+ to +, - to -)? (Refer to p.11)
- Correct remote operating mode set: TV, VCR etc.?
- Install new batteries. (Refer to p.11)

Picture appears slowly after switching on

- This is normal, the image is muted during the TV startup process. Please contact your service center, if the picture has not appeared after five minutes.

No or poor color or poor picture

- Select **Color** in the **Picture** menu and press the ▶ button. (Refer to p.62)
- Keep a sufficient distance between the TV and the VCR.
- Activate any function to restore the brightness of the picture. (If still picture is on the screen for more than 5 minutes, the screen gets dark.)

Horizontal/vertical bars or picture shaking

- Check for local interference such as an electrical appliance or power tool.

No output from one of the speakers

- Adjust **Balance** in the **AUDIO** menu. (Refer to p.63)

Unusual sound from inside the TV

- A change in ambient humidity or temperature may result in the unit turning off and does not indicate a fault with the TV.

Poor TV input signal

- Check ANTENNA and CABLE connection.

Poor Video signal

- Check ANTENNA and CABLE connection.

No channel or a few channel

- Start EZ Scan.

Unsuitable Aspect Ratio

- You can adjust the **RATIO** button or **Aspect Ratio** in the **OPTION** menu.

My Guide listings disappeared after a power failure

- You should begin to receive listings again within 24 hours.

Troubleshooting Checklist

Some channel numbers in the Guide are incorrect.

- You can correct them using Change Channel Display under Setup.

I have not received any Guide listings.

- Listings usually appear within 24 hours after a successful Setup.
- It may take up to a week to fill the Listings grid with the full 8 days of listings.
- If you see a Listings grid with the message "No Listings" displayed you should start to receive updated program listings within 24 hours. To receive listings:
 - Make sure the cable box is left On, if applicable.
 - Turn off your recorder when not in use.
- If the message "No data for this screen" is displayed:
 - Check the connections between the TV, cable, antenna, and the IR cable if using a cable box.
 - Verify Setup information under Change System Settings.
 - Make sure the cable box is On, if applicable.
 - If this message is still displayed after multiple days, please contact the LG® Brand Customer Support.

A show I set to Record did not occur.

- Make sure your recorder is turned Off before the recording begins.
- Make sure there is a tape.
- Check the Schedule menu and verify that the show is listed before recording begins.
- Check the placement of the IR cable in front of your recorder.

I set a show to Auto-Tune and it did not.

- Check the Schedule menu and verify that the show is listed as a Reminder.
- Highlight the show under Listings and do the following:
 - Press the Menu key on the remote.
 - Use the down arrow to highlight Edit Reminder, and press **ENTER**.
 - Verify the Auto-Tune option reads Yes.
- The TV must be On at the scheduled time for Auto-Tune.
- If you have a cable box, check the IR cable.

I set a show with the Power On TV option and it did not.

- Check the Schedule menu and verify that the show is listed as a Reminder.
- Highlight the show under Listings and do the following:
 - Press the Menu key on the remote.
 - Use the down arrow to highlight Edit Reminder, and press **ENTER**.
 - Verify the Power On TV option reads Yes.

Maintenance

- Early malfunctions can be prevented. Careful and regular cleaning can extend the amount of time you will have your new TV. Be sure to turn the power off and unplug the power cord before you begin any cleaning.

Cleaning the Screen

1. Here's a great way to keep the dust off your screen for a while. Wet a soft cloth in a mixture of lukewarm water and a little fabric softener or dish washing detergent. Wring the cloth until it's almost dry, and then use it to wipe the screen.
2. Make sure the excess water is off the screen, and then let it air-dry before you turn on your TV.

Cleaning the Cabinet

To remove dirt or dust, wipe the cabinet with a soft, dry, lint-free cloth. Please be sure not to use a wet cloth.

Extended Absence



If you expect to leave your TV dormant for a long time (such as a vacation), it's a good idea to unplug the power cord to protect against possible damage from lightning or power surges.

Product Specifications

MODEL	Z44SZ80	Z52SZ80
Horizontal Size (inches)	39.2	47.5
Height (inches)	29.2	33.8
Depth (inches)	14.4	15.7
Weight (lbs.)	50.7	66.1
Power requirement	AC120V ~ 60Hz	
Television System	NTSC-M, ATSC, 64 & 256 QAM	
Program Coverage	VHF 2 ~ 13, UHF 14 ~ 69, CATV 1 ~ 135, CADTV 1 ~ 135. DTV 2 ~ 69	
Power Consumption (W)	210W	
Antenna	75 ohm External Terminal for VHF/UHF	
Audio Output (W)	20Wx2	
Supplied Accessories	Remote control, 2 size AA batteries, D-sub 15 pin Cable	

- The specifications shown above may be changed without prior notice for quality improvement.