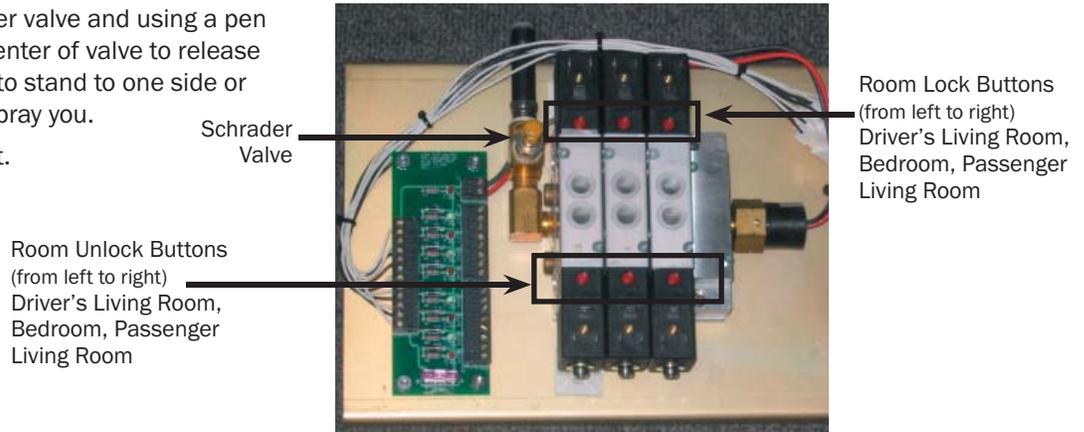# 4-7.4.1 Purge Procedure Step Two

If more than 2 ounces of water still exits after purge procedure has been performed, and locks are still not working, the following procedure can be used to purge the remaining water and restore locks to proper working order.

1. Loosen cap on schrader valve and using a pen or screwdriver press center of valve to release excess water. Be sure to stand to one side or another or water will spray you.

2. Tighten cap finger tight.

Schrader Valve

Room Lock Buttons (from left to right) Driver's Living Room, Bedroom, Passenger Living Room

Room Unlock Buttons (from left to right) Driver's Living Room, Bedroom, Passenger Living Room

Slideout Controller (with cover off) located in Bay 2 of coach.

WARNING!! **Perform steps 3 and 4 of this procedure only if room is fully extended or fully retracted (in or out). If unsure whether rooms are fully out you can measure from flat side of coach to the end of the room. Driver's Side Living Room extends 24", Bedroom extends 22" and Passenger Side Living Room extends 18". Failure to comply can severely damage the coach, voiding warranty.**

Flat Side of Coach

End of Room

Reference for measuring if room is fully out or not.
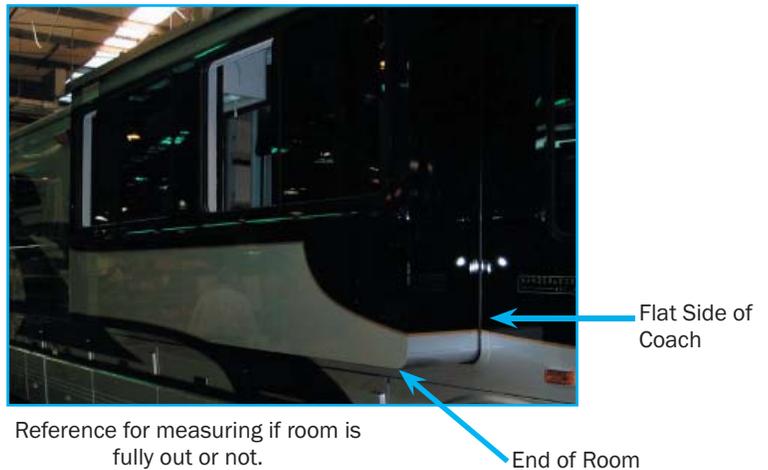
3. If room(s) are in locked position, press first red bottom on left of the Room Unlock Buttons on bottom of controller. Press second button (middle) and then the button on right.

4. If you know for absolute sure that the room(s) are completly in (flush with side of coach) or out (see figure above) then press top left red button of the Locking Buttons on controller, press middle button and then right button.

    The excess water should all be fully purged from system and coach slideouts should operate properly.

    See following page for diagram of controller if any questions.

Air Lock Valve Assembly
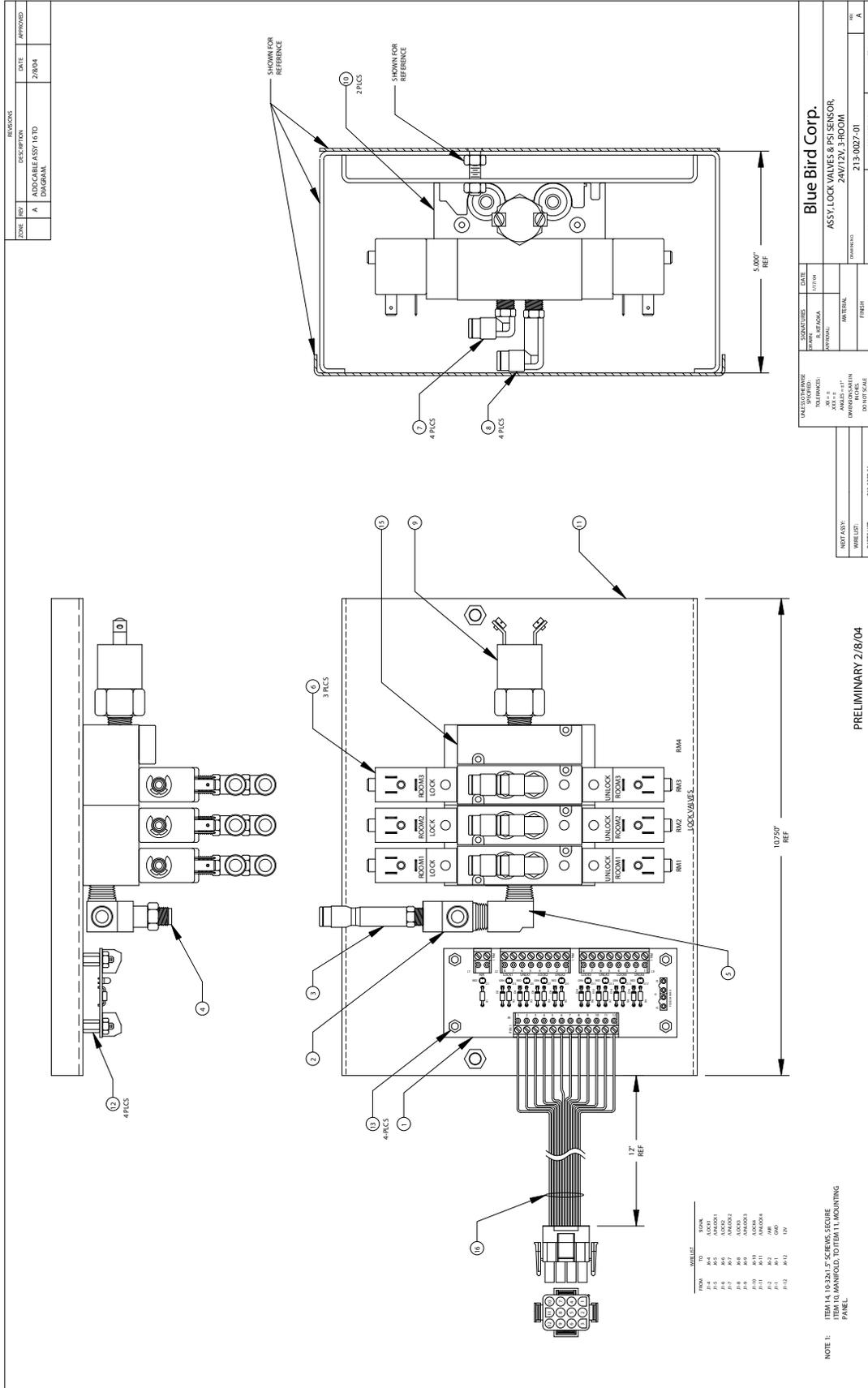
4-8 Heating Systems

There are three different heating systems in your coach. The Webasto hydronic heating system circulates a glycol-water mixture throughout the coach. The Operator can control four heating zones which direct the heat where it is needed. Further explanations of its operation and its advantages are discussed later in this section. The second heat source is a set of four heat pumps that are part of the Dometic roof top air conditioning units. These heat pumps provide heat at temperatures above 42°F. The third source of heat is four 120VAC electric heaters - two 1000 watt heaters are installed in the bathroom and kitchen, two 500 watt heaters are installed in Bay 2 and Bay 4.

4-8.1 Webasto Hydronic Heating System

Hydronic heating is comprised of a 50/50 water, antifreeze mixture that is ran through piping in the coach and continuously heated. There are zones placed throughout the coach that have fans attached to them. Using the two thermostats that are installed in the coach a user can control the heat zones for the coach. One thermostat controls the front of the coach and the other controls the back. The dividing line is the first pocket door at back of galley. The thermostats are located in the bedroom area and the front main galley area. This system is run off of the diesel and it may be preferred to use the 110 electric heating system when parked in a campground to save diesel provided the weather isn't too inclement. Some advantages of the hydronic system are:

- Continuous hot water
- Fuel efficient burner which burns all grades of diesel fuel, stove oil, furnace oil, and kerosene without any burner adjustments (not for use with gasoline.)
- Zero smoke, no carbon built-up, no fouling or smell.
- Copper and brass water jacket transfers more heat to the water and reduces the fuel consumption (three year warranty).
- High temperatures 310 stainless steel burner and marine stainless steel jacket.
- Quiet operation and low power consumption.
- All heaters are designed to operate on 10.5 to 15.0 V.D.C.
- All heaters are electric ignition, which draws 2 amps for 30 seconds on startup.
- Insulated enclosure for retaining heat and minimizing noise.
- Sealed combustion – 100% outside air is fan assisted to the combustion chamber and then exhausted outside, avoiding backpressure.
- Optional bottom exhaust – mostly used in motor homes.
- Includes four zone heating control for up to four thermostats.
- Completely modular and field serviceable (user friendly).
- Hookups and connections are easily accessible.
- Electronically controlled. Safety features include four-second shutdown in case of failure, LED digital readout on the electronic control panel for indicating faults, aquastats for monitoring water temperatures and a photodiode to monitor the flame.
- Complete with remote control panel with ON/OFF reset button, LED digital readout, and signal horn.
- Jumper for constant pump circulation (Automatic cycling when off).
- All heaters cycle at an operating temperature of 180°F (82°C) with overheat cutout set at 195°F (90.5°C).
- Air accumulator installed in the fuel line to collect air bubbles and prevent them from reaching the burner and causing nuisance shutdowns.

The Webasto heater utilizes a low pressure fuel system. The built in fuel pump draws fuel from the fuel tank up to a zero pressure regulator where it stops. An air accumulator is installed inline between the fuel pump and the regulator to trap any air bubbles from passing through the nozzle valve. For continuous bleeding, a return line can be run back to the fuel tank. A small compressor delivers air to an air aspirating nozzle. This nozzle draws fuel from the zero pressure regulator, mixing it with air through a venturi. This process produces a very fine mist of fuel into the burner providing complete combustion and very low emissions. This low pressure system allows the use of a larger fuel orifice, less clogging, less wear and less maintenance. Ignition is accomplished by a low draw ignitor, approximately 2 amps, for thirty seconds. Combustion air is drawn from outside so the heater can be installed in an air tight compartment or in the engine room without the fear of starving the heater of air or back venting the heater with the engine running.

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4-8.2 Operation

4-8.2.1 Starting the Heater

The major steps in starting the heater are as follows:

1. Turn on the ON/OFF control switch, located on the remote indicator panel.
2. Turn up the zone thermostat to a setting higher than room temperature.
3. Start the heater by switching the service switch to ON. This switch is located on the side of the electronic control box located next to the unit in the bay.

4-8.2.2 Signs of Normal Operation

When the heater is operating normally:

- The ignitor will glow and the combustion air intake fan and the circulating pump begin to run. Whenever the pump is running, the green LED at the bottom of the LED display will be on.
- A few seconds later, the fuel pump starts delivering fuel to the regulator, the compressor turns ON, the fuel valve opens, and fuel is drawn to the air aspirating nozzle. The fuel is atomized and sprayed into the combustion chamber to start combustion.

After the ignition period (about 10 seconds), the ignitor shuts OFF, and the burner continues to operate. The heater will operate until all the zone thermostats are satisfied, or until the heater reaches its normal water operating temperature of 180°F. Once the normal operating temperature is reached, the burner itself will cycle off and the combustion fan will operate for an additional two minutes to purge the burner. If a zone thermostat, domestic water heater aquastat, or engine heat exchanger aquastat is not satisfied, the circulating pump will continue to operate. If a thermostat cannot be satisfied by the residual heat in the system, and the water temperature drops, the burner will restart and cycle until all thermostats are satisfied. Once all thermostats are satisfied, the heater will go through the two minute purge, and the circulating pump will ease. The circulating pump will operate if the remote switch and any zone thermostat or the domestic water aquastat are on. The circulating pump will be activated independently by the engine heat aquastat. After the heater has been running for a little while, the water outlet of the heater case should become warm. If the water hose leaving the outlet of the heater does not warm up immediately after the pump comes on, water is not circulating properly and air may be in the system. Turn the heater OFF immediately and check water circulation, refer to *Water Filling Procedure Section* later in this manual.

4-8.2.3 Main Control Board Operation

Once the heater is operating normally, you must check the operating safety functions of the main board. To make sure the safety functions work properly, place your hand over the air intake inlet to the compressor, this will snuff out the flame. If you continue to block the air intake inlet, the heater will try to restart two more times and failing to do so will shut it down, stopping the compressor and fuel pump. The board will display a code 7. Reset the fault and the heater will continue with normal operation.

4-8.2.4 Stopping the Heater (For Seasonal Purposes)

> **WARNING!!! NEVER shut off the power to the heater using the circuit breaker or a master switch, or disconnect the battery while the heater is running. Doing so will cause serious damage to the heater, which will not be covered under warranty.**

To turn the Heater OFF, turn OFF the ON/OFF control switch, located on the remote indicator panel. The room thermostat or the remote indicator panel ON/OFF switch can be turned ON or OFF at any time, without harming the heater. The heater will automatically run through the purge cycle, which takes about two minutes.

4-8.2.5 Stopping the Heater (For Maintenance)

To shut down the heater totally, for maintenance purposes:

1. Turn OFF, the ON/OFF control switch, located on the remote indicator panel.
2. Turn OFF, the service switch on the electronic control box.
3. Wait until the heater has completed the purge cycle and turned itself OFF.
4. Disconnect the power supply.

4-8.2.6 Resetting the Fault

When a fault occurs and has been corrected, you can reset the fault by switching the service switch on the side of the main control box located next to the unit in the bay, or the remote control switch OFF, then ON again. This will reset the fault and the diagnostic code.

4-8.2.7 Stopping the Heaters (When coach is left for extended periods of time)

There are two heating systems supplied with the motor home. The Hydronic heat system has two thermostats located in the bathroom and the galley. The bay electric heater has a thermostat located in bay 2, right. If the Auto Gen-Start feature on the Inverter is Off and coach is unused for a period of time, (more than a day), be sure that all three thermostats are set to the full Off position (the thermostat Off state has a detent position at the end of the full counterclockwise rotation). If not turned to full Off position and motor home gets below 50°F, the hydronic heater pump turns On and the bay electric heaters turn On, thus draining the battery. To use the Auto Gen-Start function on the inverter, refer to *Inverter Section* section of this manual.

4-8.3 Heat Exchanger Operation

If your motor home is equipped with a heat exchanger to pre-heat your engine and recycle waste engine heat, follow these procedures.

To pre-heat your engine: Turn on the heater by a manual switch or timer wired to the jumper W-W terminal, located in the control box. If the heat exchanger is mounted upright, close to and near the bottom of the engine, it will transfer heat to the engine's cooling system through gravity circulation. A more positive solution is to install a pump on the engine side of the heat exchanger wired to the A-A pump terminals located in the control box, on the main board in series with a master switch.

To use waste engine heat for space and domestic water heating:

1. Install a switch, and/or an aquastat (part #1027), on the engine supply line to the heat exchanger, and wire to the A-A terminals on the main control board.
2. Turn OFF, the ON/OFF control switch, located on the remote indicator panel. This will stop the burner from operating, but all other heater functions will operate normally.
3. Start your engine.
4. When the engine aquastat heats up to its preset temperatures, it will automatically switch on the circulating pump of the heating system. All other functions of the system will operate normally.
5. The circulating pump will continue to operate until the engine aquastat has cooled down. A manual switch can be wired in series with this aquastat to shut down the pump sooner if required.

4-8.4 Domestic Water Operation

If your water heater is connected to the hydronic heating system and its controlling aquastat (part #1024) is wired to the W-W terminals on the main board, it will cycle the heater and the water pump. A manual switch can be wired in series with this aquastat to shut down the operation if desired. A bypass loop can be plumbed in for summer operation.

CAUTION!! Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury should antifreeze leak into your potable water supply. Double wall heat exchangers are available for potable water which will prevent contamination in the event of an internal leak.

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4-8.5 Troubleshooting
4-8.5.5 Overview

The electronic board consists of a flash micro controller programmed to monitor the timing and safety function of the heater. Each time the board is energized by a call for heat, it will check its own circuits for any problems. Should a problem exist, the board will shut down.

You can easily monitor your Webasto heater's operation by checking the electronic control box. Any fault or problem will be immediately picked up by the control board and an LED diagnostic code indicator will light up to pinpoint the fault. Once the fault has been corrected, it can be reset by switching the service or remote switch OFF, then ON again. The diagnostic codes are described below.

4-8.5.6 Power On (Green)

The POWER ON indicator is lit whenever the service switch on the control box is ON and if the remote panel is switched ON, a small red LED near the lower right hand side of the digit on the remote panel will also glow. If this light does not come on, check to see if the service switch is ON.

If the power on light does NOT come on:

Check for a blown fuse.

4-8.5.7 Burner On

No diagnostic code will be displayed on the main board or the remote panel when the burner is ON and operating normally. A small red LED will glow near the right hand side of the digital readout on the main board located on the unit in the upper left hand corner, indicating it is ON.

4-8.5.8 ⊔ - Service Switch Off

The service switch is switched OFF.
- The burner will shut down if it has been running.
- The diagnostic code, ⊔ will be displayed.
- The control board will purge the system with the combustion fan and circulating pump for two minutes. At the end of the purge period, the system will power down and will go into a low power consumption mode (10mA max.). There will not be any display or LED's lit.

4-8.5.9 ⊏ – Remote Switch Off

The remote panel is switched OFF.
- The burner will shut down.
- The diagnostic code, ⊏ will be displayed.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes.

If the remote switch is put in the ON position, the control board resumes operation and a small red LED glows near the lower right hand corner of the digit. If there is no diagnostic code displayed or small LED glowing:

1. Make sure the service switch is ON.
2. Make sure the remote switch cable is plugged into the control box and remote switch.
3. Make sure the remote rocker switch is working.
4. Check the cable continuity.

4-8.5.10 ⌴ – Heater Cycling (Normal Operation)

The operating aquastat installed on the water jacket has been satisfied.

- The burner will shut down.
- The diagnostic code, ⌴ will be displayed.
- The control board will purge the burner with the combustion fan for two minutes and then stop. The circulating pump will run until the last thermostat is satisfied, then will purge for two minutes and stop.
- To maintain the system temperature the operating aquastat will cycle the burner off at 185°F (85°C) and on again at 150°F (65°C).
- If the heater cools and fails to resume operation and the diagnostic code continues to be displayed, the aquastat is faulty or has an open connection.

4-8.5.11 ⊢ – Thermostats Off (Normal Operation)

All thermostats and aquastats are satisfied.

- The burner will shut down.
- The diagnostic code, ⊢ will be displayed.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes. When any thermostat or aquastat calls for heat, the heater will resume normal operation.
- If the heater fails to resume operations, check the thermostat and their connections.

4-8.5.12 ▯ – Voltage Low or High

The battery or power supply voltage is below 10.5Vdc or above 15.5Vdc.

- The burner will shut down.
- The diagnostic code, ▯ will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and circulating pump for two minutes while it is checking if the voltage fault is still present.

If the voltage fault has cleared, the control board resets the alarm and restarts the burner. If the condition has not cleared by the end of the purge period, the diagnostic code remains displayed. The control board continues to check the voltage every half hour until the voltage fault clears and then restarts the burner. To manually reset the fault, switch the service switch or the remote panel switch OFF then ON again.

4-8.5.13 ₁ – Overheat

The high temperature limit has been reached.

- The burner will shut down.
- The diagnostic code, ₁ will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes while it is checking if the overheat condition exists. If the condition exists, the diagnostic code will continue to be displayed.
- In order to restart the burner, first check the circulating pump, the level of the coolant, and the movement of the coolant while the circulating pump is running. Then reset the fault after the water has cooled down by switching the service switch or the remote panel switch OFF then ON again. If it does not reset, check for faulty aquastat and proper ground.

If a number diagnostic code lights up and the heater is not in an overheat condition, check the ground from the heater to the battery. The ground should be a minimum 10 AWG and connected directly to the battery.

4-8.5.14 2 – Fuse Blown

One of the fuses on the control board has blown.

- The burner will shut down.
- The diagnostic code, 2 will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes while it is checking for a blown fuse.

If a blown fuse exists, the diagnostic code will continue to be displayed.

- In order to restart the burner, replace any blown fuses with one of the proper size. Then reset the fault by switching the service switch or the remote panel switch OFF then ON again.

4-8.5.15 3 – Fuel Pump/Solenoid

The fuel pump or fuel solenoid has shorted.

- The burner will shut down.
- The diagnostic code, 3 will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes.
- In order to restart the burner, check the fuel pump and solenoid for a short circuit. Then reset the fault by switching the service switch OFF and ON again.

The remote panel switch does not reset short circuit faults.

4-8.5.16 4 – Ignitor

The ignitor is open or shorted.

- The burner will shut down.
- The diagnostic code, 4 will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes.
- In order to restart the burner, check the ignitor and connections. Then reset the fault by switching the service switch or the remote panel switch OFF then ON again if the ignitor is open or by the service switch only if the ignitor is shorted.

The remote panel switch does not reset a short circuit fault.

4-8.5.17 5 – Combustion Fan

The combustion fan is open or shorted.

- The burner will shut down.
- The diagnostic code, 5 will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge, with the circulating pump for two minutes.
- In order to restart the burner, check the combustion fan. Then reset the fault by switching the service switch or the remote panel switch OFF then ON again if the combustion fan is open or by the service switch only if the combustion fan has shorted.

The remote panel switch does not reset a short circuit fault.

4-8.5.18 6 – Water Pump

The water pump is shorted.

- The burner will shut down.
- The diagnostic code, 6 will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge with the combustion fan for two minutes.
- In order to restart the burner, check the water pump. Then reset the fault by switching the service switch OFF then ON again.

The remote panel switch does not reset a short circuit fault.

4-8.5.19 ⌇ – Flame Out

The flame went out or did not ignite.

- The burner will shut down.
- The diagnostic code, ⌇ will be displayed.
- The control board will try to restart the burner two more times. After three unsuccessful ignition attempts, the buzzer will sound for 10 seconds.
- The control board will purge with the combustion fan and circulating pump for two minutes. The diagnostic code ⌇ will continue to be displayed.

The single most common reason for flame out faults is when air gets into the fuel system. This is normally caused by loose fittings or when your fuel supply is teed off a fuel line used by your engine or generator. As air accumulates and passes through the nozzle, it interrupts the fuel and shuts down the burner. When this happens, it may be necessary to reset the fault a few times to ensure all air has passed through the system. If the burner resumes normal operation, you must find the source of the air leak, otherwise, this fault will continue to occur. An Air Accumulator has been installed to collect the air before it reaches the nozzle. Check regularly and bleed if necessary. Air which is collected is an indication of a leak somewhere in the fuel system.

1. Check the fuel supply. The fuel pump will chatter if there is no fuel or when air is passing through the pump. Check the Air Accumulator for air and bleed if necessary. Check connections between the fuel tank and fuel pump and the regulator and nozzle for air leaks. Find source of air entry and repair. Make sure the nozzle or fuel filter is not clogged.

2. Check the air line hoses for any restriction of air flow through the compressor. Restrictions may be caused by a crimped hose, clogged air filter, or a loose or leaking air hose from the compressor outlet to the nozzle. Check the air filter inlet for any obstructions.

3. Make sure the air pressure of the compressor with the nozzle installed, is at 8 to 90 psig for CO-20/32 models and 10 to 12 psig for CO-45/65, and 14 to 16 psig for CO-85/105 models.

4. Check for negative pressure in the area around the heater. When the engine is running, it can draw air back through the heater's exhaust pipe. All intake air and exhaust connections must be tight.

5. Check for restrictions or leaks in the combustion air intake hose or exhaust pipe.

6. Check for open circuit on fuel pump/solenoid and compressor.

- To restart the burner, check the fuel supply, check for air in the fuel line, and clean the nozzle. Then reset the fault by switching the service switch or the remote switch OFF then ON again.

7. If when reset, the board shuts down without trying to restart the burner the board is defective.

4-8.5.20 ☐ – Compressor

The air compressor has shorted.

- The burner will shut down
- The diagnostic code, ☐ will be displayed.
- The buzzer will sound for 10 seconds.
- The control board will purge the system with the combustion fan and the circulating pump for two minutes.
- In order to restart the burner, check the air compressor. Then reset the fault by switching the service switch OFF then ON again.

The remote panel switch does not reset a short circuit fault.

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4-8.5.17 ⊒ – Bypass Mode

The bypass mode is a service feature to be used by authorized service personnel only. The bypass mode overrides the remote switch, voltage fault, fuse blown fault, flame out fault, open ignitor fault, open fan fault, and thermostats. All these safety devices will be bypassed for five minutes.

- While in the bypass mode, the diagnostic code, ⊒ will be displayed and the Power ON LED will flash rapidly.
- If the heater cycling aquastat is satisfied or the overheat limit is reached, the burner stops and purges for two minutes while displaying the diagnostic codes: C-heater cycling or 1-overheat, and the Power ON LED flashes slowly. You must wait for the heater to cool before continuing in the bypass mode. The bypass mode times out in five minutes. After the first three minutes running, it automatically purges for the last two minutes.

4-8.5.18 Water Pump On (Green)

The green light located directly under the LED digit on the main board turns on whenever the circulating water pump is energized.

4-8.5.19 Remote Panel

The remote panel consists of an ON/OFF reset switch, an LED diagnostic digit, and fault buzzer. The diagnostic digit matches the main control board which refers to the diagnostic codes as explained previously in this section. A small red LED glows when the switch is on, which also indicates that the service switch is ON. The small buzzer sounds for 10 seconds to alert you of a fault.

4-8.5.20 LCD Readout Remote Panel (Optional)

This panel displays the diagnostic explanation which matches up to the diagnostic code on the main board. A small buzzer sounds for 10 seconds to alert you of a fault.

4-8.5.21 Flame Sensor Module

The Flame Sensor consists of a sealed module with a photodiode aimed at the flame, a red LED indicator light and 3 wires, white (+), black (-), and green (signal) connected to the main board. Under normal operating conditions whenever the burner ignition begins, the red LED flashes once indicating the white and black wires are connected and the module is receiving power and working properly. Once the burner is ignited, the LED begins to flicker like a flame. If for any reason the flame is extinguished, the flickering stops and the board shuts down the heater. If the green (signal) wire is disconnected, the board shuts down. If all wires are properly connected with module flashing and the board still shuts down, diagnostic code 7 Flame Out, the board may be defective.

4-8.5.22 Reduced Output

The heater may run without faulting, but at a reduced output. If this is noticed, it could be caused by the following:
1. High altitude
2. Dirty nozzle
3. Defective regulator
4. Too small a nozzle
5. Poor water circulation
6. Ash deposit in combustion chamber

4-8.5.23 Smokey, Smelly Exhaust

The heater may run without faulting, but you may experience signs of soot, exhaust smoke and/or a pungent smell. This is usually caused by the wrong fuel to air mixture. This can be affected by the following:
1. Low voltage
2. High altitude
3. Dirty compressor air filter
4. Low compressor air output
5. Restricted combustion air flow (intake hose/exhaust hose/combustion chamber)
6. Low combustion fan output (defective motor/wrong rotation/dirty fan blade)
7. Partially clogged grooves in nozzle distributor.

4-8.5.24 Hot Water is Coming Out Cool

This may be a sign that the Mixing Valve is not set to the proper setting. Look through the 3/8" x 1" Inspection Slot on the front of the Webasto Heat case, if setting is not at 4, it will need to be adjusted.

To adjust setting, remove cover from case and manually turn knob to highest setting (4), replace cover.

> 🖊 **NOTE: If there is no slot on the Webasto case then this is not the cause of the cool water. Unit may need to be serviced.**

4-8.6 Maintenance

4-8.6.1 The First Few Weeks

About two weeks after your Webasto heater has been running, you should conduct a general inspection of the entire system.

Check for any leaks in the exhaust, fuel, or water systems. Tighten all clamps.

4-8.6.2 Adding Antifreeze

Once the system has been filled with water and purged of all air during the installation procedure, you need to operate the heater at normal temperatures and then check for water leaks. If you do not find any, add antifreeze to lubricate the pump and prevent the water system from corroding or freezing in cold weather. To do this see *Water Filling Section Procedures* later in this manual.

> **CAUTION!!**　Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.
>
> **IT IS VERY IMPORTANT THAT YOU NEVER USE WATER ONLY AS A COOLANT.**

We recommend that you add a mixture of 50% water and 50% antifreeze. NEVER use more than a 50/50 mixture, since the added viscosity of the antifreeze solution will cause circulation problems. Your antifreeze/water mixture should be changed every three years. Antifreeze does wear out and can become very acidic.
A coolant conditioner should be added to the water system, to keep the coolant alkaline and not acidic, see section *Protecting Hydronic Heating Systems* later in this manual. These inhibitors also prevent the coolant from forming calcium scales. Conditioners are available from diesel engine manufacturers to maintain water stability and prolong heater life. If a conditioner is not installed in your system, check the pH level yearly. The components inside the heater should not normally require maintenance, except for periodic checks for obvious problems, such as leaks or overheating.

4-8.6.3 Nozzle

Nozzle problems such as clogging results in a poor flame, small and blue. Carefully disassemble. Hold nozzle and turn stem counter clockwise. Clean distributor orifice and air slots of any debris using solvent and high pressure air. Check O-rings for nicks and replace if in doubt. A leaking O-ring allows air into the fuel causing popping of the flame.

4-8.6.4 Fuel Lines and Filter

You should check your filter every season to determine if it needs replacement. The frequency depends largely on the quality of fuel you've been using.

4-8.6.5 Combustion Chamber

The quality of the fuel varies and some ash is left in the chamber after combustion. The burner and combustion tube must be removed and the combustion chamber vacuumed clean every 1000 hours. If this is neglected, the exhaust becomes restricted and causes the combustion chamber to burn out. The exhaust pipe should be checked and also be vacuumed, if required.

4-8.6.6 Checking Hoses and Tubes

Every so often, check all water hoses and tubes for leaks or weak points. Tighten all clamps and replace any sections of worn hose immediately.

> **CAUTION!!** Never let the water pump run dry. This causes irreparable damage to the pump and voids the warranty.

4-8.6.7 Electrical System

The electronic control panel should not normally require servicing, except for the following:

• Make sure that all your connections are secure.
• Periodically, do a voltage test to ensure that you are getting 12 volts from the battery.
• Check for corrosion of wires.

4-8.6.8 Recommended Spare Parts

Like any piece of machinery, your Webasto heater will need servicing from time to time. A suggested maintenance schedule can be found in *Maintenance Schedule Section* below. The following is a list of parts recommended to have on hand.

Description	Part No.
Fuel filter cartridge	6021
Air filter	6018
Fuel nozzle (# for model CO 45)	14017
Fuel nozzle "O" ring	14025
Photocell (Board versions 5-10)	16002
Photodiode (Board version 11/12)	16003
Flame Sensor (Board version 2000 and 2001)	16004

Over a period of time, operational parts of the heater will wear out and need replacing:

• Air compressor
• Fan Motor
• Ignitor
• Operating and High Limit Aquastat

4-8.6.9 Maintenance Schedule

Maintenance Item	Maintenance Frequency	Service Required
Fuel/Water Hoses	Seasonally	Inspect for leaks and weak points
Hose Clamps	Seasonally	Inspect for corrosion
		Tighten if Loose
Combustion Chamber and Exhaust	1000 Hours	Vacuum Clean
Fuel Filter	Seasonally	Inspect for Cleaning or Replacement
Nozzles, Distributor Orifice, Air Slots and O-Rings	Seasonally or Every 2000 Hours	Cleaning and Inspection for Wear and Damage
Exhaust System	Seasonally	Inspect for Leaks and Corrosion
Coolant Mixture	36 Months	Replace
	12 Months	pH Level for Acidity
Electronic Control Panel	Seasonally	Voltage Test/Inspect for Corroded Wires
Air Compressor, Fuel Pump, Combustion Fan, Motor	Seasonally	Inspect for Leaks, Corrosion and Wear

4-8.6.10 Protecting Hydronic Heating Systems

The advantage of closed hydronic heating systems is that as long as there are no leaks, (i.e., no need for constant make-up water), the fill neutralizes (that is, it reaches equilibrium). The long term result is minimal scale build-up and insignificant corrosion since after operating for a period of time, most oxygen has been "starved" out of the boiler fill water. While boiler fill water treatments have their place, leak prevention is the single most important preventative maintenance item.

Regular maintenance and prompt repair of leaks, combined with a one time application of appropriate inhibitors, can help you enjoy problem-free heating. Since it is difficult to guarantee that a hydronic heating system will never leak, corrosion inhibitors and scale inhibitors added to "fresh" boiler fill water can act as low cost "insurance" for hydronic systems.

Causes of Scale

Tap water is the most typical source selected for boiler fill water. Water contains dissolved solids such as magnesium and calcium which when heated becomes much less soluble and forms scale. Scale comes out of solution in the largest amounts where the temperature is highest in the system (i.e., the boiler heat exchanger). As the scale builds up, noise and cold spots develop since scales plug up water channels and acts as an insulator that impedes proper heater transfer.

Acidity and Corrosion

Corrosion is the result of metal oxidizing (that is, metals reacting with oxygen-rich boiler fill water). The acidity of any liquid (including water) is a good indicator of how much corrosion will actually take place. As a rule of thumb, boiler fill water should have a pH greater than 7 and less than 10.5. The key to preventing corrosion is to make sure that the heating system is free of leaks and there is no need to replace it with fresh, oxygen rich boiler fill water. Corrosion inside a hydronic heating system stops quite quickly as the fill water stabilizes and becomes oxygen-starved. The pH should be measured at least annually.

Since most hydronic heating systems are comprised of different metals (e.g., iron, copper, etc.) and since boiler fill water is an electrolyte (that is, it will conduct electrical current), electro-chemical reactions ("galvanic" reactions) can take place. As the fill water stabilizes, however, it becomes a very weak electrolyte, so galvanic corrosion rarely becomes a problem – as long as the system remains leak-free.

Preventative Treatments

Corrosion and scale inhibitors are relatively inexpensive. Ideally, they should be applied, once only, at the time of a new installation or whenever a system has been completely drained. Boiler water treatment specialists almost unanimously agree that the prevention of leaks and the elimination of the need for frequent boiler water make-up are top priorities for hydronic systems.

4-8.6.11 Water Filling Procedure

After your system has been completely installed, filled with straight water, purged of all air, and operating for a period of time at normal operating temperatures, you should now double check all connections for leaks. If no leaks are found, the system can be drained and filled with a 50/50 mixture of antifreeze and water.

> **CAUTION!!** Where there is a chance of contamination of your domestic water when using a heating system, use antifreeze specifically intended for hydronic heating systems. Inhibited propylene glycol is recommended. Do not use automotive, ethylene glycol, or any undiluted or petroleum based antifreeze as they can cause severe personal injury.

To fill the system use a separate self priming pressure pump with a hose on the suction side. Put the hose into a 5 gallon container. Remove the systems hose from the outlet of the expansion tank, which is feeding the systems circulating pump and attach it to the outlet of the self priming pressure pump. Remove the hose from the inlet of the expansion tank and hang it into the 5 gallon container.

Make a final check to ensure all of the air vents and drains are closed. Pour a mixture of antifreeze and water into the container and start the pump. As the mixture is pumped out, slowly add more mixture keeping the level above the inlet of the suction hose until all air has been expelled and the mixture starts coming out of the return hose hanging in the container. This flushes the system of any debris and purges the lines of air. Continue to run the pump for about 15 minutes.

When no more air is being expelled, stop the pump and reconnect the lines to the expansion tank. Top off the expansion tank with the mixture and turn on the system's circulating pump with the jumper, located on the main control board just right of the pump fuse, marked "Circ. Pump Override". When the jumper is on, the pump will run continuously and the bottom LED will be lit.

Check for a good flow through the expansion tank and double check all joints for leaks. Open and close all air vents to eliminate any remaining air bubbles. Recheck the mixture level and circulation in the expansion tank.

> **CAUTION!!** Make sure you have a good, quiet circulation of water through the heater. Check the pump to make sure it does not run dry. If the heater has air pockets trapped in the water jacket when it is turned on, it could overheat and damage the unit. None of this is covered by warranty.

4-9 Air Conditioning/Heat Pump

4-9.1 System Description

Air conditioners are located in the living room and bedroom areas. A wall mounted master thermostat is located in the dinette area to control all units. Directions for operation can be found in "Comfort Control Center" section. Remote temperature sensors are located in the kitchen/dinette area and bedroom. The air conditioners are operable from 120 VAC source (generator or shoreline power). Each air conditioning unit is also a heat pump.

There are four heat pump units mounted on the roof of the coach. These units operate at 42°F and above.

Condensate Drains - Separate drain lines are provided for each air conditioning unit to route condensation from the roof to the ground through the body side walls.

4-9.2 Electric Heat

An electric forced air heater is located in the bath, controlled by remote thermostat. A second electric heater is located in the kitchen.

4-9.3 Comfort Control Center

The coach comes equipped with Duo-Therm's Comfort Control Center™. The Comfort Control Center has been designed for you to easily operate all the air conditioning and gas heating appliances found in the coach from one location.

In order to familiarize yourself with the operation of the Comfort Control Center, the following diagram along with the accompanying text will explain all the functional characteristics of the system.

A. Liquid Crystal Display
B. Mode Selector Button
C. Fan Speed Selector Button
D. Temperature Selector Button
E. Zone and Stage Selector
F. On/Off Switch
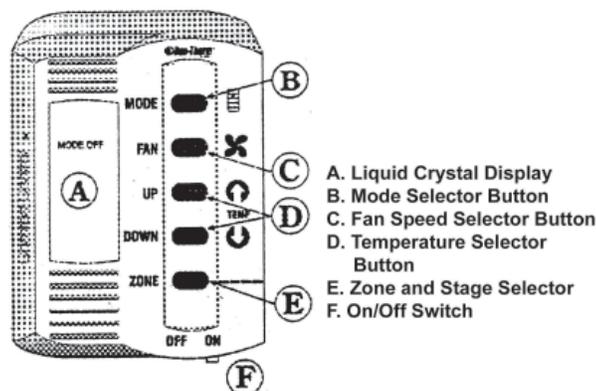
A. LIQUID CRYSTAL DISPLAY - Your Comfort Control Center is equipped with a liquid crystal display (LCD) that identifies the mode of operation, the temperature set-point, the zone identification and the fan speed. The Comfort Control Center is designed to accept and control many varied air conditioning and gas heating appliances. When you begin to first operate your Comfort Control Center, you will see that the LCD readout will only show the options available based on the appliances installed on your vehicle. An incandescent light will illuminate the LCD area when a selector button is pushed for easy reading at all times.

B. MODE SELECTOR BUTTON - Modes of operation available are: OFF, FAN ONLY, COOL, HEAT PUMP, FURNACE, HEAT STRIP and AUX. HEAT. Remember, the LCD readout will only show the options available based on the appliances installed on your vehicle. To select the mode of operation, momentarily depress the MODE push-button. You will need to continue to depress and release the button until the desired mode is shown in the LCD readout area on the Comfort Control Center.

To determine the Comfort Control Center options available to you, depress and release the MODE push-button until it goes through all selections.

C. FAN SPEEDS - Possible available fan speeds are: LOW, MEDIUM, HIGH and AUTO. To select the desired fan speed, momentarily depress the FAN push button. Continue to depress and release the FAN button until the desired fan speed is shown in the LCD readout area of the Comfort Control Center.

D. TEMPERATURE SELECTOR BUTTONS - The temperature Set-point range is from 40° to 99°F or 4° to 37°C. Determination of Fahrenheit or Celsius standard is done at the time of the manufacturer's installation of the Climate Control Center. To set the temperature at the desired comfort level, simply depress and release the UP or DOWN push-button until the desired temperature is shown in the LCD readout area of the Comfort Control Center.

E. ZONE SELECTOR BUTTON - The number of ZONES installed on the coach directly corresponds with the number of heating/cooling systems installed. The 450LXi has ?? Zones (?? Comfort Control Centers).

F. ON/OFF SWITCH - The ON/OFF switch is located on the lower right hand edge of the Comfort Control Center. Move the lever from side to side to change status.

4-9.3.1 Operation

The Comfort Control Center allows the freedom of controlling the vehicle's temperature to provide a comfortable environment. With just a few simple steps, the operator can control which mode of operation to use, the vehicle temperature and the fan speeds.

A. FAN ONLY MODE OF OPERATION

1. Begin by placing the power switch on the lower right hand edge of the Control Center on the ON position. To do this, simply move the lever to the right.

2. Momentarily depress and release the MODE push-button until the FAN ONLY indicator on the Liquid Crystal Display (LCD) is illuminated.

3. Momentarily depress and release the FAN push-button until the desired fan speed indicator (LOW, MED, HIGH, AUTO) is illuminated. If your vehicle is equipped with a heat pump air conditioning system, the selection choice will be LOW, HIGH or AUTO.

4. After approximately 5 seconds, the selected fan speed will come on. The MODE and FAN speed you have selected will remain shown in the LCD area of the Control Center until the selection is changed.

5. If The coach contains more than one ZONE, depress the ZONE push-button to select ZONE 2, and repeat procedures from step two above. Repeat entire procedure for each additional zone.
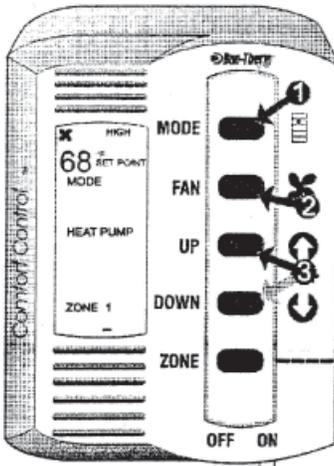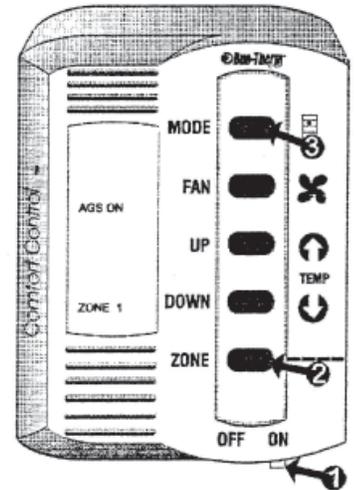
B. COOLING MODE OPERATION

(To set cooling temperatures and fan speeds on Duo-Therm Air Conditioners and the cooling mode of Duo-Therm Heat Pumps.)

1. Momentarily depress and release the MODE push-button until the COOL indicator on the LCD is illuminated.

2. Depress and release the FAN push-button to select your desired fan speed (LOW, MEDIUM, HIGH or AUTO). If the coach is equipped with a heat pump or a dual basement air conditioner system, selection choice will be LOW, HIGH or AUTO.

3. Depress and release the UP push-button to increase the temperature or the DOWN push-button to decrease the desired temperature. The final selected SET-POINT will be displayed in the LCD area of the Comfort Control Center.

4. After a delay of approximately 2 minutes the air conditioner's compressor will come on and the cooling process will begin. Once the room temperature reaches the selected SET-POINT, the compressor will cycle off. Once the Comfort Control Center senses the need for cooling, the compressor will restart in approximately two minutes. At this point, the fan will either:

5. continue to operate in the single selected fan speed or,

6. cycle OFF and ON with the compressor if the AUTO fan speed has been selected.

If The coach contains more than one ZONE, depress the ZONE push-button to select ZONE 2, and repeat procedures from step two above. Repeat entire procedure for each additional zone.
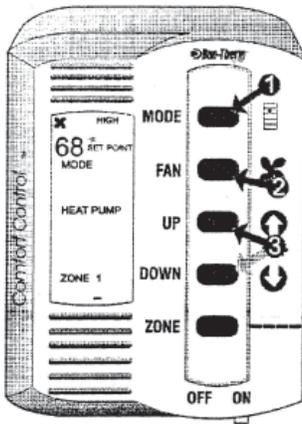
NOTE: See Defrost Cycle and Optional Automatic Generator Start (AGS) for additional Special Heat Pump Features.

C. HEAT PUMP OPERATION

(To set heating temperatures for coaches equipped with a Duo-Therm rooftop heat pump. To operate cooling mode with a heat pump, see *"B. Cooling Mode Operation"* found previously.

1. Momentarily depress and release the MODE push-button until the HEAT PUMP indicator on the LCD is illuminated.

2. If the fan speed was not previously set, do so by depressing and releasing the FAN push-button to select the desired fan speed.

3. Depress and release the UP push-button to increase the temperature or the DOWN push-button to decrease the desired temperature. The final selected SET-POINT will be displayed in the LCD area of the Comfort Control Center.

4. After a delay of approximately 2 minutes the heat pump's compressor will come on and the heating process will begin. Once the room temperature reaches the selected SET-POINT, the compressor will cycle off. Once the Comfort Control Center senses the need for heating, the compressor will restart in approximately two minutes. At this point, the fan will either:

    a.   continue to operate in the single selected fan speed, or,

    b.   cycle OFF and ON with the compressor if the AUTO fan speed has been selected.

5. If The coach contains more than one ZONE, depress the ZONE push-button to select ZONE 2, and repeat procedures from step two above. Repeat entire procedure for each additional zone.

D. FURNACE MODE OPERATION

(The coach is equipped with a hydronic heating system connected to the Comfort Control Center)

1. Momentarily depress and release the MODE push-button until the FURNACE indicator on the LCD is illuminated.

2. The A/C fan does not operate in the FURNACE mode.

3. Depress and release the UP push-button to increase the temperature or the DOWN push-button to decrease the desired temperature. The final selected SET-POINT will be displayed in the LCD area of the Comfort Control Center.

4. Your Duo-Therm air conditioning system will not operate when the Comfort Control System is in the FURNACE mode. For cooling, change the MODE to COOL.

5. If The coach contains more than one ZONE, depress the ZONE push-button to select ZONE 2, and repeat procedures from step two above. Repeat entire procedure for each additional zone.
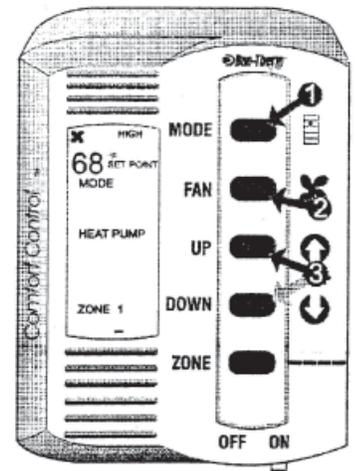
4-9.3.2 Special Control Features

A. AUTO FAN

When AUTO FAN is selected, the fan speed will be determined by the mode you are in.

1. COOL MODE - In the COOL mode, which is the air conditioning mode, the fan will automatically select the speed depending upon the difference between the temperature SET-POINT and the room temperature.

    When the difference is:

8° or more	The fan will operate on HIGH
4° to 8°	The fan will operate on MED
4° or below	The fan will operate on LOW

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2. **COOL MODE** (Heat Pump units) - If the coach is equipped with a Duo-Therm Heat Pump unit, the fan will automatically select the fan speed depending upon the difference between the temperature SET-POINT and the room temperature.

When the difference is:

Greater than 4°	The fan operates on HIGH
4° or less	The fan operates on LOW

3. **HEAT PUMP MODE** - When HEAT PUMP mode is selected, the fan will start running in the LOW speed.
4. **HEAT STRIP MODE** - When HEAT STRIP mode is selected, the fan will start running in the LOW speed.
5. **FAN ONLY MODE** - In the FAN ONLY mode, the fan will start running in the LOW speed

B. **REFRIGERANT COMPRESSOR TIME DELAY**

A time delay of approximately two minutes occurs any time the compressor is required to begin the cooling or heat pump cycle.

C. **POWER INTERRUPTION**

In the event that power to the air conditioner or control is interrupted, the system will restart with the same settings you have previously set.

D. **ZONE CONTROL**

Your Duo-Therm Control Center will operate cooling and heating appliances which your vehicle manufacturer has designed to heat or cool different areas (ZONES) of your coach. The Comfort Control Center will advise you if your coach has multiple ZONES, by showing ZONE 1,2,3 or 4 illuminated in the LCD readout. In the event your coach has multiple zones designed, you have the freedom of selecting the MODE of operation for each zone independently. To change from one zone to another, depress the ZONE push-button. Each time you depress and release this push-button, the indicator will change the zone data displayed. The zone number flashing indicates zone being programmed. The zone number will flash for approximately 30 seconds unless another zone is selected or programming has been completed. At this time the number will stop flashing and the display light will go out. When all zones have been programmed, the zones in operation will be underlined. To program each zone, simply repeat the programming steps shown in the operation section of this manual.
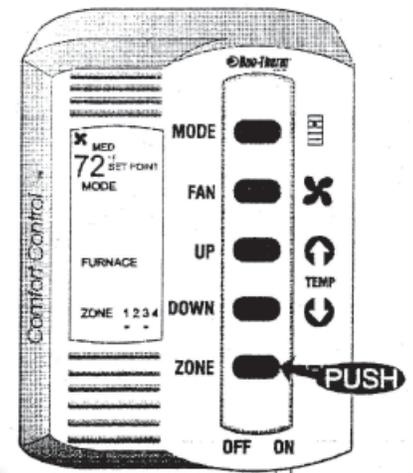
> 🖐 **Please note: The Comfort Control Center will prevent operating FURNACE and COOL or FURNACE and HEAT PUMP at the same time.**
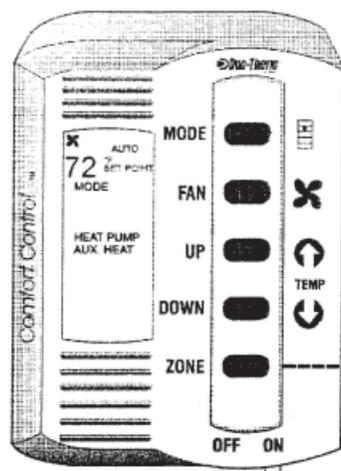
E. **AUX. HEAT**

When in the HEAT PUMP mode, if the outside ambient temperature is measured to be below 30°F, the control will automatically select the FURNACE operation. When this happens, the AUX. HEAT and the HEAT PUMP indicators on the LCD will illuminate. Once the outside ambient temperature is measured above 38°F, the control will return to the HEAT PUMP operation. If the coach does not contain a furnace, and there is a Duo-Therm Heat Pump, once the outside ambient temperature goes below 30°F, the system will shut down until the outside temperature reaches 38°F, at which time the Heat Pump will resume operation.

F. **DEFROST CYCLE**

This cycle is active during HEAT PUMP operation and allows the heat pump to operate down to 30°F. When the outside ambient temperature is less than 42°F and greater than 30°F, a defrost timing cycle will begin. The defrost timing cycle will allow operation of the heat pump for 25 minutes. The fan will then be shut off, the refrigerant flow reversed and run for 4 ½ minutes, this is the DEFROST cycle. The refrigerant flow will then be returned to normal and, after a 30 second delay will continue until the temperature is greater than 42°F or until the temperature becomes less than 30°F, at which time the furnace will activate. (See AUX. HEAT section). During the defrost cycle, the DEFROST indicator on the LCD shall be illuminated.
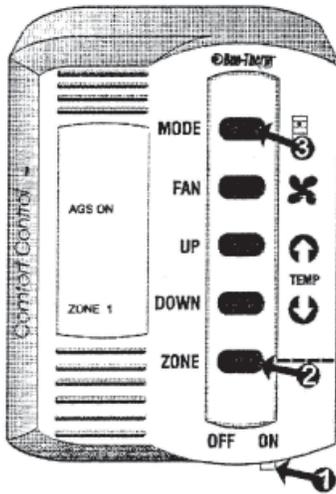
G. OPTIONAL AUTOMATIC GENERATOR START (AGS)

On coaches equipped with an optional AGS kit the coach generator will automatically start when any zone calls for cooling and will shut off when all zones reach set point.

1. Put the power switch in the ON position.
2. Momentarily depress and release the ZONE push-button until AGS indicator appears on the LCD.
3. Momentarily depress and release the MODE push-button to select AGS status.

IMPORTANT: When shore power is available, AGS must be switched to the off position.

4-9.3.3 General Information

The ability of the air conditioner to maintain the desired inside temperature depends on the heat gain of the coach. Some preventative measures taken by the occupants of the coach can reduce the heat gain and improve the performance of the air conditioner. During extremely high outdoor temperatures, the heat gain of the vehicle may be reduced by:

1. Parking the coach in a shaded area.
2. Using window shades (blinds and/or curtains).
3. Keeping windows and doors shut or minimizing usage.
4. Avoiding the use of heat producing appliances.

Starting the air conditioner early in the morning and giving it a "head start" on the expected high outdoor ambient temperature will greatly improve its ability to maintain the desired indoor temperature.

The manufacturer of this air conditioner will not be responsible for damage caused by condensed moisture on ceilings or other surfaces. Air contains moisture and this moisture tends to condense on cold surfaces. When air enters the coach, condensed moisture may appear on the ceiling windows, metal parts, etc. The air conditioner removes this moisture from the air during normal operation. Keeping doors and windows closed when this air conditioner is in operation will minimize condensed moisture on cold surfaces.

This equipment must be serviced by qualified personnel and some states require these people to be licensed.

4-9.3.4 Rebooting

Just like your computer which you may have to reboot from time to time to correct erratic behavior, you also may need to reboot the Comfort Control panel. Voltage spikes may get it off message Resetting takes it back to the factory settings.

1. Turn slide switch to OFF position
2. Press and hold down MODE and ZONE buttons
3. Turn slide switch to ON position
4. Release MODE and ZONE buttons
5. FF appears in display, indicating reset is complete

4-9.3.5 Maintenance

AIR FILTER: Periodically remove the return air filter. Wash the filter with soap and warm water; let dry and then reinstall or replace as required.

> **NOTE: Never run the air conditioner without the return air filter in place. This may plug the unit evaporator coil with dirt and may substantially affect the performance of the unit.**
>
> **Comfort Control Center™: clean the Comfort Control Center™ with a moist, soft cloth. DO NOT use solvents for cleaning.**

4-9.3.6 Service

If your unit fails to operate or operates improperly, check the following before calling your service center.

a.   If your coach is connected to a motor generator, check to be sure the motor generator is running and producing power.

b.   If the coach is connected to a power supply by a land line, check to be sure the line is sized properly to run air conditioner load and it is plugged into the power supply.

c.   Check the 115VAC fuse or circuit breaker to see if it is open.

d.   Check the 12VDC fuse or circuit breaker to see if it is open.

e.   After the above checks, call your local service center for further help. This unit must be serviced by qualified service personnel only.

When calling for service, always give the following:
1.   Air Conditioner Model Number and Serial Number found on Rating Plate located on the Base Pan of the air conditioner.

2.   Electronic Control Kit Part Number and Serial Number found on Rating Plate located on the side of the kit.

RETURN AIR GRILL MUST BE REMOVED FROM THE RETURN AIR COVER TO VIEW THESE RATING PLATES

4-9.4 Automotive Air and Heat System

The dash heat and air system are a separate HVAC system designed to meet the latest refrigerant requirements. This unit provides the ability to mix heat and air to provide defrosting capability.

4-10 Fresh Water System

4-10.1 Water Supply and Distribution System

The fresh water tank is approximately 100 gallons. The dual purpose Tank Water Fill/Municipal Water inlet connection is located in the road side holding tank compartment, in Bay 4, left. The Tank Fill On-Off switch, located in Bay 4, left, diverts the municipal water input to fill the pure water storage tank, which is also located in Bay 4. System water pressure is provided by a water pump located in the roadside compartment, Bay 3, left. The fresh water tank is non-pressurized with the system water pressure developed by a demand pump when not connected to a municipal water system. The fresh water tank is equipped with a two inch drain. The tank also includes level indicators, located on the curbside end of the fresh water tank. All of the water supplied to the motor home is filtered through an activated carbon filter.

4-10.2 Municipal Water Hookup

When facilities are available, the Municipal Water hookup can be used to supply all motor home water system requirements. In this manner, the fresh water tank and pump system are automatically bypassed with the water pressure regulated by the municipal water system (approximately 40 psi).

4-10.3 Filling and Draining

To fill the fresh water tank, connect the water hose to the municipal water inlet, set the Tank Fill switch to ON, then turn on the water supply. When the tank is full, the level switch in the tank will close the tank fill solenoid. Set the Tank Fill switch to the OFF position, shut off the water supply and disconnect the hose. At this time, check that the Monitor panel readout indicates a full water tank. By pressing the Pure tank switch and observing that all, E through F indicator segments are lit.

> ☞ NOTE: The Tank Fill switch should be ON only when the water tank is being filled. This switch must be in the OFF position at all other times.

4-10.3.1 Sanitizing

Water system sanitizing procedures should be followed before the system is used for the first time, after long idle periods where water may become stagnant, or after any suspected contamination of the water supply. Whenever possible, use a commercially approved tank sanitizer and follow the procedures on the product package. If it is not possible to use a commercial product, prepare your own mixture and sanitize the tank in accordance with the following procedures:

1. **Empty the Fresh Water Tanks** – To drain the tanks, open the 2-inch Cold Water Drain Valve located inside the opening below the fresh water tank on the roadside, Bay 4, left. Pull valve toward front of motor home. After the tank is completely drained, close the Cold Water Drain.

2. **Prepare the Sanitizing Solution** – Each gallon of Sanitizing solution consists of ¼ cup of household bleach (sodium hypochlorite) solution and one gallon of water. This mixture results in a residual chlorine concentration of 50 ppm in the water system. Seven to eight gallons of sanitizing solution will be adequate for the fresh water tank. (Approximately 100 gallons).

3. **Add sanitizing solution to water tank** – Remove deck lid plug in the curbside close out panel. Remove 3/4 inch plug from the side of the tank in the curb side luggage compartment and pour the solution into the tank. Reinstall the plug in the tank.

4. **Fill tank to capacity** – Connect the hose to the municipal water inlet, turn on the Tank Fill Switch and fill the water tanks completely. Shut off the hose and turn off the Tank Fill switch. Turn on the water pumps. Open each faucet (hot and cold), and run the water until a distinct odor of chlorine can be detected. Shut off the water pump.

5. **Allow the system to stand** – Let stand for at least 4 hours when disinfecting with 50 ppm residual chlorine. If a shorter time period is desired, then a 100 ppm chlorine concentration should be permitted to stand in the system for at least one hour.

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6. **Drain tanks** – Open the Cold Water Drain valve (as in Step 1), and allow the tank to drain completely.

7. **Refill tanks** – Close the Cold Water Drain valve and turn on the water supply to the municipal water inlet. Turn on the Tank Fill switch and fill the tank completely. When the tank is full, turn off the Tank Fill switch, shut off the water supply and disconnect the hose. Then replace the fill cap and turn on the water pump. When water flows from the opened faucets, close them and open the other faucets until water flows. This flushes the system, removing trapped air from piping and ensures that the fresh water supply is ready for use.

> **CAUTION!!** Do not permit sanitizing or antifreeze solutions to enter water filter.

8. *Repeat steps 6 and 7* until the chlorine smell and taste is no longer present at the faucets.

4-10.3.2 Water Filter Replacement

Depending upon the condition of the municipal water used, the filter media will degrade with use. The only practical way to determine when replacement is required is to go by the sense of taste. It is recommended that the filter be changed after prolonged storage.

4-10.3.3 Water Heater

With the Webasto system at operating temperature, the domestic water is automatically heated as it is being used. Open any hot water faucet and a continuous supply of domestic hot water will be present within a few seconds. This is accomplished by the Webasto's domestic hot water zones, which are an integral part of the heating system. A mixer valve has been installed to ensure that excessively hot water does not flow to the faucets.

> **CAUTION!!** The mixer valve is not an anti-scald device. Always exercise reasonable caution when using hot water.

> **CAUTION!!** Do not turn the Webasto's unit off if the outside temperature is 32°F or lower when the potable water system is not drained.

4-10.3.4 Water Pump

The water pump is located in the road side luggage compartment (bay 3). The pump employs state-of-the-art electronics to automatically control motor speed. The pump adjusts its speed as you open and close water fixtures. If the pump has been out of service for a period of time, it is advisable to open a faucet before turning them on. When water flows steadily from the opened faucet, close the faucet and observe that the pump shuts off when the system becomes pressurized. (It may also be necessary to bleed the air from the other faucets as well.) When the fresh water supply tank level is low or empty, shut the pump off to prevent possible damage to the pump motor. In addition to integral motor overload protection; the pump mechanism is also protected from damage by the presence of a filter at the water pump inlet. The filter should be cleaned periodically.

Under normal usage, the water pump should require no periodic maintenance other than ensuring that the input water supply is properly filtered of particles that could damage the pump mechanism. Pump failures can generally be tied to the plumbing system or to electrical wiring. If a pump fails to operate properly, refer to the general troubleshooting guide.

> **Note that detailed pump repairs and overhaul should be performed by a qualified repair facility.**

4-10.3.5 Water Pump Switch

The central control switch, labeled water pump, for the water pump is in the bathroom.

The associated indicator is lit whenever power is being supplied to the pump. Turning ON the switch pressurizes the water system, with the pump maintaining constant pressure. Continuous or erratic pump operation can indicate an empty water tank, system leakage or air lock in the water lines. Switches enabling the water pump are located in the bathroom, in the kitchen and in the roadside holding tank bay. These switches are labeled water pump.

4-10.3.6 Manifold

All cold and hot water is directed to the distribution manifold. Hot and cold water is distributed to each fixture via individual 3/8" I.D. lines. Individual shut-off valves are located on the manifold, and are used to shut off water to respective fixtures in the motor home. A 1/8" I.D. line is used for the refrigerator ice maker.

4-10.3.7 Water Pump Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Pump operates but no water flows through the faucet.	Low water level in the tank.	Add water.
	Suction lines or filters clogged.	Clear water lines and clean filters.
	Kink in the water suction hose.	Check water hose connections to tank and straighten or replace as necessary.
	Air leak in suction line.	Replace suction line.
	Defective water pump.	Rebuild or replace pump.
Pump cycles on and off when faucets are closed.	Water leak in plumbing.	Check for signs of leakage and tighten or replace fittings, pipe, etc.
	Defective toilet flush valve.	Repair flush valve.
	Defective water pump.	Rebuild or replace pump.
Pump operates roughly and has excessive noise and vibration.	Intake line is restricted, kink in suction hose or fittings are too small.	Check input hoses and straighten or replace, as necessary.
	Defective water pump.	Rebuild or replace pump.
Pump fails to start when faucet is opened:	Clogged pressure piping.	Blow out water lines with compressed air. Maximum pressure that can be used is 40 psi.
	No voltage to pump.	Check input wiring circuit breaker and switches.
	Defective water pump.	Rebuild or replace pump.
Pump gives low water pressure and flow;	Defective water pump.	Replace diaphragm or motor.
	Tank fill switch left on.	Turn off tank fill switch.

> ✍ **NOTE: Before blowing out water lines, be sure to remove both lines from pump to avoid blowing out towards pump. Procedure may be best performed by a certified technician.**

4-10-4 Winterizing

If you are planning on storing your motor home in an unheated area during cold weather, it is necessary to winterize the water system to prevent damage from freezing conditions. Winterizing procedures are covered in the following paragraphs.

4-10.4.1 Draining and Winterizing the Fresh Water Supply System

The following procedures show the use of the various drain valves and controls to winterize the fresh water system.

1. Open the main circuit breaker box (located in bedroom) and turn off the Water Heater and Instant Hot circuit breakers.

2. Turn on Water Pump switch (located in bathroom) and open all faucets (galley sink, lavatory, shower, outside hose connection and toilet water valve – after depressing pedal insert block to maintain position). Note that the outside water faucet should always be left open when freezing temperatures are expected. Also, remove drain plugs at rear of toilet and at bottom of Instant Hot. Refer to the Icemaker and Toilet Sections for winterizing these units.)

3. Open the Cold and Hot Water Drain valves located in roadside Bay 4, luggage compartment. Open 2" water tank drain valve in road side first luggage compartment, Bay 4.

4. Allow water to drain completely before proceeding to the next step.

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5. Turn off water pump switch.

6. Unroll coiled hose under road side end of fresh water tank. Hose is connected to valve assembly under tank (Bay 4).

7. Feed open end of hose into container of RV antifreeze. Approximately 3 to 5 gallons required.

8. Close the valve on the suction line coming from the fresh water tank and open the valve from the RV antifreeze line.

9. Close all fresh water manifold valves. Except the top hot water valve.

10. Turn on fresh water pump. Make sure RV antifreeze is moving into pump and into the manifold. Be ready to close the cold water drain valve, under manifold exiting the floor, when antifreeze exits the line under motor home. Also close hot water drain at this time.

11. Continue to run pump to fill the water heater and the hot water side of the manifold until antifreeze exits the hot water valve left open in step 9.

12. Open the hot water drain valve, closed in step 10, and close it again when antifreeze exits the hot water drain line.

13. Turn pump off at this time and close the valve on the antifreeze line. Stow hose in original location.

14. Make sure all the interior and exterior faucets, as well as, the ice maker, toilet and clothes washer are open.

15. At this point, the only water remaining in the system is contained in the P traps beneath the lavatory sink, shower drain, and kitchen sink (clothes washer optional). To prevent this water from freezing and damaging traps, put one pint of RV system anti-freeze into each drain. See *WASTE SYSTEM WINTERIZING*.

📌 **NOTE: When reactivating the system, make sure (optional) Instant Hot is full of water before switching on.**

4-11 Waste System

4-11.1 Air Flow Toilet

The waste system supplied in this vehicle is a Microphor Air Flow Toilet. The following information will discuss how these systems operate, how to take care of them, plus useful tips about the system itself.

4-11.1.1 How Microflush Toilets Operate
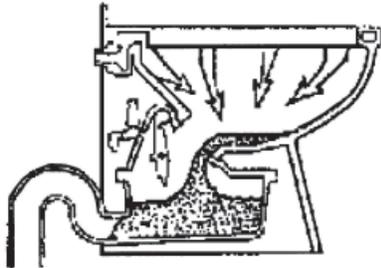
When the flush handle is pressed the flapper opens, allowing wastewater to flow into the hopper. Clean water enters the bowl from the rim to thoroughly wash the bowl.
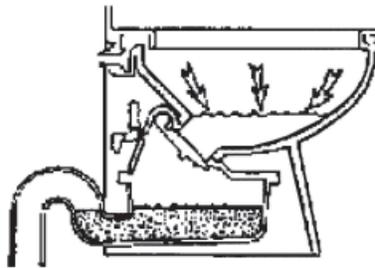
After 4-8 seconds, the flapper closes. Clean water continues to flow into the bowl, where it remains until the next flush.
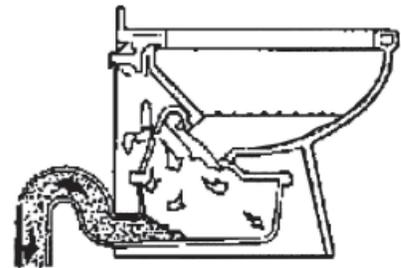
When the flapper has closed, compressed air enters the hopper, pushing the waste over the trap and into the waste line.

4-11.1.2 Air/Water Sequence Valve Operation

1. In the normal rest position, pressurized air enters the Flush Activator and goes from Flush Activator Port 1 (green tube) to Air/Water Sequence Valve Port 2, through Port 3 (red tube) to Air Cylinder Port 4 holding the Flapper closed, sealing the water in the bowl and maintaining a proper water surface area.

2. When the Flush Activator is pressed, air is shifted to Port 5 (blue tube) to A/W-Seq. Valve Port 6 and on to Air Cylinder Port 8 (white tube). The air in the base of the Air Cylinder is bled off through Port 4 (red tube) to Port 3 and out Vent [1], allowing the Air Cylinder to retract, opening the Flapper. Simultaneously, pressurized air in the base of the A/W Seq. valve pushes the piston and spool assembly up to open the water passage, allowing water to enter and rinse the bowl. The air on the top of the piston is bled off through Port 1 and out Vent [2].

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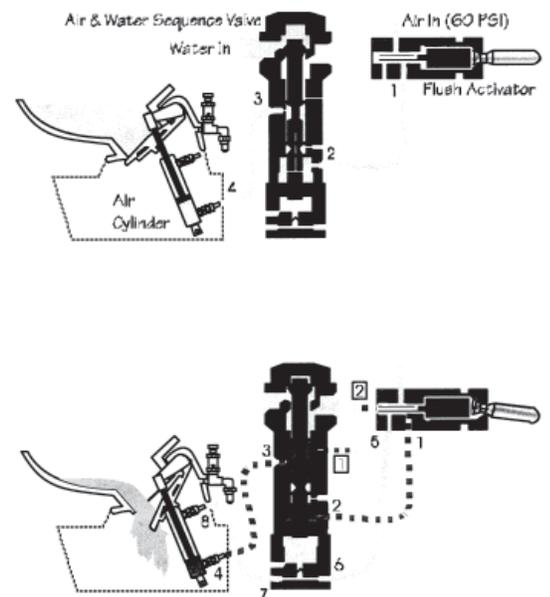
3. As the Flush Lever is released, the Flush Activator returns to the normal rest position redirecting pressurized air to Port 2, Port 3 and Port 4. The Bleed-Off Plug [12] bleeds off the air (black tube) under the piston, causing the spool to move downward, gradually closing the water passageway. The air having been bled off the top of the Air Cylinder Port 8 (white tube) through the end of the Flush Activator Vent [2] (blue tube), allows the Air Cylinder to close the Flapper allowing water to accumulate in the bowl, restoring a proper water surface area.

4. Near the bottom of the piston stroke, the air passageway from Port 10 (yellow tube) to the Hopper Port 11 is unblocked for 4-11 seconds to pressurize the hopper and expel the waste contents over the trap and into the waste line.

5. As the A/W Seq. Spool reaches the bottom position, the water supply is shut off, completing the flush cycle.
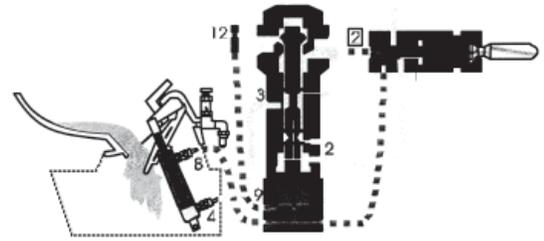
In the event of air supply failure, the spring in the Air/Water Sequence Valve maintains the valve in the closed position, blocking the water passageway. The flapper will open and allow water in the bowl to flow into the hopper forming a water seal.
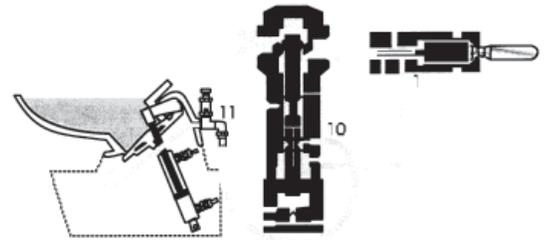
4-11.1.2 Cleaning

Use Micro-Clean Organic Spray Cleaner, P/N 24542, or equalivent cleaner approved by Microphor designed for Microflush toilets. Caustic drain openers or non-biodegradable cleaners should not be used.

1. While depressing the flush activator, turn OFF the water. Allow the bowl cleaner to flow into the lower chamber. Keep the flush deactivator pressed.

2. Insert bowl brush into lower chamber and agitate mixture.

3. Remove the bowl brush and release the flush activator.

4. Turn the water ON and flush twice to rinse thoroughly. If using a cleaner other than one with a Microphor Biological Waste Treatment System, check with your Coachworks Service Department or with Microphor for acceptable cleaners. You can access Microphor's website by http://www.microphor.com

4-11.1.3 Clearing Plugged Toilet

Turn water OFF, press flush handle and hold to remove water from the bowl. The flapper in the bottom of the toilet will remain open until the flush handle is released. Check to see if the restriction can be removed from the hopper with a hooked wire, being careful not to damage the rubber seal on the flapper or the mating surface on the hopper. If obstruction cannot be picked out with a hook or tongs, use a plunger by pushing in slowly and pulling out quickly to pull object back into the hopper. If necessary, turn the air OFF and use a snake inserted through a 12" plastic pipe placed in hopper. The pipe will protect the flapper seal from damage. If the Air/Water Sequence Valve will not operate with the water turned OFF, hold the flush lever down and turn the water ON and OFF quickly to free the valve action. When the passage becomes clear, turn the water ON and press the flush handle to start the flush cycle.

4-11.1.4 Winterizing

Shut OFF water to toilet. Flush toilet three times or until water no longer flows into the bowl. Unhook water supply at angle stop. Empty water in line into receptacle. Shut OFFf air supply to the toilet. The unit is now prepared for freezing temperatures. Open petcocks on drip legs and air receiver drain after shutting down air compressor and isolating air lines.
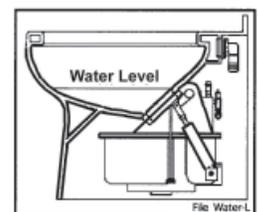
4-11.1.5 Cleaning Bleed Off Assembly

Standard Flush – Remove plug and clean with solvent; air blow dry.

Positive Flush – Remove plug and clean with solvent; air blow dry, remove and clean plug on Detent Valve.

> 🖊 **NOTE: Use 5/32" (4mm) Allen wrench to remove plugs.**
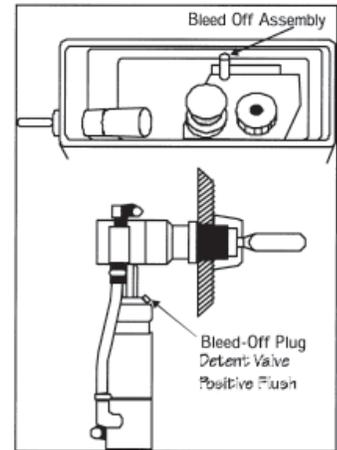
4-11.1.6 Air System Design

Filter-regulators are available in a variety of sizes and types. Their purpose is to remove water and foreign matter from the air line and to maintain a constant pressure of 60-65 psi to the toilet. The following steps must be observed to assure moisture will be removed from the air line.

1. Drain air compressor receiver regularly. Most water tends to accumulate at this point.
2. Install drip legs with condensate drains at all low points in air piping.
3. Whenever possible, grade all air lines back to the air receiver or drip leg assembly and drain regularly.
4. The air supply to the toilet must be taken from the top of the main or branch air line.

4-11.1.7 Troubleshooting

Your Microflush® toilet is designed to give you years of trouble-free operation. Please check the following before beginning any service or repair.

Water supply: 1. Is the water turned on?

                      2. Is the water pressure between 20 and 50 psi at the toilet for pressure water system?

                      3. Is there 6 feet minimum of head for gravity systems?

       Fluctuating or high water pressure can cause intermittent problems with the toilet operation. Check the water pressure at different times of the day (i.e., early morning, noon, evening) to determine if you have fluctuating or high water pressure. A pressure-reducing valve installed on the incoming water line will assure you have even pressure. Make sure no check valve is installed before the Air/Water Sequence Valve.

Air system: 1. Is the air turned on?

                      2. Is the air pressure set at a constant 60-65 psi at the toilet?

                      3. Do you have any air leaks or kinks in the air system?

                      4. Do you have water in the air system? This usually causes irregular timing.

Drain the compressor tank and check the filter regulator and drip leg(s) for water. To check for water in Air/Water Seq. Valve, remove Bleed-Off Plug, put finger over screw opening and flush. If water is present, it will squirt out. If water is detected, then the air cylinder and airlines must also be drained.

Cycle time: 1. Is the flapper cycle time set correctly at 4-8 seconds?

                      2. Is the bleed off assembly plug blocked? Remove, clean and reinstall.

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Trouble	Possible Causes	Correction
Flapper does not open. Water does not flow. Nothing happens.	1. No air supply to Microflush. 2. Water has accumulated in Air/Water Sequence Valve	1. Supply compressed air at 60-65 psi. 2. *See Check Air System*.
Flapper opens and closes 4-7 seconds after handle is released, but no water enters bowl.	1. No water supply to Microflush.	1. Supply water at 20-50 psi.
	2. Water turned off.	2. Open angle stop (shut-off valve).
Flapper opens when flushed, and closes immediately when activator is released.	1. Excessively high water pressure.	1. Install water pressure regulating valve, set at 20-50 psi.
	2. Debris in check valve at base of Air/Water Sequence Valve.	2. Clean Air/Water Seq. Valve.
Flapper opens and will not close.	Bleed-Off plug blocked.	Remove, clean or replace, reinstall.
Water continues to run when Microflush is not in use.	Foreign object is under water valve in Air/Water Sequence Valve.	Clean Air/Water Sequence Valve. Reference Service Kit P/N 95057.
Water splashes when flushed.	Water is too high in bowl.	Reduce incoming water via angle stop.
Flush cycle is too long.	Bleed-Off plug blocked.	Remove, clean or replace, reinstall.
Flush cycle is too short.	Bleed-Off plug hole too large or related air lines leaking.	Remove, replace, and check for air line leaks.

If other problems are encountered, please contact the factory: Toll Free 1-800-358-8280

4-11.1.8 Basic Repair Procedures

Hopper Components

A	00064	SS Mounting Screws (14 each)
B	27207	Gasket, flapper
C	27272	O-Ring Seal, Hopper Top to Bottom
D	37518	Pressure Relief Valve
E	37548	Bleed Valve
F	90042	Crank Arm Assy.
G	90048	Flapper Assy.
H	9001 2-3	Hopper Top with Crank and Flapper Assy.
I	45060	Hopper Bottom Assy. (not including P-trap)
J	96029	P-Trap Assy., Rear Discharge
K	95157	P-Trap Assy., Downward Discharge
	20137	Valve Mounting Bracket
	48718	Conduit Clamp
	10194	Retaining Ring, Air Cylinder
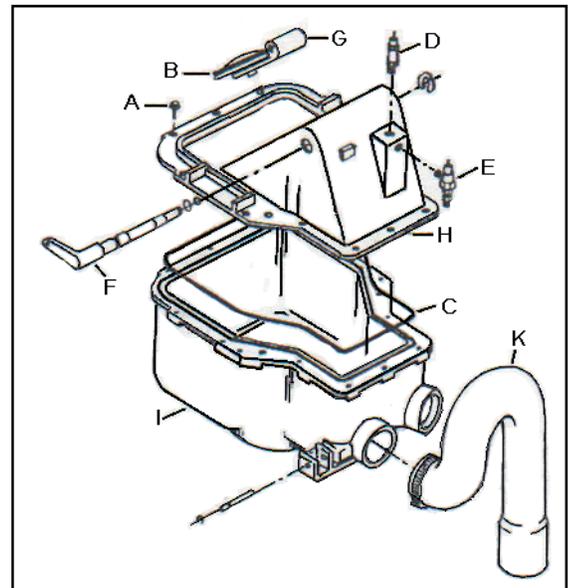
4-11.1.9 Hopper Replacement

CAUTION!!   **Read this entire procedure before beginning work!**

1. Remove toilet from floor. Place toilet upside down on a sheet of cardboard or other padded material.

2. Remove nuts from hopper supports on either side of hopper, lift hopper from bowl.

3. Remove o-ring between hopper and seal adapter. Check that o-ring is not damaged, replace if necessary.

4. Re-assemble in reverse order.
   Make sure J-bolts are tight, and pulled tight to china hopper mounting flange!

> **NOTE: The air cylinder on the hopper sub-assembly should be cleaned, lubricated and checked for adjustment whenever the toilet assembly is removed for servicing.**

China Hopper Horn

45 deg. J-Bolt Assy's (2), P/N 90899-5

Sealing Adapter (Glued to China Horn)

O-Ring, P/N 27282

Hopper

Air Cylinder

View of toilet upside down

Offset J-bolt
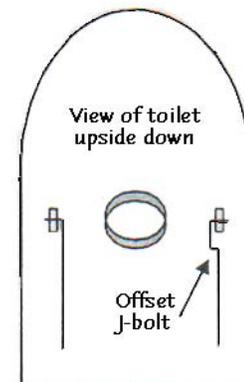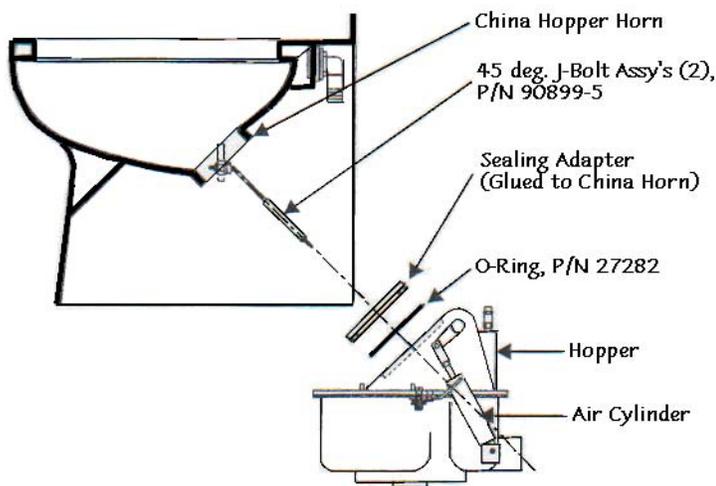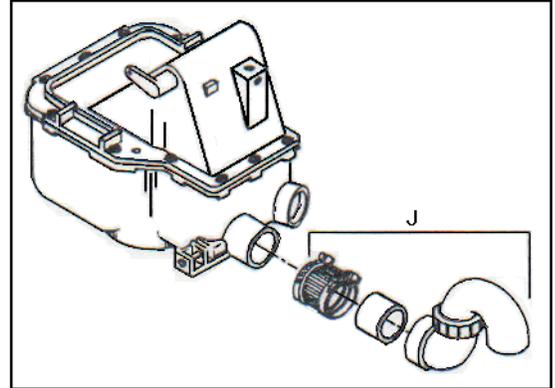
4-11.1.10 To Change Flapper Gasket:

1. Turn water and air off.
2. Reach behind flapper to grasp gasket tails.
3. Pull tails out of slots to remove old gasket.
4. Installation is the reverse of removal.
5. Tails must be pulled all the way through to insure smooth surface.

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4-11.1.11 Air Cylinder Adjustment

1. Remove toilet from floor.

2. At hopper, remove upper and lower retaining rings and clevis pin.

3. Inspect the crank arm, clevis and clevis pin for wear. Replace if required.

4. Fully extend the air cylinder – it should measure 7-1/4" between the centers of two mounting holes.

   Adjust as necessary:
   A. Fully extend the Air Cylinder.
   B. Protect the shaft with thick cloth or rubber and hold firmly with pliers.
   C. Place a screwdriver through the clevis mounting hole and turn: clockwise to shorten length; counterclockwise to extend length.
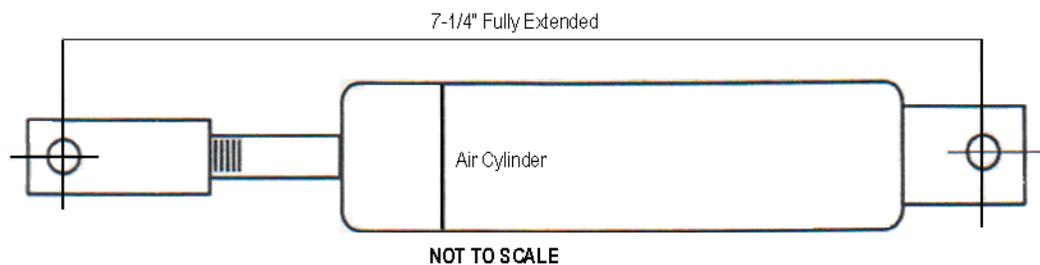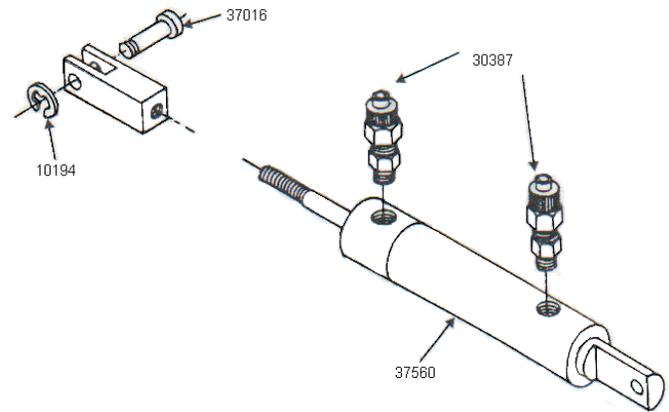
4-11.1.12 Customer Service

If you have any questions concerning your Microphor product, please contact us:

   8:00 a.m.-5:00 p.m. PST Monday-Friday

   Tel: (800) 358-8280 or (707) 459-5563

   Fax: (707) 459-6617 24 hours

   Website: www.microphor.com

IMPORTANT NOTE: Only do service procedures yourself if you have the knowledge and experience to do so. If unsure, contact a Coachworks service center or a qualified professional to have the procedure performed.

4-11.1.13 Cautions

Refer to the following table for cautions that need to be adhered to concerning the toilet.

Water Pressure	Must be regulated at an even pressure between 20 to 50 PSI at the toilet.
Air Pressure	Must be regulated at 60-65 PSI constant at the toilet.
Pipe Sealant	Use plastic compatible teflon based pipe sealants.
Do Not Use	Any "Loctite" brand adhesive on any plastic or Delrin components, as fumes will cause damage to plastic parts.
Do Not Use	Products containing petroleum distillates or formaldehyde on any rubber parts. Use Only Silicone Lubricants!
Do Not Use	Teflon tape on any air fittings as clogging may occur.

4-12 LPG System

This vehicle is equipped with a permanently mounted, 30 gallon (102 pounds of fuel-net) LP gas tank, which is the energy source for the cooktop (range) and an alternative source for the refrigerator.

4-12.1 LPG Tank and Controls

The LPG supply tank is located in an unlocked compartment behind the rear axle on the passenger side of the motor home. LPG system controls include a main gas service valve, solenoid shut-off valve, two stage pressure regulator, filler connection with Auto Stop (80%) fill valve, 20% vapor (stop filling when liquid appears) valve, and the pressure relief valve.

> **WARNING!!**
>
> **When the motor home is to be stored in a confined area, turn off the LPG at the main tank shutoff valve. With the LPG leak detector, this may now be accomplished by turning off the LPG Master Switch on the galley panel.**

LPG tank level can be monitored at the tank monitor panel located in the pantry.

4-12.1.1 Fuel Requirements

Liquefied petroleum gas is a material composed of various hydrocarbons such as propane, butane, or a mixture thereof. In its gaseous form (vaporized), it is colorless and has a garlic-scented additive to ensure detection. In addition to being highly flammable, it is also dangerous to inhale. For ease of transportation and storage, LPG is compressed into a liquid state and stored in this form within the LPG tank. As fuel is used, vapor passes from the top of the tank into the two-stage pressure regulator and to the various gas appliances.

Appliances do not function if the LP gas does not vaporize. Butane does not vaporize below 32 degrees Fahrenheit (the freezing point of water), but propane continues to vaporize down to 44 degrees below zero. Propane has become the main type of LP gas used in RVs in recent years. Your LP supplier has the correct type or blend for your locale. If your travels take you into an area where climate differs, ask your LP dealer for his recommendations. The names of LP suppliers can be found in the yellow pages of the telephone directory under "Gas-Liquefied Petroleum-Bottled & Bulk." Many campgrounds now have LP gas fill facilities, as do some service stations.

Prevent condensation and possible regulator or line freeze-ups when filling the tank by requesting the dealer to add a small amount of methyl alcohol to the fill up. A common mixture is one ounce of methyl alcohol to each 20 pounds of LPG.

> 📌 **NOTE: Liquefied petroleum gas is heavier than air.**

4-12.2 Filling the LP Gas Tank

When the tank is being filled, the service valve must be closed and the 80% liquid level valve (20% vapor valve) must be open. The 80% auto stop fill valve may close before liquid appears at the 80% liquid level valve, but if liquid does appear, stop filling immediately; the tank is filled to its LP capacity. Close the liquid level valve. Do not use a wrench to tighten this valve or the service valve; they are designed to be closed leak-tight by hand. If you cannot hand-tighten properly, the valve probably needs repair or replacement.

> **CAUTION!!**
>
> Be sure that the main LPG supply is shut off during refueling to prevent accidental ignition of gas fumes by appliance igniters.

> **CAUTION!!**
>
> All gas appliances must be cut off before filling the LPG tank. Check gas lines and fittings periodically for tightness and leakage.

4-12.2.1 Regulator

The two-stage pressure regulator regulates the pressure of the LPG supplied to the appliances. The regulator functions automatically and is factory-preset to provide the correct line pressure. Do not attempt to tamper with or reset the regulator! Even a small variation above the normal gas line pressure can be sufficient to create a dangerous situation and cause possible damage to individual appliance components. If there is any doubt about the regulator setting, it can be checked by your Coachworks Service Department or LPG supplier. The correct setting is 11-14 inch water column.

4-12.2.2 Operation

To operate any LPG appliance, the main gas (Service) valve must be open. In addition, individual valves at each appliance must be opened prior to use. When first used, or after a refill, there may be some air in the gas lines, which escapes, when you open a range burner or similar LP gas valve. The air may extinguish your match or igniter the first time or two before you get ignition. Remember, too, that when you close the tank's service valve some of the gas will remain in the lines. To completely bleed the lines of gas, close the tank's service valve and light a range burner to use up the excess. When the flame burns out, turn the range burner off.

4-12.3 Checking for Leaks

Periodically check the LP system for possible leakage. Do not wait for an alarm condition to occur before correcting a leak! Although the entire system and associated appliances undergo extensive factory testing for leakage, road shocks and heavy vibrations may loosen or damage piping or fittings. Leaks will usually become noticeable by the characteristic odor of the garlic-scented gas additive. To check, turn off all burners and pilot lights. Open all doors and windows. Open LPG tank service valve and use an ammonia and chlorine free soap-bubble solution on all connections. Any bubbles are evidence of leakage.

NOTE: The gas leakage detectors may momentarily sound an alarm when the engine is initially started or when a heavy electrical load is placed on the system. Further, the ultra sensitive response of these units may also cause an alarm to be given in the presence of certain pressurized-can sprays or cleaning agents. Do not assume! Always determine the reason for this vital alarm being given!

4-12.4 LPG Consumption

Most gas appliances are intermittently operated; however, operation during cold weather conditions does cause heavy consumption. The amount of LPG consumption depends on the total use and the manner in which these appliances are used.

For your guidance in estimating your anticipated fuel consumption, the following is a listing of typical appliance consumption ratings when the appliance is operated for one hour:

Refrigerator: 1,500 BTUs

Cooktop Burners 5,200 BTUs each

4-12.5 LPG System Warnings

> **Note that each gallon (4 1/4 lb.) of LPG fuel produces approximately 91,500 BTUs of heat energy. The LPG tank used in your motor home will furnish over 2.1 million BTUs.**

> **WARNING!!**
>
> **LP gas containers are not be placed or stored inside the vehicle. LP gas containers are equipped with safety devices, which relieve excessive pressure by discharging gas to the atmosphere.**

> **NOTE: The compartment the LPG tank is located in is NOT intended for storage – Do not place any items on, under or around the LPG tank.**

> **WARNING!!**   **It is not safe to use cooking appliances for comfort heat.**

A warning label has been placed in the cooking area to remind you to provide an adequate supply of fresh air for combustion. Unlike homes, the amount of oxygen supply is limited due to the size of the recreational vehicle, and proper ventilation when using the cooking appliance(s) will avoid dangers of asphyxiation. It is especially important that cooking appliances not be used for comfort heating as the danger of asphyxiation is greater when the appliance is used for long periods of time.

Cooking appliances need fresh air for safe operation. Before operation:

1. Open overhead vent or turn on exhaust fan.

2. Open window.

A warning label has been located near the LP gas container. This label reads:

> **WARNING!!**   **Do not fill container(s) to more than 80 percent of capacity.**

Overfilling the LP gas container can result in uncontrolled gas flow, which can cause fire or explosion. A properly filled container will contain approximately 80 percent of its volume as liquid LP gas.

> **WARNING!!**   **Portable fuel-burning equipment, including wood and charcoal grills and stoves, are not to be used inside the motorhome. The use of this equipment inside the motorhome may cause fires or asphyxiation.**

> **WARNING!!**   **Do not bring or store LP gas containers, gasoline or other flammable liquids inside the vehicle because a fire or explosion may result.**

The following label has been placed in the vehicle near the range area:

IF YOU SMELL GAS

1. Extinguish any open flames, pilot lights and all smoking materials.

2. Do not touch electrical switches.

3. Shut off the gas supply at the tank valve(s) or gas supply connection.

4. Open doors and other ventilated openings.

5. Leave the area until odor clears.

6. Have the gas system checked and leakage source corrected before using again.

LP gas regulators must always be installed with the diaphragm vent facing downward. This minimizes any chances of vent blockage, which could result in excessive gas pressure causing fire or explosion.

> **WARNING!!**   **Never check for leaks with an open flame. Do not check copper plumbing lines for leaks using ammoniated or chlorinated household-type detergents. These can cause cracks to form on the line and brass fittings. If the leak cannot be located, take the unit to your Coachworks Service Department or LPG supplier.**

4-12.6 LPG Leak Detector System

The system has been developed to the point where it is unique; it shuts off the LP gas at the high-pressure source, yet holds the valve open to provide ample appliance flow with a minimum amount of current usage.

Three components make up the system:

1. **Gas Detection Control Unit:** mounted in toe kick of the kitchen base cabinet. This is the "brains" of the system and provides an electrical signal to the solenoid valve when LPG service is required.

2. **Solenoid Valve:** installed in the high pressure LPG line feeding the two-stage regulator. It is a "normally closed" solenoid valve and has a special winding of 22 ohms (approximate) resistance, so it uses very little current in the "hold open" position. In order to close the valve, it is only necessary to break the circuit. This provides a "fail-safe" feature in the event of loss of 12-volt power.

3. **LPG Master switch:** located on the galley panel.

The following events will result in an open/low voltage circuit and allow the solenoid valve to close and shut off the LPG supply:

1. Pushing the switch to "OFF" on the LPG MASTER switch or the Gas Detection Control Unit. Green light will go out.

2. The Gas Detection Control Unit senses the presence of LP gas (or can be triggered by a propane lighter or even hair spray!). Green light goes out, Red light comes on, along with audible signal.

3. The Electronic Master switch is turned off. Green light will go out.

> **NOTE: System is not Master Switch Activated.**

1. Push switch on the LPG MASTER and the Gas Detection Control Unit to "ON." Green light will come on.

2. Correct the cause of LP gas leak or determine if other fumes caused the shut down. Green light will come on.

3. Turn Electronic Master Switch on. Green light will come on.

> **NOTE: Because of the presence of an excess flow valve in the LPG tank outlet (safety feature); sometimes an appliance may not relight after a shutdown. In this circumstance, wait five (5) minutes for LPG pressures to equalize before relighting.**

4-13 Air Pressure System

4-13.1 Description and Operation

An engine-driven compressor supplies the air pressure system on your coach. It provides pneumatic power for brakes, suspension, and numerous accessories. This complex, but efficient system is not intended to be totally leak free. After overnight parking, you may notice a significant loss of pressure on the air pressure front/rear gauge, or in systems connected to auxiliary air. This condition is normal, and in fact, our air leakage tolerance is tighter than most manufacturers within the heavy-duty equipment industry. Once the engine is running, the engine-driven compressor will quickly build up the system to the correct pressure.

4-13.1.1 Air Brakes

Your coach is equipped with dual service air brake systems for front and rear, with integral fail/safe operation; and manual/automatic rear spring (parking) brakes. The service brakes are completely independent systems, each including a reservoir and separate distribution lines and valves. The reservoirs are pressurized from a single compressor. Both service brake systems are brought into operation each time the brake treadle is depressed to slow or stop the coach. Reservoir pressure for each service brake system is monitored by a respective pressure gauge on the front panel; system failure(s) are indicated by low-pressure readings, illumination of the Low Air failure lamp and sounding of a buzzer.

4-13.1.2 Operation

When the coach is parked, and the engine is off, the rear spring brake will normally be set by operating the parking brake. The spring brakes cannot be fully released until the air pressure is above 65 psi. These brakes are in the released position when the control is pushed in. In the event that there is a loss of air pressure, the spring brakes will set automatically at the brake-applied position, and will not release until the air reserve has again built up to required value. Consequently, there will be a normal delay, after the coach is first started, while the compressor builds up pressure before the brakes can be released and the coach driven. When the brake treadle is depressed to slow or stop the coach, reservoir air is applied simultaneously to both front and rear service brakes to effect the braking action. The spring brakes are held in a released position by the air pressure supplied from the associated reservoir tank.

> **CAUTION!!** Do not attempt to drive the coach until system pressure is above 90 psi.

4-13.1.3 Brake Failures

To compensate for normal lining wear, each brake system is individually self-adjusting.

Fail/safe features provide protection against brake system failures. If the front brakes fail, operating the brake treadle still activates the rear service brakes to provide stopping capability.

If a failure occurs in the rear, the front service brakes and rear spring brakes provide braking action.

In the unlikely event of a failure where both service-braking systems are disabled, the rear spring brakes will apply automatically and bring the vehicle to a stop. As a safety factory, the coach should not be driven until any type of brake failure is corrected.

> **NOTE:** With the front brake system service reservoir fully charged, enough air pressure is available to provide for four full releases of the rear spring brakes. This will allow the coach to be brought to a safe position until repairs can be made.

4-13.1.4 Anti-Lock Brakes

In addition to the above, a four-channel anti-lock brake system for the steer and drive axles are installed. In the event one of the wheels begins to lock up under severe braking conditions, the anti-lock system will detect this situation and gradually remove air pressure from the brake chamber until the wheel begins to turn. This will help assure smooth braking action and minimize wheel lockup.

4-13.1.5 Air Suspension System

Air suspension bags cushion the front and rear axles. Ride height is automatically maintained by height control valves. Dumping these air bags when the vehicle is parked allows the rubber bumpers to come together and eliminate vehicle springiness. A switch, located on the lower left side of the LOWER DASH PANEL, controls dumping and filling of air bags. The SUSP. DUMP switch controls the front and rear suspension.

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> ✎ **NOTE:** The accessory air tank must contain at least 65 psi pressure for the DUMP switch to function. The accessory air tank pressure does not register on the dash air pressure gauges.

Moving the SUSP. DUMP switch away from the UP position applies air pressure to air pilot-operated valves on the suspension system. The pilot air shifts the valves, cutting off the air supply to the air bags and allows the air in the bags to escape. After the suspension system has been dumped and the ignition is turned on, a buzzer and a warning pilot light is illuminated on the dash to warn the driver that the system is dumped and not to drive the vehicle until the SUSP. DUMP switch is activated.

4-13.1.6 Additional Air-Operated Equipment

Besides providing the compressed air supply for the coach braking and suspension systems, the compressor also provides the air supply for the stepwell cover and entrance door lock, all via separately controlled solenoid switches operated from the dash, or at other locations throughout the coach. (This compressed air source is furnished from the front right side reservoir.) A compressed air outlet fitting and air gun are contained in a rear storage compartment on the road side of the coach, convenient for inflating tires, and so on. A Schrader valve (air connection) is available in the engine compartment to allow the air system to be pressurized from a "shop" source without the necessity of starting the engine. Two possible types of air dryers may be installed on the coach, either the AD-1 or the AD-2. Both are similar with just minor differences.

4-13.2 Compressed Air System Air Dryer

The air dryer unit collects and removes moisture and contaminants from the compressor air output before the air reaches the reservoirs. This unit is different from a reservoir drain or an after cooler in that it provides dry air for the brake system by eliminating the possible accumulation of condensation in the system reservoirs. Note that each reservoir also has a drain cock on the bottom for draining accumulated moisture. This assures a long maintenance-free life for air brake system components due to the removal of system contaminants.
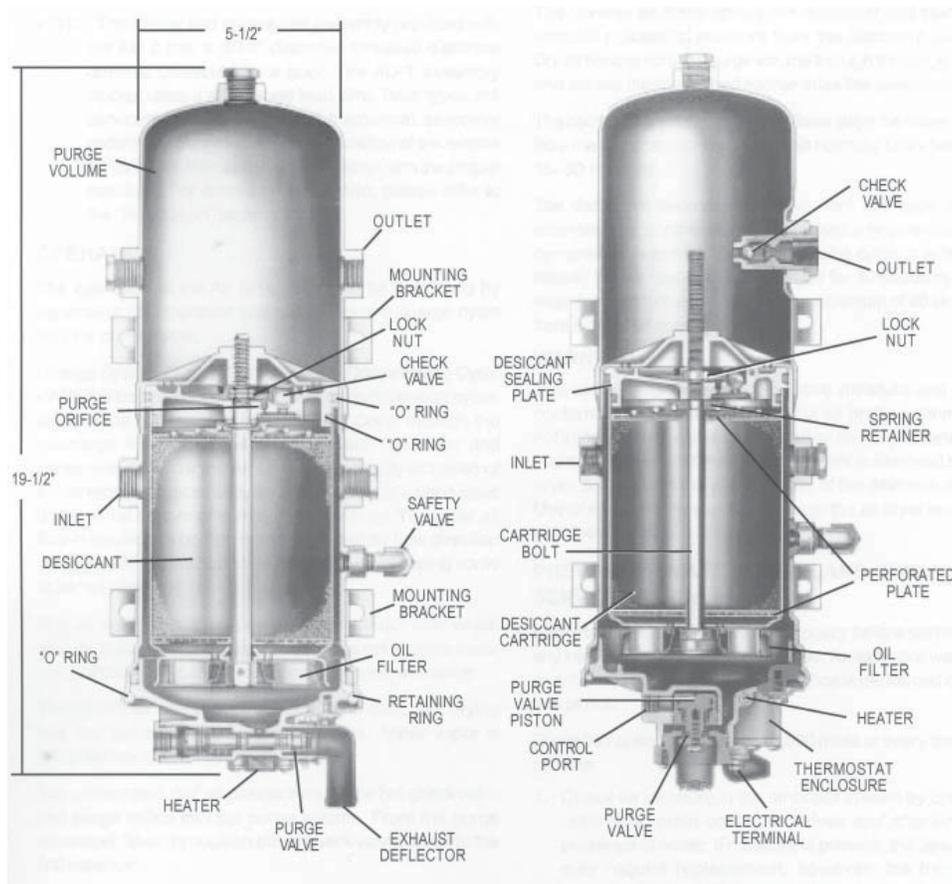
The air dryer is located between the compressor discharge (output) line and the compressed air reservoirs. A safety valve mounted in the air dryer housing assembly protects against excessive pressure buildup. The desiccant cartridge and pleated paper oil filters are easily removed and replaced as a complete serviceable unit. The desiccant "Beads" which provide the drying action have a large capacity for absorption due to their combined surface area. In addition, an internal thermostatically controlled heating element prevents freeze ups on the purge rail valve when the unit is used during sub-freezing temperatures.

The desiccant beads, which are referred to as the "drying bed", are a drying substance that has the unique property of exposing a tremendous surface area in proportion to its bulk. One pound of the desiccant beads has about two million square feet of adsorptive area made up of a large number of submicroscopic cavities in each bead. Each desiccant bead adsorbs or collects moisture.

Purging of the dryer is automatic, exhausting combined oil and water residue to the atmosphere. At the same time that the contaminants are purged, the reverse airflow across the desiccant material removes the accumulated moisture and reactivates the desiccant. Refer to the following paragraphs for a explanation of basic operation of the air dryer including the charge cycle as well as the purge cycle.

4-13.2.1 Operation

The operation of the Air Dryer can best be described by separating the operation into two cycles; the charge cycle and the purge cycle.

Charge Cycle Compressor in Compressing Cycle - With the compressor in its "loaded" or compressing cycle, air from the compressor enters the Air Dryer through the discharge line. When the air , along with the water and contaminants, enter the Air Dryer, the velocity or speed of the air reduces substantially and much of the entrained liquid drops to the bottom or sump of the Air Dryer. The initial air flow is toward the bottom of the dryer, but air flow direction changes 180° at the bottom of the Air Dryer, dropping some water and oil.

The air now passes through the oil separator filter which removes oil and foreign material but does not remove water vapor. At this point, the air remains saturated with water.

The filtered air and vapors penetrate the desiccant drying bed and the adsorption process begins. Water vapor is removed from the air by the desiccant.

The unsaturated "dry" air passes through the ball check valve and purge orifice into the purge volume. From the purge volume air flows through an outlet check valve, and into the first reservoir.
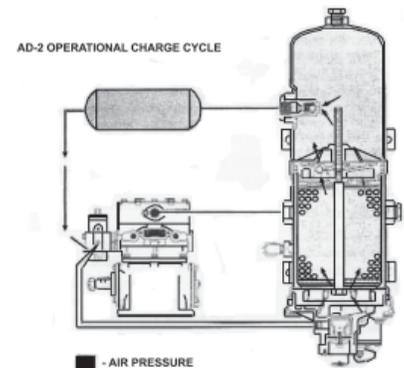
> **NOTE:** The AD-1 Air Dryer does not incorporate an integral outlet check valve. The single check valve in an AD-1 installation would be located in the line between the AD-1 outlet port and the first reservoir.

Purge Cycle - When desired system pressure is reached, the governor cuts out, pressurizing the unloader cavity of the compressor which unloads the compressor (non-compressing cycle). The line connecting the governor unloader port to the end cover purge valve port (bottom of the Air Dryer) is also pressurized, opening the exhaust of the purge valve to atmosphere. With the exhaust of the purge valve open, contaminants in the discharge line and dryer sump are purged, or forced past the open exhaust out into the atmosphere.

The reverse air flows across the desiccant and starts the removal process of moisture from the desiccant surface. Dry air flowing from the purge volume through the purge orifice and across the drying bed further dries the desiccant.

The combination of these reverse flows strips the water vapor from the desiccant (drying bed). This normally takes between 15-30 seconds.

The desiccant becomes activated from this cycle and is now ready for another charge cycle, which occurs when the compressor returns to the compressing cycle. It is for this reason the air dryer must be purged for 30 seconds, after receiving moisture saturated air for a maximum of 90 seconds from a 12 CFM compressor.
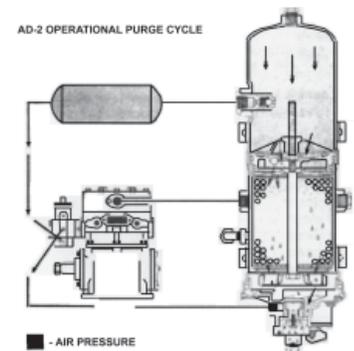
WARNING!!   This air dryer is intended to remove moisture and other contaminants normally found in the air brake system. Do not inject alcohol, anti-freeze, or other de-icing substances into or upstream of the air dryer. Alcohol is removed by the dryer, but reduces the effectiveness of the device to dry air. Use of other substances can damage the air dryer and may void the warranty.

⚗ NOTES:

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4-14 Appliances

Your vehicle is supplied with the following standard appliances. There are several optional appliances that can be purchased in addition or instead of the ones listed here. Please see a Coachwork's representative for clarification on these items.

4-14.1 Sharp Carousel Convection Microwave Oven

4-14.2 Important Safety Instructions

When using electrical appliances basic safety precautions should be followed, including the following:

> **WARNING!!**   **To reduce the risk of burns, electric shock, fire, injury to persons or exposure to excessive microwave energy:**

1. Read all instructions before using the appliance.
2. Read and follow the specific "PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY" immediately following these steps.
3. Some products such as whole eggs and sealed containers - for example, closed glass jars - may explode and should not be heated in this oven.
4. Stir liquids briskly before and after heating to avoid eruption.
5. Use this appliance only for its intended use as described in this manual. Do not use corrosive chemicals or vapors in this appliance. This type of oven is specifically designed to heat, cook or dry food. It is not designed for industrial or laboratory use.
6. As with any appliance, close supervision is necessary when used by children.
7. Do not operate this appliance if it has a damaged cord or plug, if it is not working properly or if it has been damaged or dropped.
8. This appliance should be serviced only by qualified service personnel. Contact nearest Sharp Authorized Service dealer for examination, repair or adjustment.
9. Do not cover or block any openings on the appliance.
10. Do not immerse cord or plug in water.
11. Keep cord away from heated surfaces.
12. Do not let cord hang over edge of table or counter.
13. See door surface cleaning instructions under Cleaning and Care section.
14. To reduce the risk of fire in the oven cavity:
    a. Do not overcook food. Pay close attention especially if paper, plastic or other combustible materials are placed inside the oven to facilitate cooking.
    b. Remove wire twist-ties from paper or plastic bags before placing bag in oven.
    c. If materials inside the oven should ignite, keep oven door closed, turn oven off and disconnect the power cord or shut off power at the fuse or circuit breaker panel before opening door.
    d. Do not use the cavity for storage purposes. Do not leave paper products, cooking utensils or food in the cavity when not in use.
15. Clean ventilation openings and grease filters frequently - Grease should not be allowed to accumulate on ventilation openings, hood (louver) or grease filters.
16. Use care when cleaning the louver and the grease filters. Corrosive cleaning agents, such as lye-based oven cleaners, may damage the louver and the grease filters.
17. When flaming food under the hood, turn the fan on.
18. This appliance is suitable for use above both gas and electric cooking equipment 36" wide or less.

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PRECAUTIONS TO AVOID POSSIBLE EXPOSURE TO EXCESSIVE MICROWAVE ENERGY
a) Do not attempt to operate this oven with the door open since open-door operation can result in harmful exposure to microwave energy. It is important not to defeat or tamper with the safety interlocks.
b) Do not place any object between the oven front face and the door or allow soil or cleaner residue to accumulate on sealing surfaces.
c) Do not operate the oven if it is damaged. It is particularly important that the oven door close properly and that there is no damage to the: (1) door (bent), (2) hinges and latches (broken or loosened), (3) door seals and sealing surfaces.
d) The oven should not be adjusted or repaired by anyone except properly qualified service personnel.

4-14.3 Important Information
4-14.3.1 About Your Oven
This Operator's Manual offers valuable information: read it carefully and always save it for reference.

A good microwave cookbook is a valuable asset. Check it for microwave cooking principles, techniques, hints and recipes. See *The Ultimate Accessory* section for ordering instructions for the Ultimate Accessory, the Sharp Carousel Microwave Cookbook.

NEVER use the oven without the turntable and support nor turn the turntable over so that a large dish could be placed in the oven. The turntable will turn both clockwise and counterclockwise. See *Manual Microwave Operation* for complete instructions.

ALWAYS have food in the oven when it is in use to absorb the microwave energy.

When using the oven at power levels below 100%, you may hear the magnetron cycling on and off.

The fan will automatically start when heat rises from range surface units or burners and when convection, high mix, low mix or the broil settings are used.

Condensation is a normal part of microwave cooking. Room humidity and the moisture in food will influence the amount of moisture that condenses in the oven. Generally, covered foods will not cause as much condensation as uncovered ones. Ventilation openings must not be blocked.

The oven is for food preparation only. It should not be used to dry clothes or newspapers.

The oven is rated 850 watts by using the IEC Test Procedure. When following recipes or package directions, check food a minute or two before the minimum time and add time accordingly.

4-14.3.2 About Food

FOOD	DO	DON'T
Eggs, sausages, fruits & vegetables	• Puncture egg yolks before cooking to prevent "explosion". • Pierce skins of potatoes, apples, squash, hot dogs and sausages so that steam escapes.	• Cook eggs in shells. • Reheat whole eggs. • Dry nuts or seeds in shells.
Popcorn	• Use specially bagged popcorn for the microwave oven. • Listen while popping corn for the popping to slow to 1 or 2 seconds or use special POPCORN pad.	• Pop popcorn in regular brown bags or glass bowls. • Exceed maximum time on popcorn package.
Baby food	• Transfer baby food to small dish and heat carefully, stirring often. Check temperature before serving. • Put nipples on bottles after heating and shake thoroughly. "Wrist" test before feeding.	• Heat disposable bottles. • Heat bottles with nipples on. • Heat baby food in original jars.
General	• Cut baked goods with filling after heating to release steam and avoid burns. • Stir liquids briskly before and after heating to avoid "eruption". • Use deep bowl, when cooking liquids or cereals, to prevent boilovers.	• Heat or cook in closed glass jars or air tight containers • Can in the microwave as harmful bacteria may not be destroyed. • Deep fat fry. • Dry wood, gourds, herbs or wet papers.

4-14.3.3 About Microwave Cooking

- Arrange food carefully. Place thickest areas towards outside of dish.
- Watch cooking time. Cook for the shortest amount of time indicated and add more as needed. Food severely overcooked can smoke or ignite.
- Cover foods while cooking. Check recipe or cookbook for suggestions: paper towels, wax paper, microwave plastic wrap or a lid. Covers prevent spattering and help foods to cook evenly.
- Shield with small flat pieces of aluminum foil any thin areas of meat or poultry to prevent overcooking before dense, thick areas are cooked thoroughly.
- Stir foods from outside to center of dish once or twice during cooking, if possible.
- Turn foods over once during microwaving to speed cooking of such foods as chicken and hamburgers. Large items like roasts must be turned over at least once.
- Rearrange foods such as meatballs halfway through cooking both from top to bottom and from the center of the dish to the outside.
- Add standing time. Remove food from oven and stir, if possible. Cover for standing time which allows the food to finish cooking without overcooking.
- Check for doneness. Look for signs indicating that cooking temperatures have been reached.

    Signs that suggest food is done cooking include:
    - Food steams throughout, not just at edge.
    - Center bottom of dish is very hot to the touch.
    - Poultry thigh joints move easily.
    - Meat and poultry show no pinkness.
    - Fish is opaque and flakes easily with a fork.

4-14.3.4 About Safety

- Check foods to see that they are cooked to the United States Department of Agriculture's recommended temperatures.

TEMP	FOOD
160˚F	. . .for fresh pork, ground meat, boneless white poultry, fish, seafood, egg dishes and frozen prepared food.
165˚F	. . .for leftover, ready-to-reheat refrigerated, and deli and carry-out "fresh" food.
170˚F	. . .white meat of poultry.
180˚F	. . .dark meat of poultry.

To be sure meat is done cooking, insert a meat thermometer in a thick or dense area away from fat or bone. NEVER leave the thermometer in the food during cooking, unless it is approved for microwave oven use.

- Always use potholders to prevent burns when handling utensils that are in contact with hot food. Enough heat from the food can transfer through utensils to cause skin burns.
- Avoid steam burns by directing steam away from the face and hands. Slowly lift the farthest edge of a dish's covering and carefully open popcorn and oven cooking bags away from the face.
- Stay near the oven while it is in use and check cooking progress frequently so that there is no chance of overcooking food.
- Never use the cavity for storing cookbooks or other items.
- Select, store and handle food carefully to preserve its high quality and minimize the spread of food borne bacteria.
- Keep waveguide cover clean. Food residue can cause arcing and/or fires.
- Use care when removing items from the oven so that the utensil, your clothes or accessories do not touch the safety door latches.

4-14.3.5 About Children and the Microwave

Children below the age of 7 should use the microwave oven with a supervising person very near to them. Between ages 7 and 12, the supervising person should be in the same room.

The child must be able to reach the oven comfortably; if not, he/she should stand on a sturdy stool.

At no time should anyone be allowed to lean or swing on the oven door.

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Children should be taught all safety precautions: use potholders, remove coverings carefully, pay special attention to packages that crisp food because they may be extra hot.

Don't assume that because a child has mastered one cooking skill he/she can cook everything.

Children need to learn that the microwave oven is not a toy. See Child Lock Feature later in this manual.

4-14.3.6 About Utensils and Coverings

It is not necessary to buy all new cookware. Many pieces already in your kitchen can be used successfully in your new microwave convection oven. The chart below will help you decide what utensils and coverings should be used in each mode.

UTENSILS AND COVERINGS	MICROWAVE ONLY	CONVECTION BROIL, SLOW COOK	HIGH MIX/ROAST LOW MIX/BAKE
Aluminum Foil	Yes Small flat pieces of aluminum foil placed smoothly on food can be used to shield areas from cooking or defrosting too quickly. Keep foil at least 1 inch from wall of oven.	Yes For shielding	Yes For shielding
Aluminum containers	Yes Can be used if 3/4 filled with food. Keep 1 inch away from walls and do not cover with lid.	Yes Broil - No cover	Yes Can be used if 3/4 filled with food. Keep 1 inch away from walls and do not cover with foil.
Browning dish	Yes Do not exceed recommended preheating time. Follow manufacturer's directions.	No	No
Glass ceramic (Pyroceram®)	Yes Excellent.	Yes Excellent.	Yes Excellent.
Glass, heat-resistant	Yes Excellent.	Yes Excellent.	Yes Excellent.
Glass, non-heat resistant	No	No	No
Lids, glass	Yes	Yes Broil - No cover	Yes
Lids, metal	No	Yes Broil - No cover	No
Metal cookware	No	Yes	Yes Do not use metal coverings.
Metal, misc: dishes with metallic trim, etc. Metal twist-ties	No	No	No
Oven cooking bags	Yes Good for large meals or foods that need tenderizing. DO NOT use metal twist-ties.	Yes Broil - No	Yes Do not use metal coverings.
Paper plates	Yes For reheating.	No	No
Paper towels	Yes to cover for reheating and cooking. Do not use recycled paper towels which may contain metal fillings.	No	No
Paper, ovenable	Yes	Yes for temperatures up to 400°F. Do not use for broiling.	Yes for temperatures up to 400°F.
Microwave-safe plastic containers	Yes Use for reheating and defrosting. Follow manufacturer's directions.	No	No
Plastic, Thermoset®	Yes	Yes Are heat resistant up to 425°F. Do not use for broiling.	Yes
Plastic wrap	Yes Use brands specially marked for microwave use. DO NOT allow plastic wrap to touch food. Vent so steam can escape.	No	No
Pottery, stoneware, porcelain	Yes Check manufacturer's recommendation to ensure item is microwave-safe.	Yes	Yes Must be microwave-safe and ovenable.
Styrofoam	Yes For reheating	No	No
Wax paper	Yes Good covering for cooking and reheating.	No	No
Wicker, wood, straw	Yes May be used for short periods of time. Do not use with high fat or high sugar content foods. Could char.	No	No

DISH CHECK. If you wish to check if a dish is safe for microwaving, place the empty dish in the oven and microwave on HIGH for 30 seconds. If the dish becomes very hot, DO NOT use it for microwaving, or if dish is new, check labels that accompanied dish when purchased.

ACCESSORIES There are many microwave accessories available for purchase. Evaluate carefully before you purchase so that they meet your needs. A microwave-safe thermometer will assist you in determining correct doneness and assure you that foods have been cooked to safe temperatures. Sharp is not responsible for any damage to the oven when accessories are used.

4-14.4 Part Names
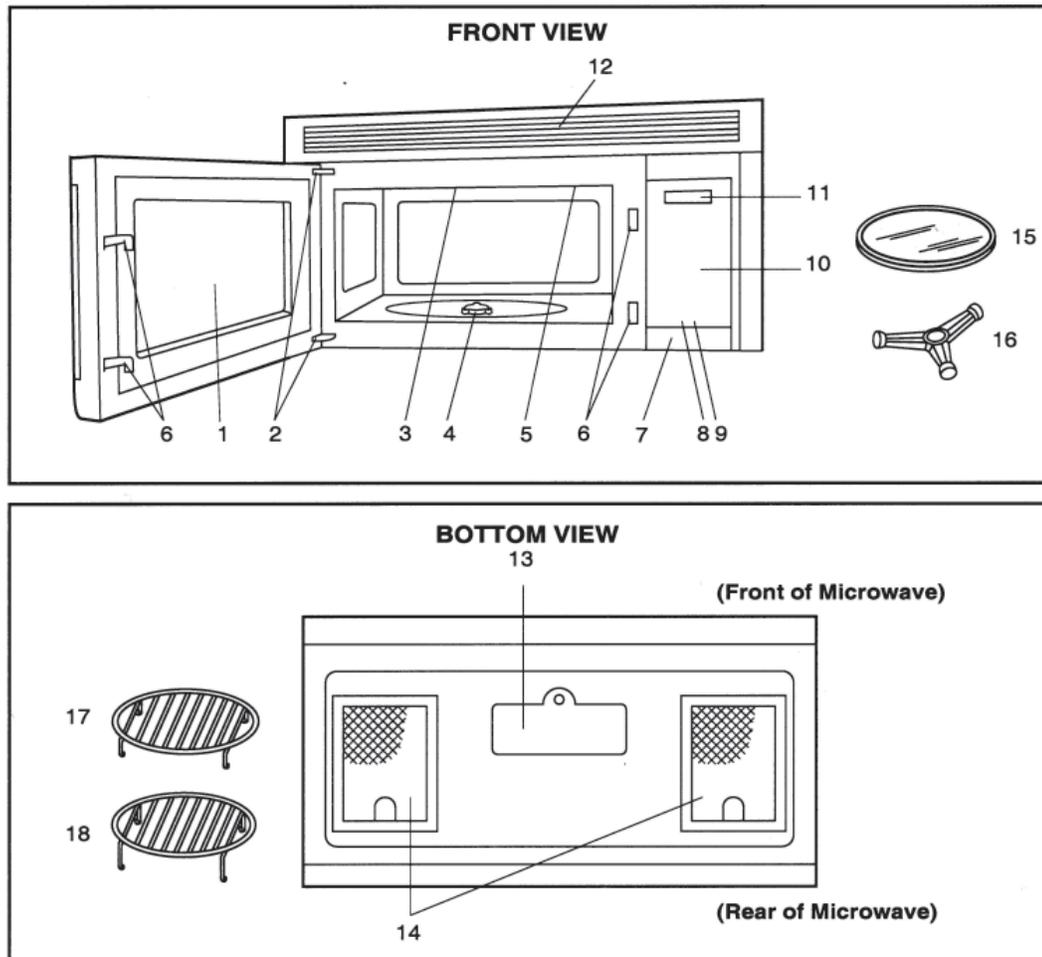
1. Oven door with see-through window.
2. Door hinges.
3. Waveguide cover DO NOT REMOVE.
4. Turntable motor shaft.
5. Oven light. Lights when oven is operating or door is open.
6. Safety door latches. The oven will not operate unless the door is securely closed.
7. One touch DOOR OPEN button. Push to open door.
8. FAN HI/LO button. Push for high/low/off.
9. LIGHT button. Push for on/off.
10. Auto-Touch control panel.
11. Time display: Digital display, 99 minutes 99 seconds.
12. Ventilation openings.
13. Light cover.
14. Grease filters.
15. Removable ceramic turntable. The turntable will rotate clockwise or counterclockwise. Only remove for cleaning.
16. Removable turntable support. Place the turntable support on the floor of the oven cavity and the turntable on the turntable support.
17. Removable low rack for broiling and meat and poultry roasting.
18. Removable high rack for two level baking.

4-14.5 Touch Control Panel

MODEL R-1874

INTERACTIVE DISPLAY
Words will light in the display to indicate
features and cooking instructions.

MIX CONV
DEFROST
SENSOR
TURNTABLE   ON   OFF   COOK   LBS   OZ   KG   HELP

MICROWAVE

15
24
15
13

SENSOR REHEAT   MINUTE PLUS

POPCORN   COMPU DEFROST

1 Baked potatoes
2 Frozen vegetables
3 Fresh veg-soft
4 Fresh veg-hard
5 Frozen entrees
6 Hot dogs
7 Bacon
8 Fish, seafood

SENSOR COOK   14 - 16

CONVECTION

19
19
20
20
19
20

CONVEC   PREHEAT

LOW MIX BAKE   HIGH MIX ROAST

BROIL   SLOW COOK

1 Hamburgers
2 Chicken pieces
3 Steaks
4 Fish steaks

COMPU BROIL   21

1 Chicken
2 Turkey
3 Turkey breast
4 Pork

COMPU ROAST   22

1 Cake
2 Brownies
3 Muffins
4 French fries

COMPU BAKE   23

100°F	150°F	275°F	300°F	325°F
1	2	3	4	5

350°F	375°F	400°F	425°F	450°F
6	7	8	9	0

11

12
24

KITCHEN TIMER   POWER LEVEL   KEEP WARM   CLOCK

CUSTOM HELP   25

FAN HI/LO   LIGHT   TURNTABLE ON/OFF   STOP CLEAR

START TOUCH ON   24

12   12   11   11

Number next to the control panel illustration indicates page on which
there are feature descriptions and usage information.

4-14.6 Before Operating

• Before operating your new microwave oven make sure you read and understand this operation manual completely.
• Before the oven can be used, follow these procedures:
    1. Plug in the oven. Close the door. The oven display will show
       SHARP SIMPLY THE BEST PRESS CLEAR AND PRESS CLOCK.
    2. Touch the STOP/CLEAR pad. : will appear.
    3. Touch CLOCK and follow directions to set.

4-14-6.1 To Set the Clock

Suppose you want to enter the correct time of day 12:30 (a.m. or p.m.) Follow these 3 easy steps:

This is a 12 hour clock. If you attempt to enter an incorrect clock time, ERROR will appear in the display. Touch the STOP/CLEAR pad and re-enter the time.

1. If the electrical power supply to your microwave oven should be interrupted, the display will intermittently show
   SHARP SIMPLY THE BEST PRESS CLEAR AND PRESS CLOCK
   after the power is reinstated. If this occurs during cooking, the program will be erased. The time of day will also be erased. Simply touch STOP/CLEAR pad and reset the clock for the correct time of day.

> **NOTE:** Your oven can be programmed with the door open except for START/TOUCH ON, MINUTE PLUS, SENSOR REHEAT and POPCORN.

4-14.6.2 Stop/Clear

Touch the STOP/CLEAR pad to:

1. Erase if you make a mistake during programming.
2. Cancel kitchen timer.
3. Stop the oven temporarily during cooking.
4. Return the time of day to the display.
5. Cancel a program during cooking, touch twice.

4-14.7 Manual Microwave Operation

4-14.7.1 Turntable On/Off

For most cooking, the turntable should be on; however the turntable can be turned off so that it does not rotate when extra large dishes, such as the popular 13"x9"x2" glass utility casserole, are used. The casserole should be placed on the turntable so that it is level.

Suppose you want to cook lasagna in a 13"x9"x2" casserole for 45 minutes on 40% power. Follow the steps in illustration at right.

> **NOTE:** The door can be opened for checking food and the turntable will stay in the off position. After checking, close door and touch START/TOUCH ON.

The turntable will stay off for one minute after door is opened when time-of-day appears in the display. It is possible to reprogram the oven during that minute without touching the TURNTABLE ON/OFF pad. The display always indicates whether the turntable is off or on.

The TURNTABLE SHOULD ALWAYS BE ON WHEN USING THE SPECIAL FEATURES. On/off function can be used with manual cooking modes and Sensor Reheat. Turntable off condition will automatically change to On condition when you select auto cooking except Sensor Reheat and CompuBake.

When cooking large quantities of food which cannot be stirred, it is best to use a lower power level such as 40 or 50%. You may speed cooking of large amounts by programming 5 to 10 minutes on 100% power (HIGH) followed by the desired time on lower power. See *Multiple Sequence Cooking* section later in manual to program multiple sequences. You may wish to reverse a large casserole once during cooking; simply open door, reposition casserole door and touch START/TOUCH ON.

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4-14.7.2 Hood Light/Hood Fan

Your oven is equipped with a Hood Light and a Hood Fan which can be used whether the door is open or closed.

To turn the Hood Light on, touch the LIGHT pad once.

To turn the Hood Light off, touch the LIGHT pad again.

To turn the Hood Fan on, touch the FAN HI/LO pad once for high speed. To turn the Hood Fan to low speed, touch pad twice and touch the pad three times to turn the fan off.

4-14.7.3 Time Cooking - Microwave

Your oven can be programmed for 99 minutes 99 seconds (99.99). Always enter the seconds after the minutes, even if they are both zeros.

Suppose you want to cook for 5 minutes at 100%, just follow instructions to the right.

4-14.7.4 Keep Warm

KEEP WARM can only be programmed with manual cooking or as a separate program.

Suppose you want to cook a baked potato for 4 minutes at 100% power and you want to keep it warm after cooking for 30 minutes. Follow steps at right.

To use KEEP WARM as a separate program, touch KEEP WARM pad within 1 minute after cooking, closing the door or touching the STOP/CLEAR pad.

4-14-7.5 To Set Power Level

There are eleven preset power levels. (see illustration at right)

Using lower power levels increases the cooking time which is recommended for foods such as cheese, milk and long slow cooking of meals. Consult cookbook or recipes for specific recommendations.

Suppose you want to defrost for 5 minutes at 30% with the turntable on.

TOUCH POWER LEVEL PAD ONCE THEN TOUCH	APPROXIMATE PERCENTAGE OF POWER	COMMON WORDS FOR POWER LEVELS
POWER LEVEL	100%	High
9	90%	
8	80%	
7	70%	Medium High
6	60%	
5	50%	Medium
4	40%	
3	30%	Med Low/Defrost
2	20%	
1	10%	Low
0	0%	

4-14.8 Microwave Features

4-14.8.1 CompuDefrost

CompuDefrost automatically defrosts ground meat, steaks and chicken pieces.

Suppose you want to defrost a 2.0 pound steak. Follow the 6 steps below:

NOTE:

1. The weight can be entered in increments of 0.1 lb. If you attempt to enter more or less than the allowed amount ERROR WEIGHT TOO SMALL or TOO LARGE will appear in the display.

2. CompuDefrost can be programmed with More/Less Time Adjustment. See *More or Less Time Adjustment* section later in manual.

3. To defrost other foods or foods above or below the weights allowed on CompuDefrost Chart, use time and 30% power. See *Manual Defrost* section later in manual.

4-14.8.2 CompuDefrost Chart

TOUCH COMPU DEFROST PAD*	FOOD	FOR AMOUNT	PROCEDURE
once	Ground Meat	0.5-3.0 lb. (0.2 - 1.4 kg)	Remove any thawed pieces after each stage. Let stand, covered, for 5 to 10 minutes.
twice	Steaks (chops, fish)	0.5-4.0 lb. (0.2 - 1.8 kg)	After each stage of defrost cycle, rearrange and if there are warm or thawed portions, shield with small flat pieces of aluminum foil. Remove any meat or fish that is nearly defrosted. Let stand, covered, for 10 to 20 minutes.
3 times	Chicken Pieces	0.5-3.0 lb. (0.2 - 1.4 kg)	After each stage of defrost cycle, if there are warm or thawed portions, rearrange or remove. Let stand, covered, for 10 to 20 minutes.

*Number of touches AFTER initial touch to access COMPUDEFROST.

NOTE: Check foods when oven signals. After final stage, small sections may still be icy. Let stand to continue thawing. Do not defrost until all ice crystals are thawed. Shielding prevents cooking from occurring before the center of the food is defrosted. Use small smooth strips of aluminum foil to cover edges and thinner sections of the food.

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4-14.8.3 Manual Defrost

If the food that you wish to defrost is not listed on the CompuDefrost Chart or is above or below the limits in the "Amount" column on the chart, you need to defrost manually.

You can defrost any frozen food, either raw or previously cooked, by using power level 3. Follow the exact 3-step procedure found under *To Set Power Level* section found previously. Estimate defrosting time and press 3 for 30% when you select the power level.

For either raw or previously cooked frozen food, the rule of thumb is approximately 5 minutes per pound. For example, defrost 5 minutes for 2-3 cups of casserole or 1 pound of frozen spaghetti sauce.

Always stop the oven periodically to remove or separate the portions that are defrosted. If food is not defrosted at the end of the estimated defrosting time, program the oven in 1 minute increments on power level 3 until totally defrosted.

When using plastic containers from the freezer, defrost only long enough to remove from the plastic in order to place food in a microwave safe dish.

4-14.8.4 Sensor Cooking

Sharp's Sensor is a semi-conductor device that detects the vapor (moisture and humidity) emitted from the food as it heats. The Sensor adjusts the cooking times and power level for various foods and quantities. It takes the guesswork out of microwave cooking.

Using Sensor Settings:

1. Room temperature should not exceed 95°F.

2. Be sure the exterior of the cooking container and the interior of the oven are dry. Wipe off any moisture with a dry cloth or paper towel.

3. Sensor cooking can only be entered within 1 minute after cooking, opening and closing the door or touching the STOP/CLEAR pad.

4. During the first part of sensor cooking, SENSOR REHEAT, POPCORN REGULAR SENSOR, BAKED POTATO, FROZEN VEG, SOFT FRESH VEG, HARD FRESH VEG, FROZEN ENTRÉE, HOT DOGS, BACON or FISH will appear on display. Do not open oven door or touch STOP/CLEAR during this part of the cooking cycle. The measurement of vapor will be interrupted. If this occurs, ERROR will appear and sensor cooking will be interrupted. To continue cooking, touch the STOP/CLEAR pad and select cooking time and power. When sensor detects the vapor emitted from the food, remainder of cooking time will appear. Door may be opened when remaining cooking time appears on display. At this time, you may stir or season food, as desired.

5. Check food for doneness after cooking with sensor settings. If additional time is needed, continue to cook with variable power and time.

6. If the sensor does not detect vapor, ERROR will appear and the oven will shut off.

7. At the end of any cycle, open oven door or touch STOP/CLEAR pad. The time of day will reappear on the display.

8. Any sensor setting can be programmed with More or Less Time Adjustment. See *More or Less Time Adjustment* section later in manual.

Selecting Foods:

1. The sensor works with foods at normal storage temperature. For example, foods for reheating would be at refrigerator temperature and potatoes for baking would be room temperature.

2. More or less food than the quantity listed in the charts should be cooked by time and variable power.

Covering Foods:

Some foods work best when covered. Use the cover recommended in the Sensor Cooking chart for these foods.

1. Casserole lid.

2. Plastic wrap: Use plastic wrap recommended for microwave cooking. Cover dish loosely; allow approximately ½ inch to remain uncovered to allow steam to escape. Plastic wrap should not touch food.

3. Paper towel: Use paper towels to absorb excess fat and moisture when cooking bacon and potatoes. Line the turntable when baking potatoes.

4. Wax paper: Cover dish completely; fold excess wrap under dish to secure. If dish is wider than paper, overlap two pieces at least one inch to cover.

4-14.8.5 Instant Sensors

Your oven has Instant Sensor Popcorn and Instant Sensor Reheat. To use any of the Instant Sensors, simply touch the chosen pad. The oven will start automatically. Any sensor setting can be programmed with More/Less Time Adjustment.

4-13.8.6 Instant Sensor Reheat

Turntable On:
You can reheat many foods by touching just one pad. You don't need to calculate reheating time or power level. To reheat food with turntable on, simply touch the SENSOR REHEAT pad.

Turntable Off:
You may reheat a 11"x8"x2" or 13"x9"x2" casserole with the turntable off. First touch TURNTABLE ON/OFF and note indicator. Then touch SENSOR REHEAT. The display will indicate turntable off and oven will start automatically. After cooking, LET STAND COVER will be displayed.

PROCEDURE

SENSOR REHEAT	Touch **SENSOR REHEAT** pad. (Note : Sensor Reheat can be programmed with turntable on or off).

SENSOR REHEAT will be displayed repeatedly. When sensor detects the vapor emitted from the food, remainder of cooking time will appear. After cooking, LET STAND COVER will be displayed.

4-14.8.7 Instant Sensor Popcorn

Suppose you want to pop a 3.5 oz. bag of popcorn.

This sensor setting works well with most brands of microwave popcorn. You may wish to try several and choose your favorite. Pop only one bag at a time. Unfold the bag and place in oven according to directions.

PROCEDURE

POPCORN	Touch **POPCORN** pad once. (Ex: Touch **POPCORN** once for regular size bag.)

SENSOR POPCORN REGULAR will be displayed repeatedly. After cooking, END will be displayed.

TOUCH POPCORN PAD	FOR AMOUNT
once	3.0 and 3.5 oz. bag (regular size)
twice	1.5 and 1.75 oz. bag (snack size)

4-14.8.8 Instant Sensor Chart

FOOD	AMOUNT	PROCEDURE
Leftovers such as rice, potatoes, vegetables casserole	4-32 oz.	Place in dish or casserole slightly larger than amount to be reheated. Flatten, if possible. Cover with lid, plastic wrap or wax paper. Use covers such as plastic wrap or lids with larger quantities of more dense foods such as stews.
Soups	1-4 cups	After reheating, stir well if possible. Foods should be very hot. If not, continue to heat with variable power and time. After stirring, recover and allow to stand 2 to 3 minutes.
Canned entrees and vegetables	4-16 oz.	Use less Time Adjustment by touching POWER LEVEL pad twice for small quantities of canned vegetables.
Dinner Plate 1 plate	3-6 oz. of meat plus vegetables and/or potato/ rice	Use this pad to reheat precooked foods from the refrigerator. Place meaty portions and bulky vegetables to outside of plate. Cut large items like baked potatoes in smaller pieces. Flatten foods such as mashed potatoes and other dense foods. Cover with wax paper or plastic wrap. ONE PLATE ONLY. After cooking, check that food is very hot throughout and that the bottom center of the plate is very hot. If not, continue heating using time and power level. Allow to stand, covered, 2 to 3 minutes.
Popcorn	Only 1 package at a time	Use only popcorn packaged for microwave oven use. Try several brands to decide which you like best. Do not try to pop unpopped kernels. More/Less Time Adjustment can be used to provide adjustment needed for older popcorn or individual tastes. Stop cooking when there is 1 to 2 seconds between pops..

4-14.8.10 Sensor Cook

Suppose you want to cook a baked potato. Just follow the directions at the right.

Open oven door or touch STOP/CLEAR pad. The time of day will appear in the display.

PROCEDURE	DISPLAY
1 SENSOR COOK — Touch **SENSOR COOK** pad.	SELECT FOOD / NUMBER
2 1 — Select desired sensor setting. Touch 1 to cook baked potatoes.	BAKED POTATO / PRESS START
3 Touch **START/TOUCH ON** pad. When sensor detects the vapor emitted from the food, the remainder of cooking time will appear.	LET STAND / COVER

Open oven door or touch **STOP/CLEAR** pad. The time of day will appear in the display.

FOOD	AMOUNT	PROCEDURE
1. Baked potatoes	1-6 medium	Pierce. Place on paper-towel-lined turntable. After cooking, remove from oven, wrap in aluminum foil and let stand 5 to 10 minutes.
2. Frozen vegetables	1-6 cups	Cover with lid or plastic wrap. After cooking, stir and let stand 3 minutes, covered.

3. Fresh vegetables - soft
    Broccoli
    Brussels sprouts
    Cabbage
    Cauliflower (flowerets)
    Cauliflower (whole)
    Spinach
    Zucchini
    Baked apples
	
	0.25-2.0 lb.
	0.25-2.0 lb.
	0.25-2.0 lb.
	0.25-2.0 lb.
	1 medium
	0.25-2.0 lb.
	0.25-2.0 lb.
	2-4 medium
		Wash and place in casserole. Add no water if vegetables have just been washed. Cover with lid for tender vegetables. Use plastic wrap for tender-crisp vegetables. Stir before standing, if possible. After cooking, let stand, covered, 2 to 5 minutes.

4. Fresh vegetables - firm
    Carrots, sliced
    Corn on the cob
    Green beans
    Winter squash: diced
             halves
	
	0.25-1-5 lb.
	2-4 pcs.
	0.25-1.5 lb.
	0.25-1.5 lb.
	1-2
		Place in casserole. Add 1-4 tbsp. water. Cover with lid for tender vegetables. Use plastic wrap cover for tender-crisp vegetables. Stir before standing, if possible. After cooking, let stand, covered, 2 to 5 minutes.

5. Frozen entrees	6-17 oz.	Use for frozen convenience food. It will give satisfactory results for most brands. You may wish to try several and choose your favorite. Remove package from outer wrapping and follow package directions for covering. After cooking, let stand, covered, for 1 to 3 minutes.
6. Hot dogs	1-4 servings	Place hot dog in bun and wrap in paper towel or paper napkin.
7. Bacon	2-6 slices	Place bacon on paper plate, lined with paper towel. Bacon should not extend over the rim of plate. Cover with paper towel
8. Fish, seafood	0.25-2.0 lb.	Arrange in ring around shallow glass dish (roll fillet with edges underneath). Cover with vented plastic wrap. After cooking, let stand, covered, 3 minutes.

4-15.9 Manual Convection/Automatic Mix Operation

This section of the Operation manual gives you specific cooking instructions and procedures. Please consult your Sharp Carousel Convection Microwave Cookbook for helpful hints for convection and combination cooking.

The oven should not be used without the turntable in place, and it should never be restricted so that it cannot rotate. You may remove the turntable when preheating the oven and when preparing food to be cooked directly on the turntable.

4-15.9.1 Convection Cooking

During convection heating, hot air is circulated throughout the oven cavity to brown and crisp foods quickly and evenly. This oven can be programmed for ten different convection cooking temperatures for up to 99 minutes, 99 seconds.

4-15.9.2 To Cook with Convection

Suppose you want to cook at 350°F for 20 minutes. Follow directions in illustration below.

4-15.9.3 To Preheat and Cook with Convection

Your oven can be programmed to combine preheating and convection cooking operations. You can preheat at the same temperature as the convection temperature or change it to a higher or lower temperature.

Suppose you want to preheat until 350°F and then cook 25 minutes at 375°F convection. Follow these simple instructions at right.

> ✎ **NOTE:** To preheat and cook with the same temperature, enter same temperature in steps 2 and 3.

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4-14.9.4 To Broil

In the BROIL setting, preheating is automatic. Just enter the actual broiling time and wait for preheat to be over before adding food. (Preset 450°F). Oven temperature cannot be changed.

Suppose you want to broil a ham steak for 15 minutes. Refer to illustration at right for directions.

4-14.9.5 To Slow Cook

Slow Cook is a preset at 300°F. Slow Cook is programmed for 4 hours. Oven temperature can be changed to temperature below 300°F. Simply touch the SLOW COOK pad and touch the desired numbered pad with temperature below 300°F.

4-14.9.6 Automatic Mix Cooking

This oven has two pre-programmed settings that make it easy to cook with both convection heat and microwave automatically.

	OVEN TEMPERATURE	MICROWAVE POWER
HIGH MIX	325°F	30%
LOW MIX	325°F	10%

With the exception of those foods that cook best by convection heating alone, most foods are well suited to mix cooking using either LOW MIX/BAKE or HIGH MIX/ROAST.

The marriage of these two cooking methods produces juicy meats, moist and tender cakes and fine textured breads, all with just the right amount of browning and crispness.

The temperature can be changed; however, the microwave power cannot.

The oven temperature can be changed from 100°F to 450°F. To change the temperature, first touch HIGH MIX or LOW MIX, then touch the same pad again. When the display says SELECT TEMP, touch desired temperature pad. Ex. HIGH MIX, HIGH MIX, pad 7 and START/TOUCH ON. The mix temperature will change automatically.

4-14.9.7 To Cook with Automatic Mix

Suppose you want to bake a cake at low mix for 20 minutes. See illustration at right.

4-14-9.8 To Preheat and Cook with Automatic Mix

Your oven can be programmed to combine preheating and Automatic Mix cooking operations. You can preheat at the same temperature as the present combination temperature or change it to a different temperature.

Suppose you want to preheat until 350°F and then cook 25 minutes on 325°F Low Mix bake. Follow the 5 steps at the right.

4-14.10 Convection Automatic Mix Features

This section of the operation manual offers instructions for preparing 12 popular foods using CompuBroil, CompuRoast and CompuBake.
After selecting the desired feature, follow the directions indicated in the display.

For helpful hints, simply touch CUSTOM HELP anytime HELP is lighted in the display.

4-14.10.1 CompuBroil

CompuBroil automatically broils hamburgers, chicken pieces, steaks and fish steaks.

Suppose you want to broil 2 hamburgers. Follow steps 1-5 on the right for directions.

✎ NOTE:

1. CompuBroil can be programmed with More/Less Time Adjustment.

2. If you attempt to enter more or less than the allowed weight ERROR WEIGHT TOO LARGE PRESS CLEAR or ERROR WEIGHT TOO SMALL PRESS CLEAR will appear in the display. If you enter more or less than the allowed number ERROR O QTY PRESS CLEAR or ERROR TOO MANY PRESS CLEAR will appear in the display.

3. To broil other foods or foods above or below the weight or number allowed on the chart below, follow instructions in the Sharp Carousel Convection Microwave Cookbook. See *Broiling Chart* to follow.

To preheat and cook with the same temperature, enter same temperature in steps 2 and 3.

PROCEDURE   DISPLAY

1 PREHEAT — Touch **PREHEAT** pad. — SELECT PREHEAT TEMP

2 Touch number pad for desired temperature (Ex: Pad 6 for 350°F.) — 350F PRESS / START OR / PRESS CONVEC

3 LOW MIX BAKE — Touch **LOW MIX/BAKE** pad. — 325F ENTER / COOKING TIME

4 2 5 0 0 — Touch number pads to select time. — 25.00 / PRESS START

5 START TOUCH ON — Touch **START/TOUCH ON** pad. — PREHEAT
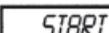
At the end of the baking time, 1 long tone will sound and END will be displayed.

PROCEDURE   DISPLAY

1 COMPU BROIL — Touch **COMPU BROIL** pad. — SELECT FOOD / NUMBER

2 1 — Touch number pad. (Ex: for hamburgers, touch 1.) — HAM- BURGERS / USE LOW / RACK / HOW MANY / PRESS NUMBER

3 2 — Touch number pad to enter quantity. (Ex: 2.) Follow information in display for cooking information. — 2 / NO FOOD IN OVEN / FOR MEDIUM / PRESS START

For well done or rare burgers, touch **POWER LEVEL** pad to select More for well done or Less for rare. See More/ Less Time Adjustment on page 24.

4 START TOUCH ON — Touch **START/TOUCH ON** pad. — CON PREHEAT TURNTABLE ON COOK HELP

After broil preheat cycle ends, 4 long tones will sound. PREHEAT OVER PLACE FOOD IN OVEN will be displayed repeatedly. Open the door and place hamburgers into oven. Close the door.

5 START TOUCH ON — Touch **START/TOUCH ON** pad.

After broil cycle ends, 1 long tone will sound and END will be displayed.

4-14.10.2 CompuBroil Chart

SETTING/FOOD	AMOUNT	PROCEDURE
1. Hamburgers	1-8 pieces 1/4 lb each	Use this setting to broil hamburger patties. Place on low rack.
2. Chicken pieces	0.5-2.0 lb	Arrange pieces on low rack. After cooking, let stand, 3-5 minutes. Dark meat should be 180°F, and white meat should be 170°F.
3. Steaks	0.5-2.0 lb.	Use this setting to broil steaks from 3/4" to 1" thick. Individual boneless steaks broil evenly. Place steak on low rack. For well done, touch POWER LEVEL once; for rare, touch POWER LEVEL twice.
4. Fish steaks	0.5-2.0 lb.	Use this setting to broil fish steak which is 3/4" to 1" thick. Place on low rack.

4-14.10.3 CompuRoast

CompuRoast automatically roasts chicken, turkey, turkey breast or pork.

Suppose you want to roast a 2.5 pound chicken. Follow instructions on right.

> ✎ **NOTE:**
> 1. CompuRoast can be programmed with More/Less Time Adjustment.
> 2. If you attempt to enter more or less than the allowed weight. ERROR WEIGHT TOO LARGE PRESS CLEAR or ERROR WEIGHT TOO SMALL PRESS CLEAR will appear in the display.
> 3. To roast other food or foods above or below the weights allowed on the chart below, check the Sharp Carousel Convection Microwave Cookbook's Combination Roasting Chart.

4-14.10.4 CompuRoast Chart

SETTING FOOD	AMOUNT	RACK	PROCEDURE
1. Chicken	2-5 - 7.0 lb. (1.2 - 3.1 kg)	Low	After the cycle ends, cover with foil and let stand for 5-10 minutes. Internal temperature of white meat should be 170°F and of dark meat, 180°F.
2. Turkey (Unstuffed)	6.5 - 9.0 lb. (3.0 - 4.0 kg)	Low	Season, as desired. Place on low rack. After the cycle ends, cover with foil and let stand 10 minutes. Internal temperature of white meat should be 170°F and of dark meat, 180°F.
3. Turkey breast	3.0 - 6.0 lb. (1.4 - 2.7 kg)	Low	Season, as desired. Place on low rack. After the cycle ends, cover foil and let stand 10 minutes. Internal temperature of white meat should be 170°F.
4. Pork	2.0 - 3.5 lb. (0.9 - 1.5 kg)	Low	Boneless pork loin is recommended because it cooks evenly. Place on low rack. After cooking, remove from oven, cover with foil and allow to stand 5-10 minutes. Internal temperature should be 160°F.

4-14.10.5 Compu Bake

CompuBake automatically bakes cakes, brownies, muffins and French fries.

Follow steps 1 through 4 to bake a 13"x9"x2" cake.

> **NOTE:**
> 1. CompuBake can be programmed with More/Less Time Adjustment.
> 2. To bake other food, see the Sharp Carousel Convection Microwave Cookbook's Baking Section.

4-14.10.6 CompuBake Chart

SETTING FOOD	PAN SIZE/ QTY	RACK	PROCEDURE
1. Cake	13"x9"x2"	Low	Ideal for packaged cake mix or your own recipe for 13"x9"x2" pan. Prepare according to package or recipe directions and place in a greased and floured 13"x9"x2" baking pan. After the preheat is over, place pan in oven centered on low rack. Cool before frosting and serving.
2. Brownies	13"x9"x2"	Low	Ideal for packaged brownie mix or your own recipe for 13"x9"x2" pan. Prepare according to package or recipe directions and place in a greased and floured 13"x9"x2" baking pan. After the preheat is over, place pan in oven centered on low rack. Cool before cutting into serving pieces.
3. Muffins	12 cup Muffin pan	Low	Ideal for packaged muffin mix or your own recipe for 12 medium size muffins. Prepare according to package or recipe directions and place in one 12-cup muffin pan. After the preheat is over, place pan in oven centered on low rack.
4. French Fries	3 to 24 oz. Cookie sheet to hold	Low	Use frozen prepared French Fries. No preheat is required for the French Fries baking procedure. Place French Fries on cookie sheet on low rack. For shoestring potatoes, touch POWER LEVEL pad twice to enter less time before touching START/TOUCH ON pad.

4-14.11 Other Convenient Features

4-14.11.1 Multiple Sequence Cooking

The oven can be programmed for up to 4 automatic cooking sequences for the microwave mode and 3 automatic cooking sequences for convection mode, switching from one setting to another automatically.

PROCEDURE

1 POWER LEVEL — Touch **POWER LEVEL** pad once.

2 9 — Touch POWER LEVEL number. (Ex: 90%)

3 5 0 0 — Enter cooking time. (Ex: 5 minutes.)

4 POWER LEVEL — Touch **POWER LEVEL** pad again.

5 5 — Touch POWER LEVEL number. (Ex: 50%)

6 3 0 0 0 — Enter cooking time. (Ex: 30 minutes.)

7 START TOUCH ON — Touch **START/TOUCH ON** pad.

Sometimes cooking directions tell you to start on one power level and then change to a different power level. Your oven can do this automatically.

Suppose you want to cook roast beef for 5 minutes at 90% and then continue to cook for 30 minutes at 50%. Follow the directions in illustration at left.

📌 NOTE:

1. If POWER LEVEL pad is touched twice, HIGH will be displayed.

2. If 100% is selected as the final sequence, it is not necessary to touch the POWER LEVEL pad.

3. If you wish to know power level, simply touch the POWER LEVEL pad. As long as your finger is touching the POWER LEVEL pad, the power level will be displayed.

4-14.11.2 More or Less Time Adjustment

More: Should you discover that you like any of the COMPUDEFROST, COMPUROAST, COMPUBAKE, COMPUBROIL, SENSOR COOK or INSTANT SENSOR settings more done, touch the POWER LEVEL pad once after touching your choice of pads.

Less: Should you discover that you like any of the COMPUDEFROST, COMPUROAST, COMPUBAKE, COMPUBROIL, SENSOR COOK or INSTANT SENSOR settings slightly less done, touch the POWER LEVEL pad twice after touching your choice of pads.

4-14.11.3 Kitchen Timer

Suppose you want to time a 3 minute long distance phone call. Follow the steps in the illustration at right.

4-14.11.4 Minute Plus

Minute Plus allows you to cook for a minute at 100% by simply touching the MINUTE PLUS pad. You can also extend cooking time in multiples of 1 minute by repeatedly touching the MINUTE PLUS pad during manual cooking using microwave, convection, mix or broil.

Suppose you want to heat a cup of soup for one minute Simply press the MINUTE PLUS pad once.

PROCEDURE

1 KITCHEN TIMER — Touch **KITCHEN TIMER** pad.

2 3 0 0 — Enter time.

3 START TOUCH ON — Touch **START/TOUCH ON** pad.

PROCEDURE

MINUTE PLUS — Touch **MINUTE PLUS** pad.

📌 NOTE:

1. Touch MINUTE PLUS pad within 1 minute after cooking, closing the door, touching the STOP/CLEAR pad or during cooking. Minute Plus cannot be used to start the oven if any program is on display.

2. Minute Plus cannot be used with Special Features.

4-14.11.5 Demonstration Mode

To demonstrate, touch CLOCK, 0 and START/TOUCH ON and hold for three seconds. DEMO ON DURING DEMO NO OVEN POWER SHARP SIMPLY THE BEST and DEMO will appear in the display. Cooking operations and special features can now be demonstrated with no power in the oven. For example, touch MINUTE PLUS, and the display will show 1.00 and count down quickly to 0 and the END.

To cancel, touch CLOCK, the number 0 and STOP/CLEAR.

4-14.11.6 Help

Each setting of CompuDefrost, CompuBroil, CompuRoast, CompuBake and Sensor Cook has a cooking hint. If you wish to check, touch CUSTOM HELP whenever HELP is lighted in the Interactive Display.

4-14.11.7 Custom Help

Custom Help provides 5 features which make using your oven easy because specific instructions are provided in the Interactive Display.

1. Child Lock

The Child Lock prevents unwanted oven operation such as by small children. Note: Child Lock is not applicable to Hood Fan and Hood Light buttons.

The oven can be set so that the control panel is deactivated or locked. To set, touch CUSTOM HELP, the number 1 and START/TOUCH ON pad. Should a pad be touched, LOCK will appear in the display.

To cancel, touch CUSTOM HELP, the number 1 and STOP/CLEAR.

2. Audible Signal Elimination

If you wish to have the oven operate with no audible signal, touch CUSTOM HELP, the number 2 and STOP/CLEAR.

To cancel and restore the audible signal, touch CUSTOM HELP, the number 2 and START/TOUCH ON.

3. Auto Start

If you wish to program your oven to begin cooking automatically at a designated time of day, follow this procedure below: Suppose you want to start cooking a stew for 20 minutes on 50% at 4:30. Before setting, check to make sure the clock is set correctly.

NOTE:

1. Auto Start can be used for manual cooking, CompuBroil/Roast/Bake, if clock is set.

2. If the oven door is opened after programming Auto Start, it is necessary to touch the START/TOUCH ON pad for the time of day to appear in the readout so that the oven will automatically begin programmed cooking at the chosen Auto Start time.

3. Be sure to choose foods that can be left in the oven safely until the Auto Start time. Baked potatoes are often a good choice.

PROCEDURE

1	CUSTOM HELP	Touch **CUSTOM HELP** pad.
2	3	Touch the number.
3	4 3 0	Enter the start time.
4	CLOCK	Touch **CLOCK** pad.
5	2 0 0 0	Enter cooking program.
6	START TOUCH ON	Touch **START/TOUCH ON** pad.

4. Language Selection

The oven comes set for the English language. To change, touch CUSTOM HELP and the number 4. Continue to touch the number 4 until your choice is selected from the table below. Then touch START/TOUCH ON pad.

NUMBER 4	LANGUAGE	DISPLAY
Once	English	ENGLISH
Twice	Spanish	ESPAÑOL
3 times	French	FR

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5. Weight/Temp Selection

The oven comes set for U.S. Customary Unit-pounds. To change, touch CUSTOM HELP and the number 5. Continue to touch the number 5 until your choice is selected from the list as shown on right. Then, touch START/TOUCH ON pad.

NUMBER 5	STANDARD OF WEIGHT AND TEMPERATURE	DISPLAY
Once	Pound/Fahrenheit	LB F
Twice	Kilogram/Celsius	KG C

PROCEDURE

1 START TOUCH ON — Continuously touch **START/TOUCH ON** pad. The cooking time will begin counting up.

2 When the cheese is melted to desired degree, remove finger from **START/TOUCH ON** pad. Oven stops immediately.

4-14.11.8 Touch On

Touch On allows you to cook at 100% power by touching the START/TOUCH ON continuously. Touch On is ideal for melting cheese, bringing milk to just below boiling, etc. The maximum cooking time is 3 minutes.

Suppose you want to melt cheese on a piece of toast. Follow the simple steps on left.

NOTE:

1. Note time it takes for frequently used foods and program that time in the future.

2. Touch the TOUCH ON pad within 1 minute after cooking, opening and closing the door or touching the STOP/CLEAR pad.

3. TOUCH ON can only be used 3 times in a row. If more times are needed, open and close door or touch STOP/CLEAR.

4-14.12 Cleaning and Care

4-14.12.1 Exterior

The outside surface is pre-coated metal and plastic. Clean the outside with mild soap and water; rinse and dry with a soft cloth. Do not use any type of household or abrasive cleanser.

4-14.12.2 Door

Wipe the window on both sides with a damp cloth to remove any spills or spatters. Metal parts will be easier to maintain if wiped frequently with a damp cloth. Avoid the use of harsh abrasives.

4-14.12.3 Touch Control Panel

Care should be taken in cleaning the touch control panel. If the control panel becomes soiled, open the oven door to inactivate the control panel before cleaning. Wipe the panel with a cloth dampened slightly with water only. Dry with a soft cloth. Do not scrub or use any sort of chemical cleaners. Avoid the use of excess water. Close door and touch STOP/CLEAR.

4-14.12.4 Interior - After Microwave Cooking

The oven walls, ceiling and floor are stainless steel. Cleaning after microwave cooking is easy because no heat is generated to the interior surface; therefore, there is no baking and setting of spills or spattering. To clean the interior surface, wipe with a soft cloth and warm water. DO NOT USE ABRASIVE OR HARSH CLEANERS OR SCOURING PADS. For heavier soil, use mild soap; rinse thoroughly with hot water.

4-14.12.5 Interior - After Convection, Mix or Broil Cooking

Spatters may occur because of moisture and grease. Wash immediately after use with hot, soapy water. Rinse and polish dry. Harder to remove spatters may occur if oven is not thoroughly cleaned or if there is long time/high temperature cooking. If so, you may wish to purchase an oven cleaner pad with liquid cleaner within it-not a soap filled steel pad-for use on stainless or porcelain surfaces. Follow manufacturer's directions carefully and be especially cautious not to get any of the liquid cleaner in the perforations on the wall or ceiling or any door surfaces. Rinse thoroughly and polish dry.

4-14.12.6 Waveguide Cover

The waveguide cover is located on the ceiling in the oven cavity. It is made from mica so requires special care. Keep the waveguide cover clean to assure good oven performance. Carefully wipe with a damp cloth any food spatters from the surface of the cover immediately after they occur. Built-up splashes may overheat and cause smoke or possibly catch fire. DO NOT REMOVE THE WAVEGUIDE COVER.

4-14.12.7 Odor Removal

Occasionally, a cooking odor may remain in the oven. To remove, combine 1 cup water, grated peel and juice of 1 lemon and several whole cloves in a 2-cup glass measuring cup. Boil for several minutes using 100% power. Allow to set in oven until cool. Wipe interior with a soft cloth.

4-14.12.8 Turntable/Turntable Support

The ceramic turntable and turntable support can be removed for easy cleaning. Wash them in mild, sudsy water; for stubborn stains use a mild cleanser and scouring sponge as described above. They are also dishwasher-safe using top rack.

4-14.12.8 Oven Racks

The high and low baking racks can be removed for easy cleaning and stored away from the microwave oven when racks are not needed. After each use, wash them in mild, sudsy water. For any stubborn stains, use a mild kitchen cleanser and scouring sponge as described above. They are dishwasher-safe.

4-14.12.9 Grease Filters

Filters should be cleaned at least once a month. Never operate the fan or oven without the filters in place.

1. Pull the tab toward the front of the oven, down slightly and remove the filter. Repeat for the other filter.

2. Soak the filters in a sink or dish pan filled with hot water and detergent. DO NOT use ammonia or other alkali; they will react with the filter material and darken it.

3. Agitate and scrub with a brush to remove embedded dirt.

4. Rinse thoroughly and shake dry.

5. Replace by fitting the filter back into the opening.
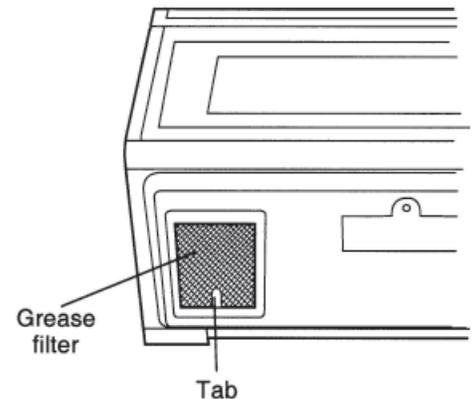
4-14.12.10 Fan

The fan will automatically start when heat rises from range surface units or burners and when convection, high mix, low mix or the broil settings are used. This protects the microwave oven from excessive temperature rise. The fan will stay on until the temperature decreases. It cannot be turned off manually during this time.

For other uses, select either high or low speed.

PRECAUTIONS FOR PROPER USE:

1. DO NOT leave range unattended while using high temperatures. Automatic fan may start and provide excessive air to the surface units. This may cause spattering or boil over.

2. Avoid burning food.

3. Keep grease filters clean.

4-14.12.11 Light

1. To replace light bulbs, first disconnect power to the oven at the circuit breaker panel or by unplugging.

2. To release cover remove the screw on the light cover. (see illustration)

3. Replace bulbs only with equivalent watt bulbs available from a Sharp Authorized Service or parts distributor. Bulbs are also available at most hardware stores or lighting centers. DO NOT USE A BULB LARGER THAN 30 WATTS.

4. Close light cover and secure with screw removed in step 2.

CAUTION!! Light cover may become very hot. Do not touch glass when light is on. Do not use light for long time use such as a night light.
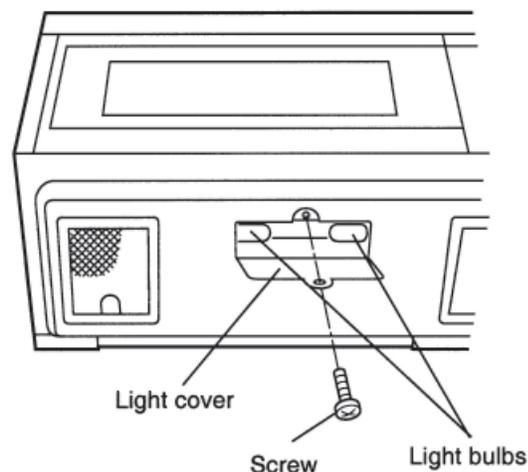
4-14.12.12 Charcoal Filter

Charcoal Filter, Sharp Part Number RK-220 is used for No-vented, re-circulated installation. The filter should be changed every 6 to 12 months depending on use.

1. Disconnect power to the oven at the circuit breaker panel or by unplugging.

2. Remove 3 screws that secure louver.

3. Remove louver by inserting flat edge of screwdriver over each tab depressing the tab down and moving louver away from unit.

4. Pull the louver away from the oven.

5. Slide Charcoal Filter into position on support tabs.

6. Push louver back into place and gently snap tabs into place by hand (engaging both the bottom and top tabs) and replace the 3 screws to secure louver.

4-14.12.13 Oven Light

Remove the louver per instructions 1-4 above and charcoal filter, if used.

1. Slide the light cover forward and lift up.

2. Remove old light bulb and replace only with an equivalent watt bulb available from a Sharp Authorized Servicer or parts distributor. Bulbs are also available at most hardware stores or lighting centers. DO NOT USE A BULB LARGER THAN 30 WATTS.

3. Replace the oven light cover and charcoal filter, if used; push louver back in place (engaging both the bottom and top tabs) and replace the louver mounting screws.

4-14.13 Auto-Touch Guide

SET CLOCK

If SHARP SIMPLY THE BEST PRESS CLEAR AND PRESS CLOCK is in the display, first touch **STOP/CLEAR**.

1. Touch **CLOCK** pad.
2. Enter correct time of day by touching numbers in sequence. (Ex: 12:30)
3. Touch **CLOCK** pad again.

CLOCK
1 2 3 0
CLOCK

INSTANT SENSOR POPCORN

Touch **POPCORN** pad. Touch once for regular size and twice for snack size. See page 15.

POPCORN

INSTANT SENSOR REHEAT

Touch **SENSOR REHEAT** once. The oven will start automatically. SENSOR REHEAT can be programmed with turntable on or off. See Instant Sensor Chart on page 15.

SENSOR REHEAT

SENSOR COOK

1. Touch **SENSOR COOK** pad.
2. Select desired SENSOR COOK setting. (Ex: [1])
3. Touch **START/TOUCH ON** pad.

See Sensor Cook Chart, page 16.

SENSOR COOK
1
START TOUCH ON

TO PREHEAT AND COOK WITH CONVECTION

1. Touch **PREHEAT** pad.
2. Touch number pad for desired temperature. (Ex: touch pad [6] for 350° F.)
3. Touch **CONVEC** pad.
4. Touch number pad for desired temperature. (Ex: [5] for 325°F.)
5. Enter cooking time by touching number pads. (Ex: [2][0][0][0] .)
6. Touch **START/TOUCH ON** pad.

SELECT PREHEAT
TEMP
350F PRESS
START OR
PRESS CONVEC
SELECT TEMP
325F
ENTER COOKING
TIME
20.00 PRESS
START
PREHEAT

When the oven reaches the programmed temp., it will automatically hold at the preheat temperature for 30 minutes and then the display will change to the time of day. Whenever **STOP/CLEAR** is touched during this 30 minute period, PRESS CONVEC or PRESS MIX will be displayed and cooking mode and time can be entered.

For more information on convection cooking, see pages 19 and 20.

MANUAL OPERATION

High Power Cooking

1. Enter cooking time by touching numbers pads. (Ex: 1 min. 30 sec.)
2. Touch **START/TOUCH ON** pad.

1 3 0
START TOUCH ON

Variable Power Cooking

2. After Step 1 above, touch **POWER LEVEL** pad.
3. Select power level (Ex: 5 for 50%) and touch **START/TOUCH ON** pad.

POWER LEVEL 5
START TOUCH ON

MINUTE PLUS

Touch **MINUTE PLUS** for one munute at 100% power or to add additional minutes.

MINUTE PLUS

TOUCH ON

Continuously touch **START/TOUCH ON** for 100% power cooking. Remove finger and oven will stop instantly.

START TOUCH ON

COMPU DEFROST

1. Touch **COMPU DEFROST** pad (Ex: three times for a steak).
2. Enter weight by touching number pad. (Ex: [2] and [0].)
3. Touch **START/TOUCH ON** pad.

During defrosting, oven will stop. Check food. See CompuDefrost Chart on page 13.

COMPU DEFROST
2 0
START TOUCH ON

COMPU ROAST

or CompuBake or CompuBroil

1. Touch desired **COMPU** pad.
2. Select desired Compu setting. (Ex: Touch [1] for chicken.)
3. Touch number pad for weight or quantity.
4. Touch **START/TOUCH ON** pad.

See CompuRoast, Bake and Broil Charts on pages 21, 22 and 23.

COMPU ROAST
1
2 5
START TOUCH ON

TO COOK WITH AUTOMATIC MIX

Touch **LOW MIX/BAKE** pad, enter desired cooking time and touch **START/TOUCH ON** pad. Follow information on the display.

325F ENTER
COOKING TIME
PRESS START

Your oven can be programmed to combine preheating and automatic mix cooking operations. See page 19 for information.

SHARP
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Sharp Plaza, Mahwah, NJ 07430-2135
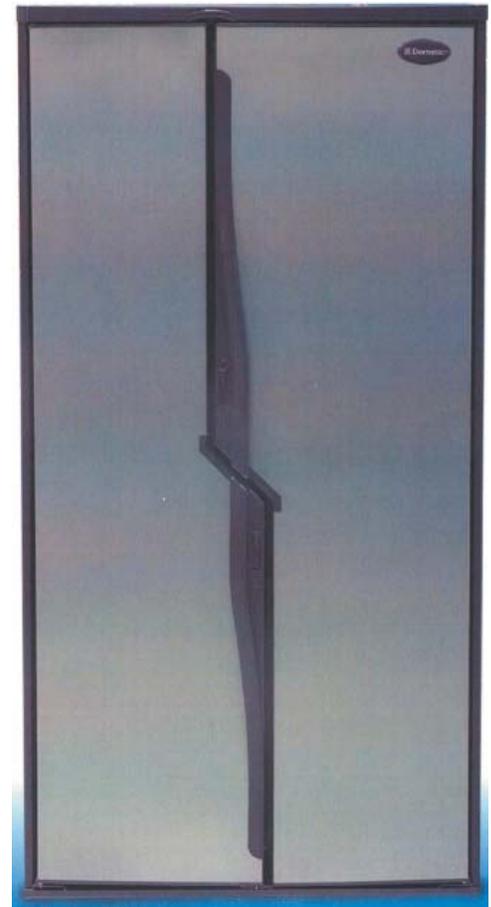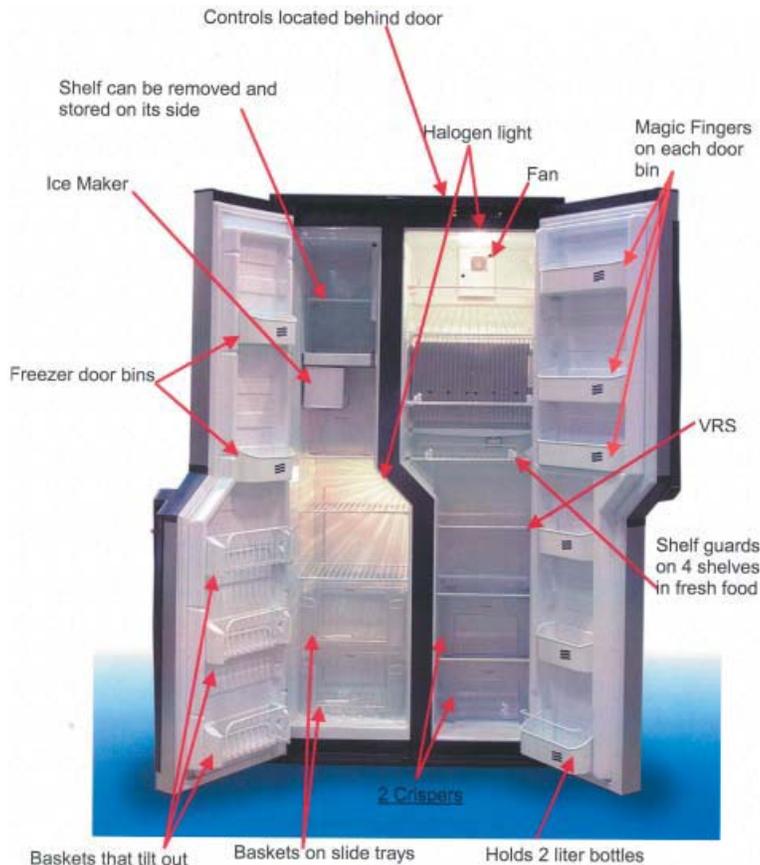
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4-14-14 Gas Refrigerator

The standard refrigerator for the 450 LXi is a 13.5 cu. ft. Dometic SideWise Refrigerator.

4-14-14.1 Exterior

This refrigerator from the outside makes a statement of being non-RV. The full silver and black stainless doors will make a real statement in most galley layouts. The full-length door handle system provides a customer-friendly means for unlocking the doors.

Controls located behind door

Shelf can be removed and stored on its side

Halogen light

Magic Fingers on each door bin

Ice Maker

Fan

Freezer door bins

VRS

Shelf guards on 4 shelves in fresh food

2 Crispers

Baskets that tilt out   Baskets on slide trays   Holds 2 liter bottles

4-14.14.2 Fresh Food Side

• Control package is located behind the door. Once the refrigerator is turned on and the temperature is set, there is no reason to have it exposed.

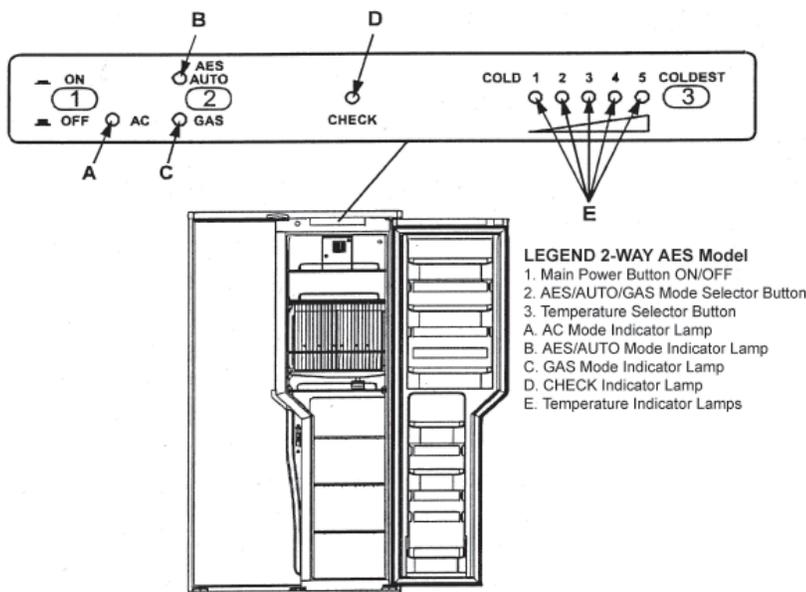• The control package makes the SideWise look very residential.

• Halogen light provides great light intensity throughout the interior.

• A brushless fan designed to run continually when the refrigerator is on providing even temperature from top to bottom even when there isn't any space between items on each shelf.

• VRS enables the consumer to move 3 of the shelves in one-inch increments providing the best space utilization.

• The second shelf folds back against the evaporator to provide height for very tall items.

• One slide-out shelf makes it easier to remove a large heavy pan standing straight up compared to bending your back.

• Different width shelves will provide better utilization of the available space.

• Shelf guards allow items to be blocked from falling over or off the shelf when opening the door. When you need an item, just lift up on the shelf guard bar and drop it down. As items are removed from the shelf, simply keep pushing the shelf guard back to secure items in place.

• Two large clear view slide-out crispers just like you may have at home, for fresh produce and meats.

• Space for 2-liter bottles. The lower door bin will hold any 2-liter bottle and has a retainer bar for tall slender containers.

• Magic fingers - each door shelf has one set so smaller items can be wedged in securely.

4-14.14.3 Freezer Section

- The freezer section offers 58% more than ever before.

- The top shelf can be removed and stored on the side to provide space for tall items in the upper section of the freezer.

- Optional ice maker.

- Halogen light illuminates the area. Never before has there been an absorption refrigerator with a light in the freezer.

- Three wire bins that tilt out. This allows for full use of the space between the bins.

- Two additional door bins to house smaller items.

- Two clear view baskets with individual side tracks. This provides the ease of loading and removing items without complete removal of the heavy baskets when full.

4-14.14.3 Refrigerator Control Panel

LEGEND 2-WAY AES Model
1. Main Power Button ON/OFF
2. AES/AUTO/GAS Mode Selector Button
3. Temperature Selector Button
A. AC Mode Indicator Lamp
B. AES/AUTO Mode Indicator Lamp
C. GAS Mode Indicator Lamp
D. CHECK Indicator Lamp
E. Temperature Indicator Lamps

4-14.14.4 Operating Instructions

IMPORTANCE OF LEVELING A REFRIGERATOR

In an absorption refrigerator system, ammonia is liquefied in the finned condenser coil at the top rear of the refrigerator. The liquid ammonia then flows into the evaporator (inside the freezer section) and is exposed to a circulating flow of hydrogen gas, which causes the ammonia to evaporate, creating a cold condition in the freezer.

When starting this refrigerator for the very first time, the cooling cycle may require up to four hours of running time before the cooling unit is fully operational.

The tubing in the evaporator section is specifically sloped to provide a continuous movement of liquid ammonia, flowing downward by gravity through this section. If the refrigerator is operated when it is not level and the coach is not moving, liquid ammonia will accumulate in sections of the evaporator tubing. This will slow the circulation of hydrogen and ammonia gas, or in severe cases, completely block it, resulting in a loss of cooling.

Any time the coach is parked for several hours with the refrigerator operating, the coach should be leveled to prevent this loss of cooling. The coach needs to be leveled only so it is comfortable to live in (no noticeable sloping of floor or walls).

When the coach is moving, the leveling is not critical, as the rolling and pitching movement of the coach will pass to either side of level, keeping the liquid ammonia from accumulating in the evaporator tubing.

OPERATION

Before starting the refrigerator, check that all the manual gas valves are in the ON position. DO NOT forget the manual shutoff valve on the rear of the refrigerator (*see Fig. 1*).

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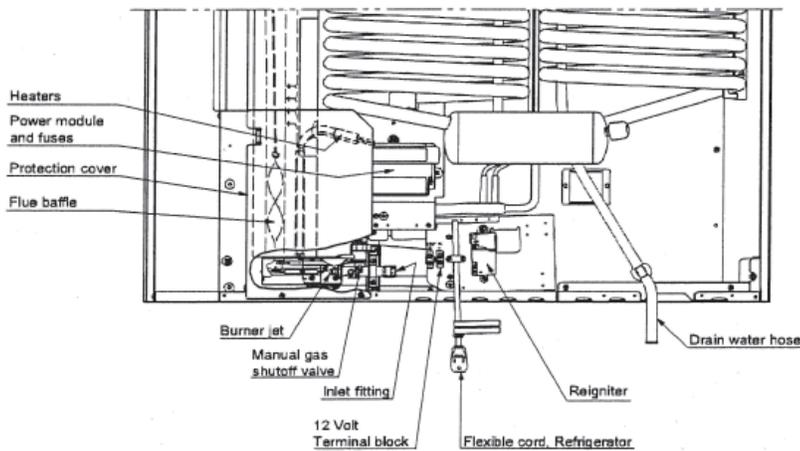
This refrigerator is equipped with an Automatic Energy Selector (AES) control system, which can automatically select the most suitable energy source which is available, either 120 Volt AC, or LP gas operation. The system can be set by the user to be fully automatic, or if desired, LP gas only. The refrigerator controls will work down to 9.6 volt DC.

> **WARNING!!** Most LP gas appliances used in recreational coaches are vented to the outside of the coach. When parked close to a gasoline pump, it is possible that the gasoline fumes could enter this type of appliance and ignite from the burner frame, CAUSING A FIRE OR AN EXPLOSION.
>
> FOR YOUR SAFETY, when refueling, shut off all LP gas appliances which are vented to the outside.

4-14.14.5 Start Up Instructions

A. A continuous 12 volt DC supply must be available for the electronic control to function.

B. Press the main power ON/OFF button (1) to the DOWN position.

C. Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired setting is illuminated.

AES/AUTO MODE

1. Press the AES/AUTO/GAS mode selector button (2) to turn ON the AES/AUTO lamp (B). If 120 volts is available, the AC mode indicator lamp (A) will illuminate indicating AC operation. If 120 volts AC is not available, the GAS indicator lamp (C) will illuminate indicating the control has automatically switched to the GAS mode.

2. If the CHECK indicator lamp (D) illuminates and the GAS mode indicator lamp (C) is off, the controls have failed to ignite the burner in the GAS mode. GAS operation may be reset by pressing the main power ON/OFF button (1) to the OFF then ON position. (*See step 2 under GAS MODE*).

3. Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired position is illuminated.

GAS MODE

1. Press the AES/AUTO/GAS mode selector button (2) to turn OFF the AES/AUTO lamp (B). The GAS mode indicator lamp (C) will illuminate. Within 45 seconds the burner should be ignited and operating normally.

2. On the initial refrigerator start-up, it may take longer than 45 seconds to allow air to be purged from the gas line. If the gas does not ignite within 45 seconds the CHECK indicator lamp (D) will illuminate and the GAS mode indicator lamp (C) will go off.

    To reset when the CHECK indicator lamp (D) is illuminated, press the main power ON/OFF button (1) to the OFF and then ON position.

> ✏ **NOTE:** Do not continue to reset GAS operation if the CHECK indicator lamp continues to be illuminated after several tries.

3. Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired position is illuminated.

THERMOSTAT

The thermostat on the refrigerator controls both the gas and electric operation, thereby eliminating the necessity of resetting each time a different energy source is employed.

After the initial start-up, the thermostat should be moved from "COLDEST" to the desired temperature setting, usually at mid setting.

TO SHUT OFF THE REFRIGERATOR

The refrigerator may be shut off while in any mode of operation by pressing the main power ON/OFF button to the UP (OFF) position. This shuts off all DC power to the refrigerator, including the interior light.
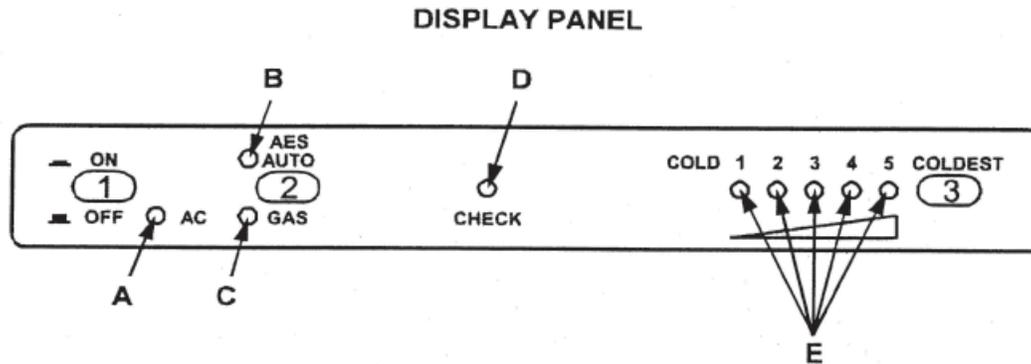
4-14.14.6 Start Up Instructions

A.   A continuous 12 volt DC supply must be available for the electronic control to function.

B.   Press the main power ON/OFF button (1) to the DOWN position.

C.   Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired setting is illuminated.

AES/AUTO MODE

1.   Press the AES/AUTO/GAS mode selector button (2) to turn ON the AES/AUTO lamp (B). If 120 volts is available, the AC mode indicator lamp (A) will illuminate indicating AC operation. If 120 volts AC is not available, the GAS indicator lamp (C) will illuminate indicating the control has automatically switched to the GAS mode.

2.   If the CHECK indicator lamp (D) illuminates and the GAS mode indicator lamp (C) is off, the controls have failed to ignite the burner in the GAS mode. GAS operation may be reset by pressing the main power ON/OFF button (1) to the OFF then ON position. (*See step 2 under GAS MODE*).

3.   Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired position is illuminated.

GAS MODE

1.   Press the AES/AUTO/GAS mode selector button (2) to turn OFF the AES/AUTO lamp (B). The GAS mode indicator lamp (C) will illuminate. Within 45 seconds the burner should be ignited and operating normally.

2.   On the initial refrigerator start-up, it may take longer than 45 seconds to allow air to be purged from the gas line. If the gas does not ignite within 45 seconds the CHECK indicator lamp (D) will illuminate and the GAS mode indicator lamp (C) will go off.

   To reset when the CHECK indicator lamp (D) is illuminated, press the main power ON/OFF button (1) to the OFF and then ON position.

> ✎   **NOTE:** Do not continue to reset GAS operation if the CHECK indicator lamp continues to be illuminated after several tries.

Press the TEMPERATURE SELECTOR button (3) until the lamp at the desired position is illuminated.

THERMOSTAT

The thermostat on the refrigerator controls both the gas and electric operation, thereby eliminating the necessity of resetting each time a different energy source is employed.

After the initial start-up, the thermostat should be moved from "COLDEST" to the desired temperature setting, usually at mid setting.

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4-14.14.7 Description of Operating Modes

AES/AUTO MODE

When operating in the AES/AUTO mode, the AES/AUTO mode indicator lamp (B) will illuminate. The control system will automatically select between AC and GAS operation with AC having priority over GAS. Either the AC indicator lamp (A) or the GAS indicator lamp (C) will illuminate depending on the energy source selected by the control system. If the control system is operating with AC energy and it then becomes unavailable, the system will automatically switch to GAS. As soon as AC becomes available again the control will switch back to AC regardless of the status of GAS operation. Refer to Display Panel found previously for illustration.

GAS MODE

When operating in the GAS mode the AES/AUTO mode indicator lamp (B) will be off and the GAS mode indicator lamp (C) will be illuminated. This mode provides LP gas operation only. The control system will activate the ignition system and will make three attempts to light the burner for a period of approximately 45 seconds with two minute intervals. If unsuccessful, the CHECK indicator lamp (D) will illuminate and the GAS mode indicator lamp (C) will turn off.

To restart GAS operation, press the main power ON/OFF button (1) to the OFF and then ON position. The control system will attempt a new ignition sequence.

If the refrigerator has not been used for a long time or the LP tanks have just been refilled, air may be trapped in the supply lines. To purge the air from the lines may require resetting the main power ON/OFF button (1) three or four times. If repeated attempts fail to start the LP gas operation, check to make sure that the LP gas supply tanks are not empty and all manual shutoff valves in the lines are open. If the problem is still not corrected, contact a service center for assistance.

If the control is switched to AC operation while the CHECK indicator lamp is on, it will function properly, but the CHECK indicator lamp will not go off until the main power ON/OFF button is pressed to the OFF then ON position.

LIMP MODE OF OPERATION

This control system contains a feature where it will continue to operate the cooling system in the event of a failure of a major operating component. Two different modes of operation can occur in this category.

If for some reason the display module becomes non functional, the control system will revert to full automatic operation selecting the best energy source available with AC, Gas priority. The temperature of the refrigerator will be maintained at the MID position within normal temperature tolerances. The power module will continually attempt to reestablish operation of the display module.

The second limp mode of operation will execute when a failure of the temperature sensing device or associated electronic circuitry occurs. If this should occur, the control system will operate on the energy source selected via the control panel. The cooling unit will run continuously on the selected energy source. The refrigerator will continue to operate in this module indefinitely or until a new sensor is installed and the system is reset.

4-14.14.8 How to Use the Refrigerator

FOOD STORAGE COMPARTMENT

The food storage compartment is completely closed and unventilated, which is necessary to maintain the required low temperature for food storage. Consequently, foods having a strong odor or those that absorb odors easily should be covered. Vegetables, salads etc. should be covered to retain their crispness. The coldest positions in the refrigerator are under the cooling fins and at the bottom of the refrigerator. The warmer areas are on the upper door shelves. This should be considered when placing different types of food in the refrigerator.

When the refrigerator is heavily loaded, it will take a longer time to lower the temperature; therefore, to get maximum efficiency the refrigerator and food items should be pre-cooled prior to loading. The shelves should not be covered with paper or plastic, and the food items should be arranged so air can circulate freely.

If you need more space in the refrigerator you can lift up the front of the second shelf from the top and push the shelf in, the shelf will fall down against the finned evaporator. This shelf cannot be relocated to a different position within the refrigerator.

The middle shelf is a sliding shelf, to slide out grasp the front of the shelf and pull forward. Push the shelf in to return to original position. This shelf cannot be relocated to a different position within the refrigerator.

The lower door shelf is designed for large containers or bottles (1/2-gallon milk or juice).

FROZEN FOOD STORAGE COMPARTMENT

Quick frozen soft fruits and ice cream should be placed in the coldest part of the compartment, which is on the top freezer shelf. Frozen vegetables, may be stored in any part of the compartment.

This compartment is not designed for deep or quick-freezing of food. Meat or fish, whether raw or prepared, can be stored in the frozen food storage compartment provided they are pre-cooled first in the refrigerator. They can be stored about three times longer in the frozen food compartment as compared to the fresh food compartment. To prevent food from drying out, keep it in covered dishes, containers, plastic bags or wrapped in aluminum foil.

Total Refrigerated Volume is 13.2 cu. ft.

ICE MAKING

Ice cubes can be made in ice trays placed in the freezer compartment. For faster ice making, the trays should be placed in direct contact with the aluminum shelf.

Ice will be made more rapidly if the thermostat is set at its highest position. It is a good idea to do this a few hours before the anticipated need for ice, but be sure to move the thermostat back to normal setting, usually about mid setting when the ice is formed. Food in the fresh food compartment may be frozen if the setting is left on "COLDEST" position for too long.
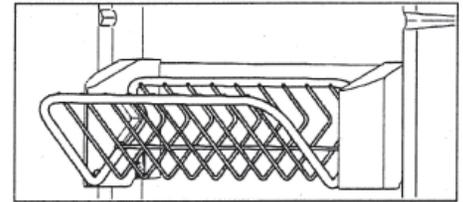
FREEZER DOOR

The freezer door has three wire door baskets for frozen food items, such as bagged vegetables.
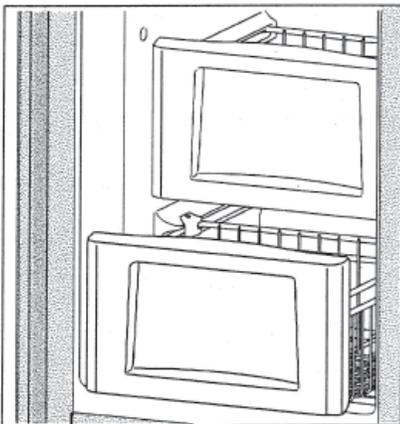
FREEZER COMPARTMENT

The freezer compartment has two sliding wire baskets for more convenient access to the frozen foods.

DEFROSTING

Shut off the refrigerator by pressing the main power ON/OFF button to the UP (OFF) position.

Empty the refrigerator, leaving the drip tray under the finned evaporator, and the cabinet and freezer doors open. Filling ice trays with hot water and placing them on the freezer shelves can reduce defrosting time.

When all the frost has melted, dry the interior of the refrigerator and freezer with a clean cloth. Replace all food and set the thermostat to the COLDEST temperature setting for a few hours. Then reset the thermostat to the desired setting, usually at mid setting.

CAUTION!! Do not use a hot air blower. Permanent damage could result from warping the metal or plastic parts. DO NOT use a knife or an ice pick, or other sharp tools to remove frost from the freezer shelves. They can create a leak in the ammonia system.

CLEANING

Cleaning the refrigerator is usually done after it is defrosted or put into storage. To clean the interior liner of the refrigerator, use lukewarm weak soda solution. Use only warm water to clean the finned evaporator, ice trays and shelves. NEVER use strong chemicals or abrasives to clean these parts, as the protective surfaces will be damaged. It is important to always keep the refrigerator clean.

SHUT OFF - STORAGE PROCEDURE

Shut off the refrigerator by pressing the main power ON/OFF button to the UP (OFF) position.

If the refrigerator will not be in operation for a period of weeks, it should be emptied, defrosted, cleaned and the doors left ajar. The ice trays should also be dried and kept outside the cabinet.

WARNING!! DO NOT store explosive substances in the refrigerator, such as cigarette lighter gas, gasoline, ether or the like.

NOTE: Sodium chromate is used for corrosion protection (less than 2-weight % of the coolant).

4-14.14.9 Electric Equipment

HEATERS

The heat necessary for the operation of an absorption cooling unit is supplied by an electric heater mounted in a pocket of the boiler system.

This model is equipped with a series connected twin heater.

To replace the heater proceed as follows:

1. Disconnect the wall plug, and the 12 volt wires.
2. Remove the protection cover.
3. Remove the power module cover.
4. Disconnect the heater leads.
5. With a pair of pliers unfold the lug holding the lid of the boiler casing and open the lid.
6. Remove some insulation wool so that the heater is accessible.
7. Turn and lift the heater out of its pocket.
8. Fit the new heater into the pocket.
9. Connect the leads and put on the power module cover.
10. Reset the insulation and close the lid of the boiler.
11. Replace the protection cover.

FUSES

This model is equipped with 2 fuses, one for the refrigerator control system and one for AC cartridge heater. (see table below).

To replace fuses proceed as follows:

1. Disconnect the wall plug, and the 12 volt wires.
2. Remove the power module cover. (see Fig. 1)
3. Snap the fuse out of the fuse holder.
4. Fit a new fuse in to the fuse holder.
5. Replace the power module cover.

Control System	3 Amp
AC Heater	5 Amp

4-14.14.10 Maintenance and Service

The user should be aware of service that must be done on a regular schedule to keep the refrigerator operating properly. The service should only be performed by qualified technicians who are familiar with LP gas systems and refrigerators.

REFRIGERATOR REMOVAL

Before working on the refrigerator, make sure the AC voltage and DC voltage leads are disconnected. Shut off the gas supply. Disconnect the gas supply line at the rear of the refrigerator (see Fig. 1). Always use a back up wrench when loosening and tightening this connection. Cap the gas supply line loosen the screws anchoring the refrigerator to the enclosure and slide the refrigerator out of the compartment.

When replacing the refrigerator make sure that the sealing strips are properly positioned.

Replacement is the reverse of removal. Check all connections for gas leaks.

PERIODIC MAINTENANCE

To keep your Dometic refrigerator operating efficiently and safely, periodic inspection and cleaning of several components once or twice a year is recommended.

A. It is important to keep the area at the back of the refrigerator clean. Check the lower vent, upper vent and area between these openings for any obstructions such as bird/insect nests, spider webs, etc. Clean the coils on the back of the refrigerator. Use a soft bristled brush to dust off the coils.

It is important to keep the refrigerator area free from combustible material, gasoline and other flammable vapors or liquids.

GAS EQUIPMENT ASSEMBLY
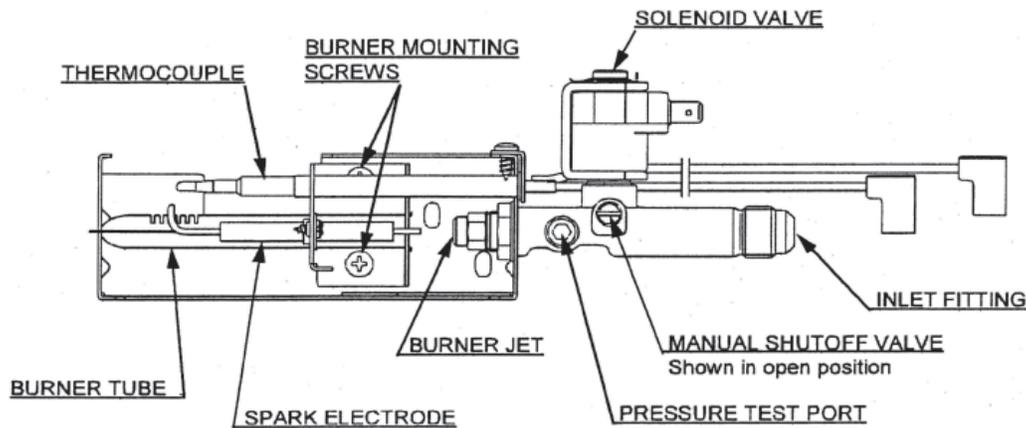
> 📌 **NOTE:** The following maintenance is required once or twice a year, but should only be done by a qualified serviceman who is familiar with LP gas systems and refrigerators.

Check all connections in the LP gas system (at the back of the refrigerator) for gas leaks. The LP gas supply must be turned on. Apply a non-corrosive bubble solution to all LP gas connections. The appearance of bubbles indicates a leak and should be repaired immediately by a QUALIFIED SERVICE PERSON WHO IS FAMILIAR WITH GAS SYSTEMS AND REFRIGERATORS.

WARNING!!   **DO NOT use a flame to check for gas leaks.**

C. Check the AES control system by connecting/disconnecting 120 volt AC power, start/stop the engine, etc. Compare the operation with the operation described in description of operating modes.

D. The LP gas pressure should be checked and the main regulator readjusted if pressure is incorrect.
    The correct operating pressure is 11 inches of water column. The correct place to take the LP gas pressure is at the test port just ahead of the burner jet.

E. Inspect the fuel baffle. It should be reasonably clean and free of soot. Heavy soot formation indicates improper functioning of the burner. The flue and burner both require cleaning in the following manner.
    1. Unplug the refrigerator power cord from the 120 volt AC outlet.
    2. Disconnect or shut off the 12 volt power to the refrigerator.
    3. Turn manual shutoff valve to OFF. (*see Fig. 1*).
    4. Remove cover from the burner housing. (*See Fig. 1*).
    5. Disconnect the wire from the high voltage electrode.
    6. Remove the burner mounting screws and remove the burner assembly.
    7. Remove the wire and the flue baffle from the top of flue tube. Clean the flue tube from the top using a flue brush. Blowing compressed air into the flue will not properly clean soot and scale out of the flue tube. Replace the flue baffle.
    8. Clean burner tube with a brush. Blow out burner with compressed air.
    9. Before removing burner jet, clean burner area of soot and scale that fell out of flue tube. Remove the burner jet. Soak the jet in wood alcohol and blow it out with compressed air. Reinstall and tighten burner jet.

> 📌 **NOTE:** The color of the flame shall be clear blue over the slots of the burner. (*See figure at right.*)

Clear blue color of flame
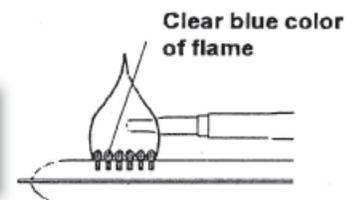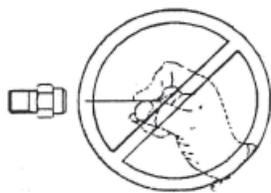
WARNING!! DO NOT use a wire or pin when cleaning the burner jet as damage can occur to the precision opening. This can cause damage to the refrigerator or create a fire hazard.

10. Reinstall burner, being careful that the end of the burner fits into the slot on the burner bracket. Check to make sure slots are centered under the flue tube and the thermocouple is positioned properly (tip of thermocouple extends over two slots of burner).

11. Be sure to reconnect the wire to high voltage electrode. Check the electrode for proper location and gap. (See *figure at left*)

12. Turn on manual gas shutoff valve and check all fittings for leaks.

13. Connect 120 volt power cord to the outlet and reconnect or turn on the 12 volt DC power.

14. Check LP gas safety shutoff.

Electrode

1/8" to 3/16" (3-5 mm)

Burner tube
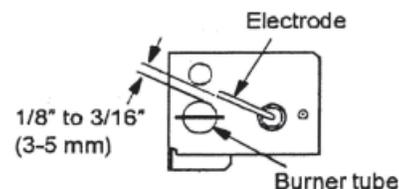
REPLACING A HALOGEN LAMP

CAUTION!! Turn off the refrigerator before replacing the lamp. Wear gloves as protection against hot lamp, broken glass and as protection of the new lamp.

Refrigerator

The lamp is located at the top of the refrigerator compartment.

To replace the lamp proceed as follows:

1. Unhook the tab on the lamp cover by pressing in with the thumb on the side of the lamp cover.

2. Remove the lamp cover.

3. With gloves, pull out the lamp from the socket and replace it with a new 12V, 10-watt halogen lamp base G4.

4. Replace the lamp cover by placing the two tabs into the corresponding slots of the lamp house and press the tab into place.

Freezer

The lamp is located on the right side of the freezer compartment.

To replace the lamp proceed as follows:

1. Unhook the tab on the lamp cover by pressing in with the thumb on the side of the lamp cover.

2. Remove the lamp cover.

3. With gloves, pull out the lamp from the socket and replace it with a new 12V, 5-watt halogen lamp base G4.

4. Replace the lamp cover by placing the two tabs into the corresponding slots of the lamp house and press the tab into place.

4-14.14.11 Troubleshooting

The Refrigerator Does Not Cool Properly

A.   Burner jet clogged. Clean. (See *Maintenance and Service* section, item 2, *Periodic Maintenance, Paragraph E, Item 1-14*.)

B.   Check level of refrigerator.

C.   Venting problem. Restriction in air flow across cooling unit.

D.   Heavy frost buildup on evaporator fins. Defrost

E.   Flue baffle not inserted properly in flue tube.

F.   Improperly set thermostat. (See *Operating Instructions, part Start Up Instructions*.)

G.   Burner dirty. Clean. (See *Maintenance and Service, Item 2, Periodic Maintenance, Paragraph E, Item 1-14*.)

H.   LP Gas pressure low at burner. Set main regulator so pressure does not drop below 11 inches water column at pressure tap.

I.   Burner not located properly under flue tube. Relocate.

J.   Burner damaged. Replace.

K.   Odors from fumes.

   1.   Dislocated burner.

   2.   Damaged burner.

   3.   Dirty flue tube.

L.   Fuses

   1.   Refrigerator AC Supply.

> 📌   **NOTE:** Avoid spraying water through the refrigerator vents while washing the coach.

All the above instructions are to be followed closely. The refrigerator is quality-guaranteed. However, we are not responsible for any failures caused by improper adjustments and unfavorable installation conditions. Contact service point or distributor service department for assistance.

4-14.15 Electric Refrigerator (Optional)

The KitchenAid® Stainless Steel w/Black 22.0 cu. ft. Superba® Side-by-Side Refrigerator with Thru-the-Door Ice and Water may be purchased as an alternative to the Dometic gas refrigerator that comes standard.

4-14.16.1 Features:

Warranty: 1 Year

Capacity: Freezer: 7.5 cu. ft.

Capacity: Fresh Food Volume: 14.5 cu. ft.

Capacity: Total Shelf Area: 22.0 sq. ft.

Energy: Kilowatt Hrs. per Year: 607

Energy Star Compliant: Yes

Ice Maker: Type: Ice maker, factory installed

Thru-the-Door Dispenser: Type: Ice and water

Water Filtration: Yes

Fresh Food Shelves: 3 adjustable Rollertrac™ plus Spillclean™ shelves
3 adjustable Rollertrac™ plus Spillclean™ slide-out shelves

Fresh Food Bins: Egg Bin: Clearvue™ egg container

Meat Keeper: Freshchill™ convertible meat locker

Special Items Bin: Wine rack

Vegetable Crisper: Freshseal™ humidity-controlled vegetable crisper.

Freezer Features: 2 White Triple Tall Slide-Out Freezer Basket System   3 Freezer Shelves

This chart explains some of the features that are standard with this refrigerator.

Feature	Description	Benefit
Power Switch	Button that will turn on cooling and control display when it is pressed and held for 2 seconds.	Allows you to operate digital controls.
Max Cool	Button that simultaneously changes and overrides both the refrigerator and freezer temperature to a colder setting for 24 hours. After the 24 hour period, the refrigerator and freezer temp changes back to the previous temperature setting.	Maintains Freshness - cools refrigerated foods 30% faster and freezer foods 20% faster.
Water Filter Reset	Button that resets the Water Filter Indicator light to Green (Good Filter). You must hit reset after changing the filter.	Easier to reset - You no longer need to press the light switch 5 times within 10 seconds to reset.
Over Temp Reset	Button that turns off overtemp alarm which comes on when either the refrigerator or freezer temperature exceed 48°F or 15°F, respectively, for over 1.5 hours. The alarm will deactivate if the overtemp condition self-corrects but a light will continue to flash.	Peace of Mind - Alerts you to check food in the event of a power failure or an overtemp condition such as door ajar or system malfunction.
Numeric Temperature Display	Numeric Control can display temperature settings in Celsius and Fahrenheit degree units. The digital controls can adjust the refrigerator and freezer temperatures 2° up or down.	Customization - allows you to override the refrigerator and/or freezer temperature default settings.
ExtendFresh™ Temperature Management System	An Indicator light that is steadily lit when the Smart™Fan runs.	Peace of Mind - You know that the ExtendFresh™ Temperature Management System is operating.

4-14.15.2 ExtendFresh™ Temperature Management System

Some benefits are:

• Keeps temperature within 1°F of setting.

• Independent temperature controls for both freezer and refrigerator components.

• Dual Sensors immediately identify changes in temperature, triggering the Smart™Fan

• Smart™Fan pulls air from the Freezer into the Refrigerator without turning on the compressor, saving energy.

4-14.15.3 AquaSense™ In-Door -Ice Dispensing System

KitchenAid® did independent research and found that the #1 dislike of customers was lack of freezer space and as a result of that research they have developed a system which moves the ice pitcher from the cabinet to the door, creating 19% more usable freezer space in 25 Cubic Feet refrigerators and 27% more in 22 Cubic Feet refrigerators. The AquaSense™ In-Door-Ice Dispensing System is an ideal companion to the AquaSense™ Ice and Water Filtration system and just as practical. The conveniently positioned ice maker makes it easy to access a fresh supply of ice when refilling ice buckets and blenders.

4-14.15.4 AquaSense™ Water Filtration System

The AquaSense™ Twice-The-Life™ ice and water filter offers 500 gallons of filtering to remove lead, chlorine, particles and turbidity. A monitor lighting system takes the guesswork out of when to change the filter: green-good filter, yellow-order filter, red-change filter. The up front grille location allows for a quick and easy filter change without the need to remove food from refrigerator shelf.

4-14.15.5 SpillClean™ RollerTrac™ Adjustable Glass Shelves

SpillClean™ Glass Shelves have raised edges to keep spills in place for fast and easy cleaning - which keeps your refrigerator looking like new. KitchenAid® door shelves, crisper and meat pan drawers, and the roll-out freezer floor all feature the Roller Trac™ Plus system. Rollers allow the shelves, drawers and floors to glide out smoothly and quietly for easier reach of stored items. Roll-out shelves sustain up to 60 pounds even when fully loaded and the freezer floor holds up to 75 pounds.

4-14.15.6 FreshChill™ Temperature Controlled Convertible Vegetable/Meat Locker

The major benefit of the FreshChill™ Locker is how it lets you properly store expensive prepared meat in a compartment that is colder than the rest of the refrigerator to help preserve freshness. The FreshChill™ temperature-controlled meat locker maintains a temperature range of 28-32 degrees F inside the meat locker without affecting the rest of the refrigerator. Top-to-bottom See Through Fresh Seal Crisper and Fresh Chill Meat Locker are engineered for freshness. The humidity-controlled crisper is sealed with gaskets on all four sides and the meat locker is temperature-controlled. For added convenience, the meat locker converts to a crisper.

4-14.15.7 Slide N Lock™ Door Storage System

Slide N Lock™ Door Bins and Can Racks offer unparalleled flexibility and convenient refrigerator door storage. All can racks and door bins carry a lifetime warranty. Kitchenaid® four-sided adjustable door bins are sturdy enough to lift out even when fully loaded. The unique, laddered system lets you adjust the bins up and down to fit your storage needs. The Gallon Door Storage Bin allows you to free up shelf space by storing gallon containers in the door. It's ergonomic position at the bottom of the door allows you to easily lift them out and replace them. The gallon bin is removable for easy cleaning.

4-14.15.8 FreshSeal™ Dairy Locker System

The FreshSeal™ Dairy Locker System is transparent for easy viewing and slides up smoothly for loading and unloading. A gasket along the front of the cover presents air from entering and seals in freshness. Many KitchenAid® Refrigerators includes a high quality, Pyrex glass butter dish for convenience.

4-14.15.9 FreshSeal™ Humidity-Controlled Crispers

KitchenAid® ClearVue™ humidity-controlled crispers provide more flexible storage and preservation for your fruits and vegetables than ever before. The crispers are clear for easy viewing and the seal at the front of the crisper locks in the humidity that is needed to keep leafy vegetables crisp and fresh. KitchenAid® crispers are sealed on all four sides with gaskets to prevent colder air from escaping while maintaining the freshness of fruits and vegetables longer. The seal provides over 80% humidity retention, optimizing storage of fruits and leafy vegetables. Controls are easy to read and can be quickly adjusted to set the desired crisper temperature. Air flows in through the vents located along the front of the crisper. The placement of the vents prevent any spills in the refrigerator from leaking into the crisper when they are open.

4-14.15.10 Cleaning

Cleaning of this refrigerator is much like that of a house refrigerator. Use warm soapy water for tough stains. Do not use abrasive cleansers as they may scratch the surface of the refrigerator.

4-14.16 In-Sink-Erator
4-14.16.1 Instant Hot Water Dispenser

Your coach is equipped with an In-Sink-Erator Instant Hot Water Dispenser. This will give you hot water as easy as turning on a faucet.

This is how your dispenser works

Water is electrically heated to near boiling (190ºF/88ºC) in a compact tank that mounts under the sink. A thermostat maintains it at this approximate temperature. When you turn the handle, cold water enters the tank and forces hot water out of the faucet. The system is vented so the tank is not pressurized.

> **NOTE:** Due to the unique operation of your Instant Hot Water Dispenser, you may experience a slight delay in the dispensing of water after the handle is actuated. This assures maximum water temperature and is not indicative of a problem with the unit.

WARNING!!   This product dispenses water at approximately 190ºF, which is hot enough to cause severe burns. Caution should be exercised when installing and using this product. Do not allow children to operate this appliance without adult supervision.

CAUTION!!   Do not, under any circumstances use bleach, abrasive liquids, powders or scouring pads to clean the faucet as doing so could void the warranty. Occasional cleaning with a soft cloth and warm soapy water is sufficient.

4-14.16.2 Adjusting Temperature

The thermostat is factory pre-set at approximately 190ºF (88ºC). If the temperature needs to be adjusted, follow the steps outlined below.

1. Unplug or disconnect the unit from the electrical supply.
2. Remove the screw securing the access cover to the unit.
3. Insert a small flat blade screwdriver into the thermostat adjusting screw.
4. Turn the screw ½ dial marker clockwise to increase the temperature (1/2 dial marker counterclockwise to decrease water temperature).
5. Replace access cover and screw.
6. Reconnect the electrical supply.
7. Draw three (3) cups of water and allow the unit to reheat.
8. Check the water temperature and repeat the process if necessary.

Do not allow the unit to boil.

4-14.16.3 Draining the Tank

1. Unplug or disconnect the unit from the electrical supply.
2. Allow water to run from the dispenser head until cool (approximately ½ gallon).
3. Shut off the supply of water to the dispenser.
4. Place a drain pan or other similar container underneath the tank.
5. Remove the drain cap located at the bottom of the tank and drain water (approximately ½ gallon).
6. Replace drain cap. Do not over tighten.
7. Reconnect water supply.
8. Actuate dispenser head handle until water flows from the dispenser head.
9. Reconnect the electrical supply.

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4-14.16.4 Seasonal Storage

Seasonal storage of the unit is recommended if the unit is to be left unattended for long periods of time (typically more than two weeks) particularly if the unit could be exposed to freezing temperatures.

1. Unplug or disconnect the unit from the electrical supply.
2. Allow water to run from the dispenser head until cool (approximately ½ gallon).
3. Shut off the supply of water to the dispenser.
4. Place a drain pan or other similar container underneath the sink.
5. Remove the drain cap located on the bottom of the tank and drain water (approximately ½ gallon).
6. Replace drain cap. Do not over tighten.

CAUTION!! **Remember – do not reconnect the electrical supply unless the tank is completely filled with water and water flows from the dispenser head.**

4-14.16.5 Cleaning

Use only a soft cloth and warm soapy water to clean the dispenser head and tank. The use of harsh cleaning agents containing acids, alkaline and organic solvents can destroy the dispenser head and tank finishes.

Problem	Possible Cause	What to Do
Water is not hot	Unit not plugged in or electric outlet is inoperative.	Check that the unit is connected to a properly grounded electric outlet and that circuit breakers or fuses are in good order.
	Thermal overload protector has tripped	Contact your In-Sink-Erator dealer for service.
Water too hot or not hot enough	Thermostat not adjusted to your taste	Adjust thermostat. See *Adjusting Temperature*.
Water dripping from the spout or vent: • When heating • Constantly	Low water pressure preventing the expansion chamber from draining properly.	Unplug the unit. If the dripping stops within a few minutes, your water pressure may not be sufficient to properly drain the expansion chamber. Check that there are no obstructions in the water line reducing the supply pressure below 20 pounds per square inch. For example: a poorly mounted saddle valve, a clogged water filter (not supplied), or a partially opened shut-off valve (not supplied).
	Construction debris from water line obstructing the faucet valve seat causing a slow water leak.	Contact your In-Sink-Erator dealer for service.
Water comes out the vent instead of the spout.	Outlet tube is blocked Flow straightener is blocked	Check that the outlet tube is not kinked, twisted or pinched. Remove flow straightener from end of spout by twisting counterclockwise. Remove any debris or scale accumulation. Soak in a mild vinegar solution if necessary to loosen scale deposits. Reinstall flow straightener by threading it on clockwise.
Water and steam spits forcefully from spout without turning on the dispenser faucet.	Unit is boiling	Reduce water temperature. See *Adjusting Temperature*.
Water taste or odor	Normal start-up.	Under some water conditions your unit may need a few days to "season". Open the dispenser faucet and run until the water is cold. Allow the unit to reheat. Repeat several times per day over 3-4 days to season the unit.
	Chlorine or contaminants in the incoming water supply may be more noticeable in hot water.	Provide a suitable drinking water filter. Contact your local water authority for suggestions.
Water does not flow immediately after the actuating handle.	Normal functioning of the unit	No correction needed.

4-14.17 Princess Two Burner Cook Top

The standard cook top supplied with the 450 LXi is a Princess two burner, gas cook top. Basic information concerning operating and maintaining your cook top follows:

4-14.17.1 What To Do if You Smell Gas

- Evacuate all persons from the coach.
- Shut off the gas supply at the gas container or source.
- Do not touch any electrical switch, or use any phone or radio in the coach.
- Do not start the coach's engine or electrical generator.
- Contact the nearest gas supplier or qualified service technician for repair.
- If you cannot reach a gas supplier or qualified service technician, contact nearest fire department.
- Do not turn on the gas supply until the gas leak(s) has been repaired.

4-14.17.2 Carbon Monoxide Poisoning

- Do not use any cooking appliance for space heating because of potential danger to occupants of the coach and damage to the cook top.
- A window or air vent should be open slightly while using any cooking appliance. Gas flame consumes oxygen which must be replaced to assure proper combustion and prevent carbon monoxide.

> **NOTE:** Be sure you know where the main gas shut off valve is located so that you will know how and where to turn off the gas supply when necessary. There is a shutoff switch in the pantry area next to water pump switch. There is also a main shut off valve at the lp tank. It is recommended that user familiarize themselves with both of these shut off mechanisms in case of an emergency.

4-14.17.3 To Light the Burners

1. Push down the knob and turn counterclockwise to "IGNITE" position.
2. Hold the knob down fully until the spark ignites the gas and continue to hold the knob down for approximately 5 to 10 seconds. The thermocouple will be heated to activate the safety mechanism.
3. Release the knob and set to desired setting.
4. To turn off the burner flame, turn the knob clockwise to "OFF" position.

CAUTION!!
- Be sure your cook top is installed properly.
- Do not operate cook top if it is damaged or not working properly.
- Do not store flammable materials on or near the cook top.
- Never leave lit burners unattended. A boil over may result, causing smoke or fire.
- Do not use your cook top for warming or heating the room.
- The handle of utensil should be positioned so that it they are turned inward but not extending over adjacent burner.
- To reduce the risk of burns and ignition of flammable materials, the burner flame should not extend beyond the edge of the cooking utensil.
- Grease is flammable. Never allow grease to collect around top burners or cook top surface. Wipe spillovers immediately.
- Only certain types of glass, glass/ceramic, earthenware, or other glazed utensils are suitable for cook top use without breaking due to sudden change in temperature.
- Do not use water on grease fire. Smother the fire or flame or use baking soda, multipurpose dry chemical or foam type fire extinguisher.
- Children should not be left alone or unattended in area where cook top is in use. Children should never be allowed to sit or stand on any part of the cook top.
- Do not heat unopened containers. They could explode.
- Do not touch burners, grates or areas near cook top after use. Units may be hot even though it may not be obvious. Areas near burners and grates may become hot enough to cause burns. During and after use, do not touch, or let clothing or other flammable material contact cook top or areas near it until they have had sufficient time to cool.

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4-14.17.4 Care and Cleaning

Regular cleaning with a soft cloth and a warm detergent solution is generally enough to keep your cook top clean and beautiful. This is done when the cook top is cool. Use a dry cloth or paper towel to clean splatters and spills when surfaces are warm.

GLASS – We recommend the use of Hope's Cleaning Cream for care and maintenance of the glass surfaces. For more information about this product and a dealer near you, contact:
The Hope Company, Inc. – (800) 325-4026

4-14.18 Princess Two Burner Electric Cook Top (optional)

Offered as an option is the Princess Model 2247 Two Burner Ceran Glass Top Electric Stove.

4-14.18.1 Features
* Drop-in, flush mount Ceran glass
* Available in 120v or 240v.
* Halogen burners available, 240 volt only
* Limiters in burners to prevent overheating.
* Black glass top with white graphics.
* UL 858 Certified.
* 2 Burners
* 120 volts/20 amps
* 240 volts/15 amps per leg
* Overall Dimensions: 22W x 13D x 4H
* Cutout Dimensions: 21 3/8W x 12 3/8D x 4H
* Colors: White Graphics on Black
* Shipping Weight: 20 lbs.

4-14.18.2 Cleaning

It is recommended that the cook top be cleaned with non-abrasive cleaner such as warm soapy water and a soft cloth. For tough stains use a reputable cleanser designed for Ceran glass cook tops.

4-15 Fans, Vent and Exhaust

4-15.1 Fantastic Fan

12 VDC exhaust fan located in the bathroom.

4-15.1.1 Operation

1. Open the damper from the control located on the face of the vanity.

2. Turn on the fan from the control located on the fan. Set the desired speed. The switch on fan may be left on in order for the vanity (remote) switch to operate all functions.

4-15.2 6" 12 VDC Pop-Up Fan

12 VDC six-inch exhaust fan is located in the private toilet area of models that are so equipped.

4-15.2.1 Operation

1. Push handle up to open the vent.

2. Turn on the fan from the control located on the bottom of medicine cabinet.

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4-16 Audio - Video Components

Beginning with Body Numbers W000361 there will be a few changes made to the audio-video components that are supplied with the coach. They are as follows:

The coach is supplied with state-of-the-art audio/video equipment. In the main galley area a 32" Panasonic High Definition Television, a Panasonic DVR unit with a 100 GB hard drive, an AV Control Receiver, and a DirectTV High Definition Satellite Receiver is installed. A 20" Panasonic television and a Panasonic VCR are installed in the bedroom area. Basic operation of all of these components is explained in this section. This will mean that High Definition satellite TV will be standard on our units and that the customer will be able to record 177 hours of programs on the DVR hard drive and be able to write programs onto a DVD disc.

The connections from these units to the TVs are being upgraded from S video to HDMI for the satellite receivers and component for the DVR unit. This will give the best picture resolution and clarity possible.

Because of these additional items the customer will have to deviate from the factory settings and set the settings to what is shown below for optimal picture benefit.

AUDIO/VIDEO SETTINGS

FRONT SYSTEM:

The TV display should be set to 16:9 normal

The XR50 receiver should be set up with the correct inputs for audio and video.

The DVR Video output should be set to 480p via component cable
>   Video format should be 16:9 normal or full.
>   Audio output should be set to "bitstream".

The Sateillite receiver should be set to 1080i via HDMI
>   Video format should be 16:9 normal or full.
>   Audio output should be set to "bitstream".

THE REAR SYSTEM:

The TV display should be set to 16:9 normal

The DVD video output should be set to 480p
>   Video format should be 16:9 normal or full.

The Satellite receiver should be set to 1080i via HDMI
>   Video format should be 16:9 normal or full.
>   Audio output should be set to "bitstream".

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4-16.1 Basic Operating Instructions
4-16.1.1 Living Room
From the living room, to watch something, pick up remote and make sure screen is on the "Main" menu. If not, press the "Main" button below the LCD screen.

Next, press the button "FT. TV" this is short for front TV, and then press the button next to what you want to watch, "SAT", "DVD", "VCR", "CABLE", and "OFAIR", that's the TV antenna.

To play CD's use the "DVD" button.

Make sure remote is held pointing towards the TV when pressing buttons and hold there until everything turns on.

✎ **NOTE:** It is not necessary to hold buttons down, a quick press of a button should do it.

Remote can also control equipment separately. Go back to the "Main" screen and press the button next to what you want to control. The items on the left are for the living room, items on the right are for the bedroom.

4-18.1.2 Bedroom
Everything is exactly the same for the bedroom, except instead of pressing "FT. TV" select "BEDTV" short for bedroom TV.

4-16.1.3 Shutting Down
The system can be shut down from either the Living Room or the Bedroom. Hold remote pointed at the either TV and hit off and entire system will shut down.

4-16.2 Panasonic 32" High Definition Television
In the galley area a Panasonic 32" High Definition Television is installed. General operating instructions and troubleshooting tips are as follows:

4-16.2.1 Important Safety Instructions
Note to CATV System Installer: This reminder is provided to direct the CATV system installer's attention to Article 820-40 of the NEC that 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 cable entry as practical.

Important Safety Instructions for LCD TV
1) Read these instructions.
   All the safety and operating instructions should be read before the appliance is operated.
2) Keep these instructions.
   The safety and operating instructions should be retained for future reference.
3) Heed all warnings.
   All warnings on the appliance and in the operating instructions should be adhered to.
4) Follow all instructions.
   All operating and use instructions should be followed.
5) Do not use this apparatus near water.
   For example, near a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool, and the like.
6) Clean only with a dry cloth.
   Do not use liquid cleaners or aerosol cleaners. Use a dry cloth for cleaning.

7) Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

8) Slots and Openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface.

9) Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

8) This product should not be placed in a built-in-installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.

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) Use only 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 combination to avoid injury from tip-over. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.

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 the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

15) To prevent electric shock, ensure the grounding pin on the AC cord power plug is securely connected.

16) If an outside antenna is connected to the television equipment, be sure the antenna system is grounded so as to provide some protection against voltage surges and built up static charges. The U.S. Selection 810-21 of the National Electrical Code 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 for the grounding electrode.

17) An outside antenna system should not be located in the vicinity of overhead power lines or other electric light or power circuits, or where it can fall into such power lines or circuits. When installing an outside antenna system extreme care should be taken to keep from touching power lines or circuits as contact with them might be fatal.

18) Unplug this LCD TV from the wall outlet, and refer servicing to qualified service personnel under the following condition

     a) When the power cord or plug is damaged or frayed.

     b) If liquid has been spilled into the LCD TV.

     c) If the LCD TV has been exposed to rain or water.

     d) If the LCD TV does not operate normally by following the operating instructions.

     e) Adjust only those controls that are covered by the operating instructions as improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the LCD TV to normal operation.

     f) If the LCD TV has been dropped or the cabinet has been damaged.

     g) When the LCD TV exhibits a distinct change in performance - this indicates a need for service.
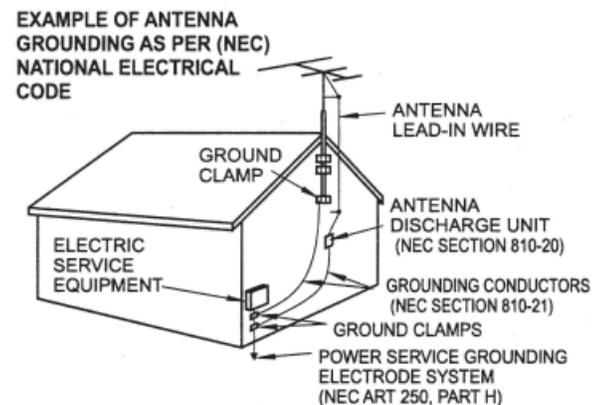
19) When replacement parts are required, be sure the service technician uses replacement parts specified by the manufacturer that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

20) WARNING: TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOISTURE.
DO NOT PLACE LIQUID CONTAINERS (FLOWER VASES, CUPS, COSMETICS, ETC.) ABOVE THE SET. (INCLUDING ON SHELVES ABOVE, ETC.)

21) CAUTION: TO PREVENT ELECTRIC SHOCK DO NOT USE THIS PLUG WITH A RECEPTACLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

NOTE: This equipment is designed to operate in the U.S.A. and other countries where the broadcasting system and AC house current is exactly the same as in the U.S.A.

The marking or retained image on the LCD panel resulting from fixed image use is not an operating defect and as such is not covered by Warranty. This product is not designed to display fixed image patterns for extended periods of time.

Important Information Regarding Use of Video Games, Computers, Captions or Other Fixed Image Displays.

The extended use of fixed image program material can cause a permanent "shadow image" on the LCD panel. This background image is viewable on normal programs in the form of a stationary fixed image. This type of irreversible LCD panel deterioration can be limited by observing the following steps:

A. Replace the brightness/contrast setting to a minimum viewing level.

B. Do not display the fixed image for extended periods of time.

C. Turn the power off when not in actual use.

This product utilizes tin-lead solder, and has a fluorescent lamp containing a small amount of mercury. Disposal of these materials may be regulated in your community due to environmental considerations. For disposal or recycling information please contact your local authorities, or the Electronics Industries Alliance: www.eiae.org.

4-16.2.2 Connections

Connecting the Antenna Cable to the Antenna Terminal

Antenna Connection - For proper reception of VHF/UHF channels, an external antenna is required. For best reception an outdoor antenna is recommended. Antenna Mode must be set to TV.
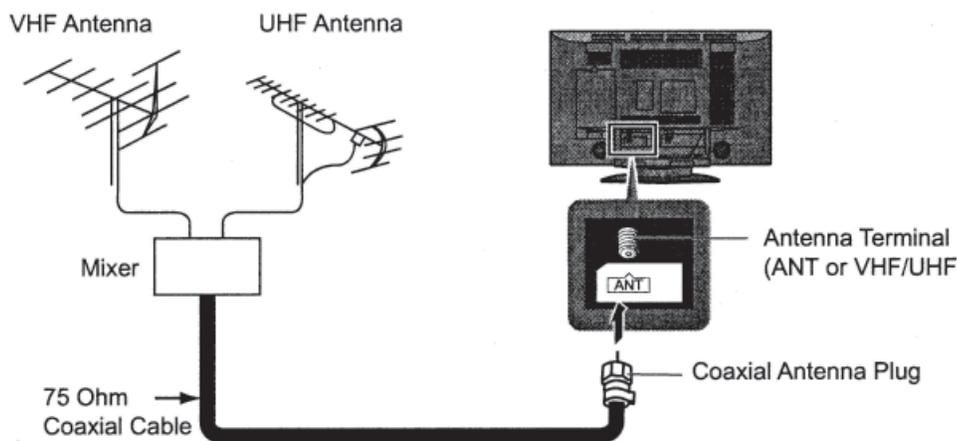
4-16.2.3 Antenna Cover Removal and Fitting

REMOVAL

1. Push up hooks and pull the cover slightly towards yourself to disengage the claws (at 4 points)

2. Slowly pull out in the downward direction.

FITTING

1. Insert the claws (at 4 points) at the top end.

2. Push it until hook is locked.
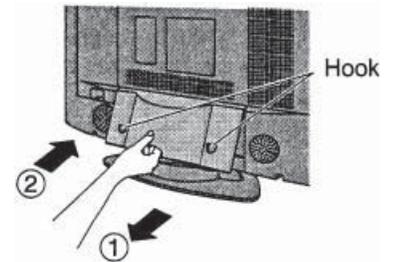
> **NOTE:** To avoid interference appearing on the screen, do not bundle the antenna wire and AC adapter wire together.

4-16.2.4 Antenna/Cable Connection

Incoming 75 Ohm Cable from Home Antenna/Cable Company

Cable Connection - For reception of cable channels (01-125) connect the cable supplied by your local cable company. Antenna Mode must be set to CABLE. (Refer to *Antenna Mode* section.)
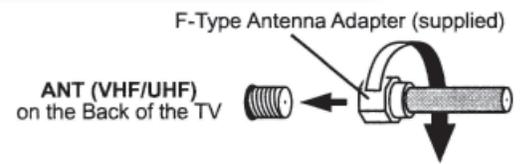
> **NOTE:** Certain cable systems offset some channels to reduce interference or have Premium (scrambled) channels. A cable converter box is required for proper reception. Check with your local Cable company for its compatibility requirements.

4-16.2.5 Antenna Connection (Cable Box, no VCR)

Use this configuration when connecting the TV to a cable TV system using a Cable Box.

BLUE BIRD
Coachworks
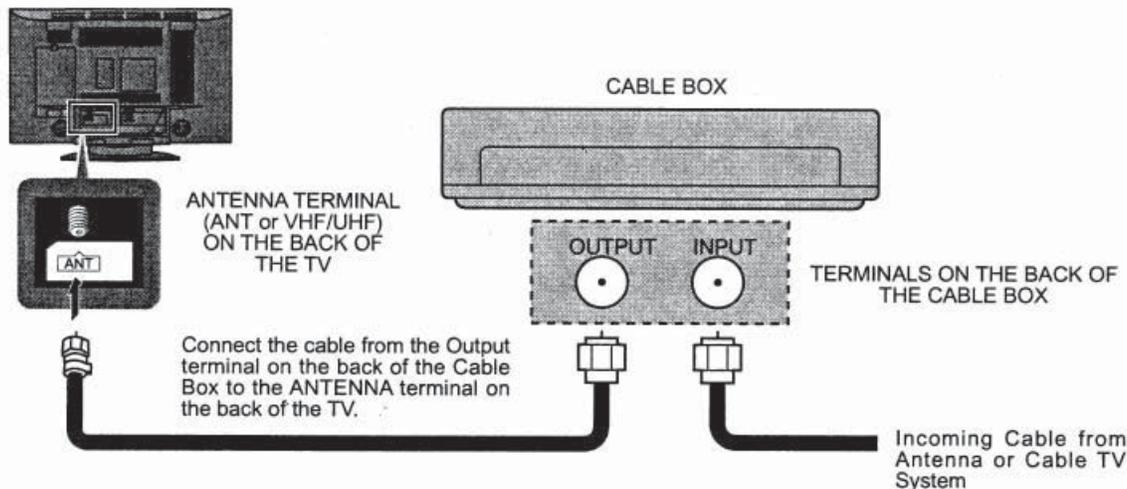
4-16.2.6 Antenna Connection (Cable Box, and VCR)

Use this configuration when connecting the TV to a cable TV system using a Cable Box and VCR.
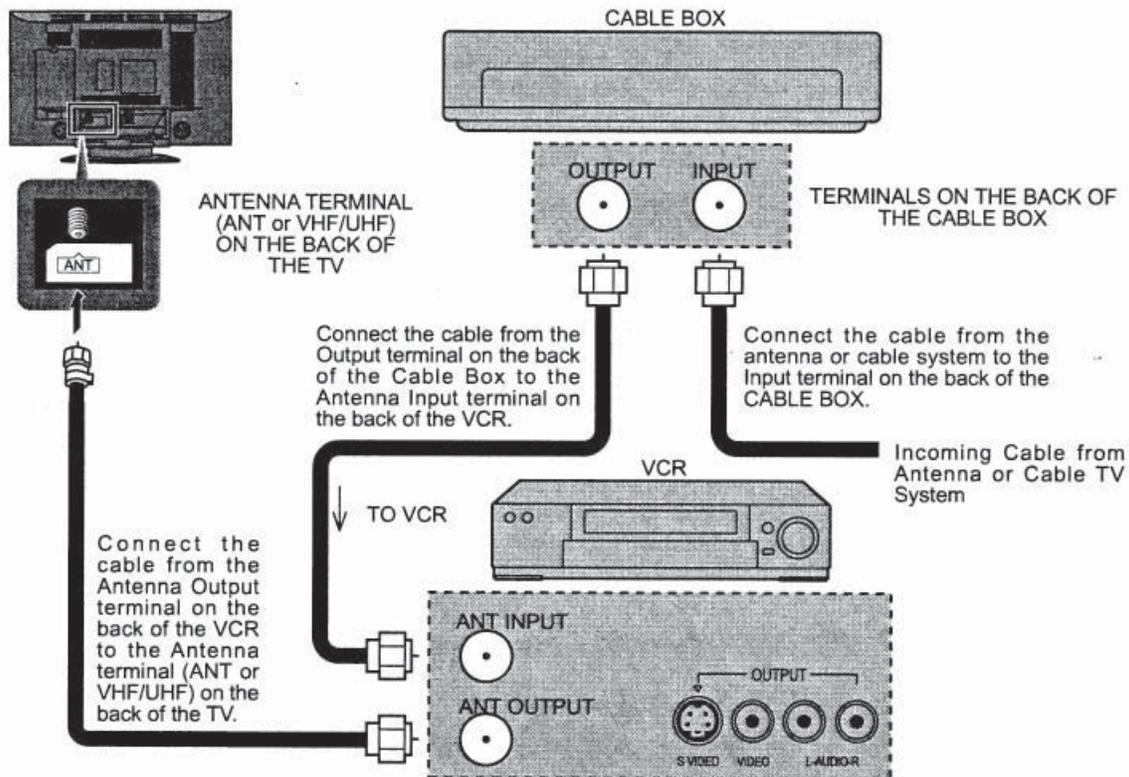
> ✏ **NOTE:** When the antenna cable is connected to the TV antenna terminal via a cable box or VCR, set the TV channel to CH3 or CH4, cable. This does not apply when signal is input from VIDEO INPUT.

4-16.2.7 Cable Cover Removal and Fitting

Removal
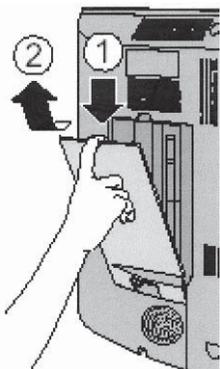
1. Disengage the claws at the uppermost end.
2. Slowly pull out in the upward direction.

Fitting
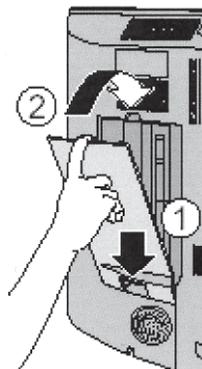
1. Insert the claws (at 2 points) at the bottom.
2. Push in the TOP.

> ✏ **NOTE:** Depending on the type of cable used it may not be possible to close the cover. In such cases the cable may be routed through the antenna cover.

4-16.2.8 How to Connect the Input Terminals in Front
Connect camcorder and video game console.

BLUE BIRD
Coachworks®
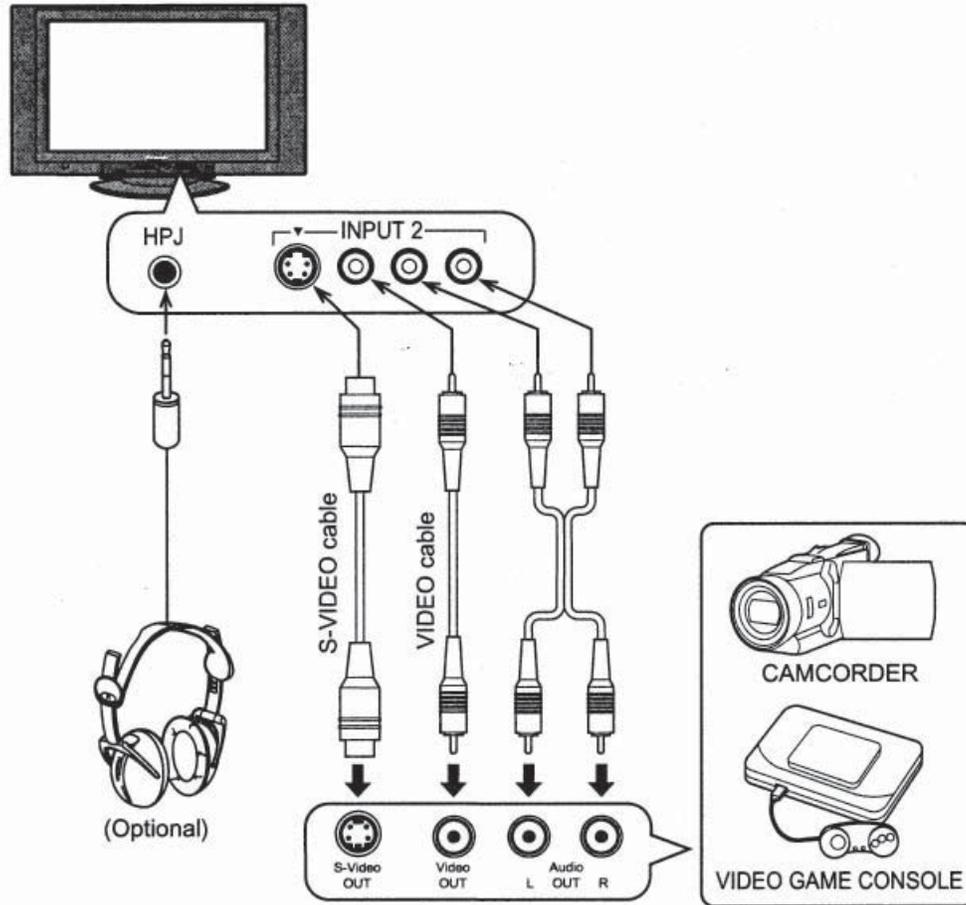
4-16.2.9 How to Connect with Other Equipment

Connect VCR and other peripheral equipment
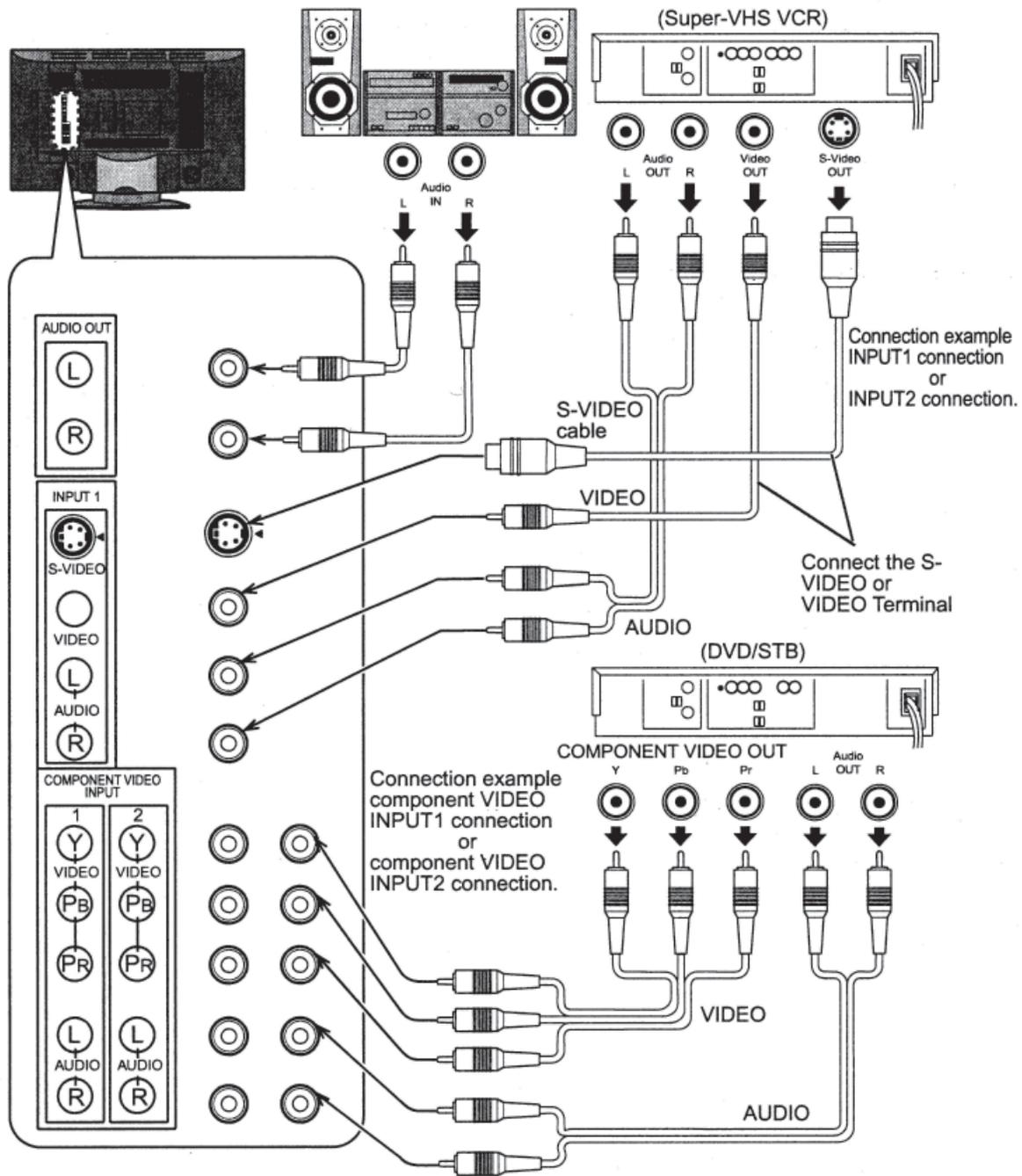
NOTES:

- When connecting video cables, priority is given to the S-Video cable when the S-Video input terminal and the video input terminal are connected at the same time.

- The volume control output of the LCD TV will be fixed. (SOUND, ADJUST, VOLUME UP/DOWN and SURROUND ON/OFF are not functional for output signals from the AUDIO OUT terminals.)

4-16.2.10 How to Connect the HDMI Terminal

HDMI*1 (HDMI: High Definition Multimedia Interface) is the first all digital consumer electronics A/V interface that supports uncompressed standard. One jack supports both video and audio information.
This HDMI*1 input can be connected to an EIA/CEA-861/861B*2 compliant consumer electronic device, such as a Set Top Box or DVD player equipped with HDMI or DVI output connection.

By inputting a High-bandwidth Digital Content Protection (HDCP) high-definition picture source to the HDMI terminal of this television, high-definition pictures can be displayed on the screen in their digital form.

HDMI Cable (not included)

Set Top Box

DVD player

HDMI or DVI signal out

Audio Cable (not included)

If the external device has DVI output only, use a HDMI-DVI conversion cable*3 to connect to the HDMI jack on the LCD. Also, connect the Audio out signal from the external device. (Set Top Box or DVD player) to the AUDIO IN*4 jacks beside the HDMI input.
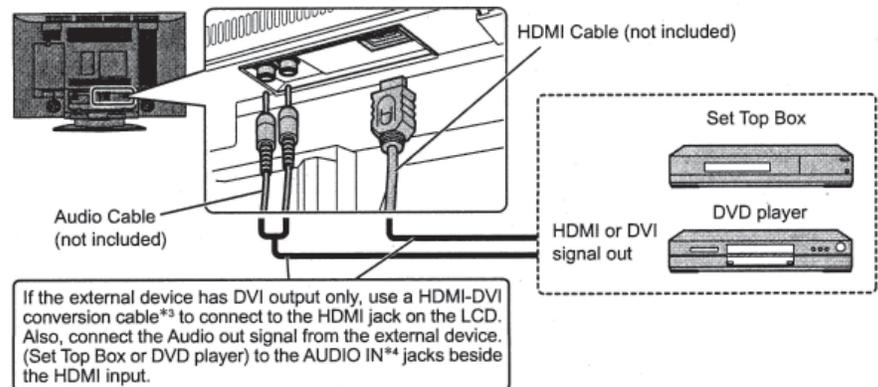
Applicable VIDEO Signal
This model supports following format.
Please adjust the format of connecting equipment.

	No. of Dots (H x V)	Vertical Scanning Frequency (Hz)
1080i	1,920 x 1,080i	59.94/60
480P	720 x 480 P 640 x 480 P	59.94/60 59.94/60
480i	720 (1,440) x 480i	59.94/60

This input terminal is not intended for use with computers.

AUDIO Signal (L.PCM)
When the digital sound signal is included at connecting HDMI equipment, L.PCM sound is available.
Sampling frequency
        48KHz/44.1KHz/32KHz

📌 **NOTES:**
1) This HDMI connector is Type A.
2) If you cannot display the picture because your Digital Set Top Box does not have a Digital OUT Terminal Output setting, use the component Video Input (or the S Video Input or Video Input). In this case the picture will be displayed as an analog signal.

*1. HDMI, the HDMI logo and High-Definition Multimedia Interface are trademarks or registered trademarks of HDMI Licensing LLC.

*2. EIA/CEA-861/861B profiles compliance covers profiles for transmission of uncompressed digital video including high bandwidth digital content protection.

*3. HDMI-DVI conversion cable part no. (TY-SCH03DH): available from the Panasonic National Parts Center at 1-800-332-5368 or on the Panasonic Website (USA only) at www.panasonic.com.

*4. AUDIO-IN, Please refer to *Audio Adjustment* section. (HDMI-IN)

4-16.2.11 Power ON/OFF
Connecting the Plug to the Wall Outlet
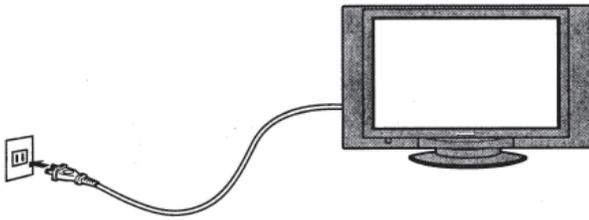
> 🖈 **NOTE:** The TV's power cord must first be plugged into the wall outlet.
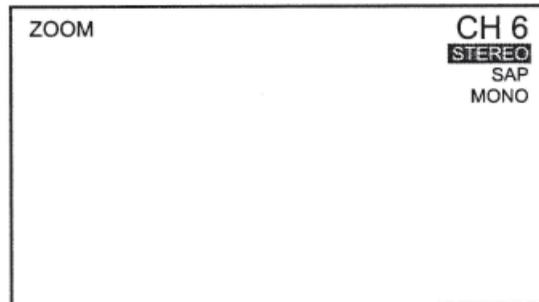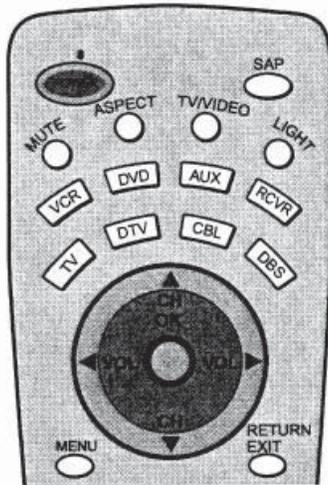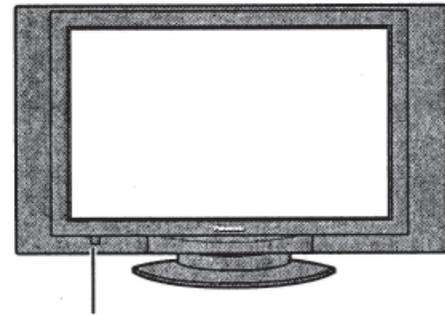
4-16.2.11.2 How to Turn the Power On

Press the Main POWER switch on the front of TV to turn the set on.

POWER-ON: Green
When the set is on or in standby mode press the Main POWER switch on the TV to turn the set off.

POWER-OFF: No light
Example: The screen below is displayed for a while after the TV is turned on. (setting condition is an example.)

Main POWER switch

```
ZOOM                                  CH 6
                                    STEREO
                                      SAP
                                     MONO
```

POWER

Press the POWER button on the remote control to turn the TV off: Red (standby)

Press the POWER button on the remote control to turn the TV on: Green

> 🖈 **NOTE:** The TV will still consume some power as long as the power cord is still plugged into the wall outlet.

4-16.2.12 Location of Controls
Illuminate Remote Control

Power button
Press to turn the TV ON or OFF.
Note: The TV's power cord must first be plugged into the wall outlet and then turned on at the POWER switch (standby mode).

ASPECT button
Change of screen size (See page 20).
→ JUST ⟶ ZOOM ⟶ FULL ⟶ NORMAL

MUTE button
Press this button to mute the sound, press again to cancel the mute.

Mode Selection buttons

Digital Video Disc Mode Selection for Remote Control

VCR Mode Selection for Remote Control

TV Mode Selection for Remote Control

Digital TV Mode Selection for Remote Control

Aux Mode Selection for Remote Control

Receiver/Amplifier Mode Selection for Remote Control

Digital Broadcasting Satellite for Remote Control

Cable TV Mode Selection for Remote Control

DVD   AUX   VCR   RCVR   DTV   CBL   TV   DBS
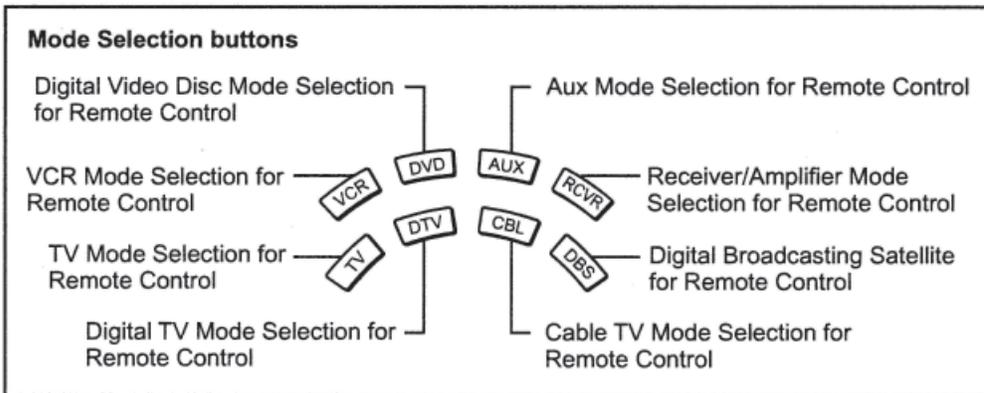
R-TUNE button
Switches to previously viewed channel or video mode.

Operation of other Device

Buttons / Device	REW / FF ◄◄ / ►►	PLAY ►	PAUSE ❚❚	STOP ■
VCR	VCR REW/FF	PLAY	Pause	STOP
CABLE/DBS	—	—	—	—
DVD/CD	Skip Search REW/FF	PLAY	Pause	STOP
RCVR	Surround +/−	—	—	—

Buttons / Device	REC ●	TV/VCR	VCR CH ▼ ▲	OPEN/CLOSE ⏏
VCR	VCR RECORD	TV/VCR Switch	VCR CH up/down	—
CABLE/DBS	CABLE RECORD	—	CABLE CH up/down	—
DVD/CD	—	—	SLOW +/− /RAND. REP	OPEN/CLOSE
RCVR	—	—	Center +/−	—

TV/VIDEO button
The input mode changes each time this button is pressed.

TV → COMPONENT 1 → COMPONENT 2 →
HDMI ← VIDEO 2 ← VIDEO 1 ←

SAP button
Selects Audio mode (See page 24).

STEREO → SAP → MONO

Lights the remote control buttons.
The selected button blinks when lit.

Changes to the next channel up
Moves cursor upward during menu mode.

Reduces volume
Moves cursor to
the left during
menu mode.

Increases volume
Moves cursor to
the right during
menu mode.

Displays menu
Press to access
TV, DTV, DBS or
DVD menus.

Press to Return
to previous
MENU or EXIT
from menu.

MENU

RETURN
EXIT

**Changes to the next
channel down**
Moves cursor downward
during menu mode.

Page up/down for DBS,
skip +/- for DVD & CD.

RECALL   PAGE   GUIDE

GUIDE button
for DBS.

Press to display the current system status, for example, Aspect
mode, Channel number, Stereo mode, Picture menu, TV/VIDEO,
Power save, Off timer and Color system.

**Direct program number
selection buttons**

SLEEP/PROG   **PROG dash button / SLEEP TIMER button**
Program dash channel numbers for DTV and DBS.
Sleep timer (MINUTES)

0 → 30 → 60 → 90

Panasonic
TV

4-16.2.13 Flow Chart of MENU

All adjustments and setting functions available in this set can be made using the menu buttons. The menu screen is composed of 2 menus: the ADJUST menu and the SET UP menu.

1

Press to display MENU screen, press again to clear.

MENU
ADJUST   SET UP
PICTURE
▥ PICTURE ADJUST
⊞ POSITION / SIZE
AUDIO
♪ AUDIO ADJUST

2 MENU selection

MENU
ADJUST   SET UP
PICTURE
▥ PICTURE ADJUST
⊞ POSITION / SIZE
AUDIO
♪ AUDIO ADJUST

or

MENU
ADJUST   SET UP
🔊 LANGUAGE
▱ PROGRAM CH
🔒 LOCK
㏄ CLOSED CAPTION
▭ INPUT LABEL
🔧 OTHER ADJUST

MENU
ADJUST   SET UP
PICTURE
▥ PICTURE ADJUST
⊞ POSITION / SIZE
AUDIO
♪ AUDIO ADJUST

MENU
ADJUST   SET UP
🔊 LANGUAGE
▱ PROGRAM CH
🔒 LOCK
㏄ CLOSED CAPTION
▭ INPUT LABEL
🔧 OTHER ADJUST

Please refer to the On Screen Help

An On Screen Help box is displayed whenever a menu is displayed on the TV. This Help box indicates which keys on the remote control are used to navigate the menu shown. See above for descriptions of button functions.
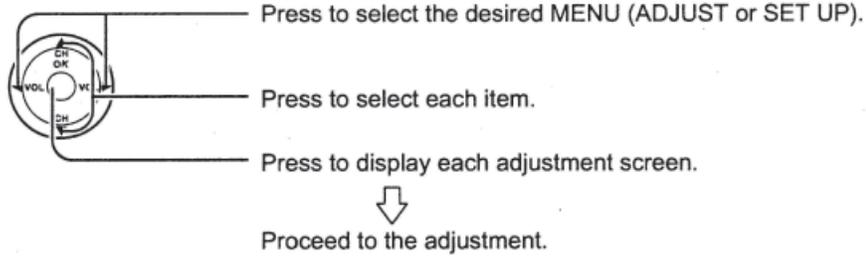
ON SCREEN HELP 'Instruction' box

LANGUAGE
LANGUAGE ◄ ENGLISH ►

Press to select the desired MENU (ADJUST or SET UP).

Press to select each item.

Press to display each adjustment screen.

⇩

Proceed to the adjustment.

● To return to previous screen :

RETURN
EXIT
Press to return.

● To end adjustments :

MENU
Press to exit from the MENU screen.
This returns the set to the normal viewing condition.

Press to display each adjustment screen.

OK

RETURN
EXIT

Press the RETURN button to return to previous screen.

TO PICTURE ADJUST
menu

PICTURE ADJUST
NORMALIZE
PIC MODE — STANDARD
BACK LIGHT — + 20
PICTURE — + 20
BRIGHTNESS — 0
COLOR — − 1
TINT — 0
SHARPNESS — 0
AI PICTURE — OFF ON

(See page 21)

POSITION/SIZE
NORMAL
NORMALIZE
SIZE
1
RETURN

TO AUDIO ADJUST
menu

AUDIO ADJUST
NORMAL
MODE ◄ DYNAMIC ►
BASS — + 10
TREBLE — + 8
BALANCE — 0
SURROUND OFF ON
EQUALIZER OFF ON
STEREO SAP MONO
HDMI IN AUTO

(See page 24)

Press to display each adjustment screen.

OK

RETURN
EXIT

Press the RETURN button to return to previous screen.

TO LANGUAGE

LANGUAGE
LANGUAGE ◄ ENGLISH ►

Allows you to select the language used for On Screen Displays.

►ENGLISH ◄► FRANÇAIS◄
► ESPAÑOL◄

TO CLOSED CAPTION

CLOSED CAPTION
cc ON MUTE ◄ NO ►
cc MODE ◄ OFF ►

(See page 29)

TO PROGRAM CHANNELS

PROGRAM CHANNELS
MODE TV CABLE
AUTO PROGRAM
MANUAL PROGRAM

(See page 18,19)

TO OTHER ADJUST
screen

OTHER ADJUST
VIDEO NR
OFF ON
3D Y/C
OFF ON
COLOR MATRIX
SD HD
POWER SAVE
STANDARD

(See page 30)

TO LOCK
selection screen

LOCK
BLOCK PROGRAMS
U. S. MOVIES
STATUS OFF ON
↩ CHANGE SETTING
ENTER CODE FIRST
_ _ _

(See page 25)

TO INPUT LABEL
selection screen

INPUT LABEL
COMPONENT1 ◄COMPONENT1►
COMPONENT2 COMPONENT2
VIDEO1 VIDEO1
VIDEO2 VIDEO2
HDMI HDMI

(See page 30)

4-16.2.14 Remote Control Battery Installation

Replacing Batteries

Replace batteries by following the steps below:

Requires two AA batteries.

1. Open the battery cover.

2. Install the batteries as shown in the battery compartment. (Polarity + or - must match the markings in the compartment).

3. Replace the cover.
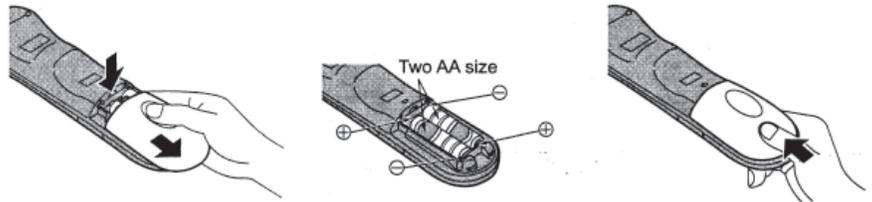
> **CAUTION!!** Precaution on battery use. Incorrect installation can cause battery leakage and corrosion that will damage the remote control transmitter.

Observe the following precautions:

1. Always use new batteries when replacing the old set.

2. Do not attempt to charge, short-circuit, disassemble, heat or burn used batteries.

3. Battery replacement is necessary when remote control acts sporadically or stops operating this unit.

> **NOTE:**
> - Do not drop, apply shock to or step on the remote control.
> - Do not spill water on the remote control.
> - Do not place objects between the remote control and remote control receiver.
> - Do not use remote controls for other equipment at the same time.
> - If the TV does not operate even when operating the remote control from a close range, it is time to replace the batteries.

4-16.2.15 Maintenance

To clean this unit, wipe with a soft, dry cloth.
If the surfaces are extremely dirty, use a soft cloth dipped in a soap and water solution or a weak detergent solution.

- Use eyeglass cleaner to remove stubborn dirt from the LCD.

- Never use alcohol, paint thinner or benzene to clean this unit.

- Before using a chemically treated cloth, read the instructions that came with the cloth carefully.

> **CAUTION!!** If water or similar substances get inside the monitor via the liquid crystal panel surface, a malfunction may result.

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4-16.2.16 Tuning Channels (Automatic Channel Programming)

Automatically scans all TV channels and stores them in memory

1 Turn the Power on and press the TV/VIDEO button to display the TV channel.

2 Press the MENU button to display the MENU screen and select SET UP.

Press to select PROGRAM CH.

Press to display the PROGRAM CHANNELS screen.

MENU

| ADJUST | SET UP |

LANGUAGE
PROGRAM CH
LOCK
CLOSED CAPTION
INPUT LABEL
OTHER ADJUST
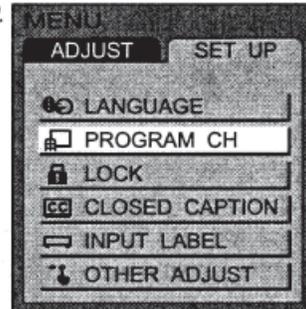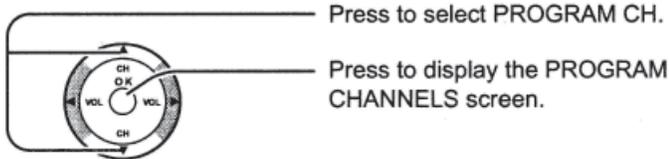
3 Press to select MODE.

Press to select TV or CABLE.

PROGRAM CHANNELS
MODE   TV CABLE
AUTO PROGRAM
MANUAL PROGRAM
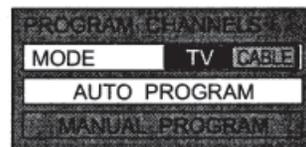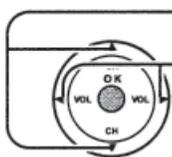
4 Press to select AUTO PROGRAM.

Press to display the confirmation screen.

AUTO PROGRAM

Activate
"AUTO PROGRAM?"
YES   NO
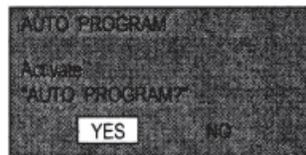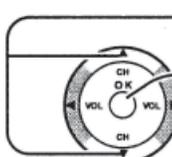
5 Press to select YES.

Press to select NO.

Press to run AUTO PROGRAM.

AUTO PROGRAM
in "AUTO PROGRAM"
CHANNEL   59
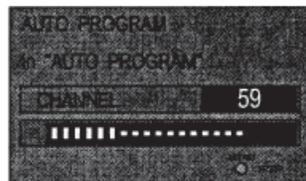
Channels will automatically advance until all channels have been scanned. Channel numbers with a video signal present will be stored in the Channel Scan Memory.

MENU

Press to exit from the MENU screen.
This returns the set to the normal viewing condition.

NOTE:
- When buttons are pressed with AUTO PROGRAM running, the TV set will return to normal viewing. (Channels searched up to this point are added.)
- After AUTO PROGRAM is finished, the lowest channel number added will be received.
- When there are no receivable channels, channel 60 is displayed for TV and channel 125 is displayed for cable TV.

4-16.2.17 Tuning Channels (Manual Channel Programming)

Use this setting when changing setting of receiving channels or changing the channel display.

Turn the TV on and select the broadcast channel. Follow the steps on the previous page to display the PROGRAM CHANNELS screen.

1

Press to select MANUAL PROGRAM.

Press to display the MANUAL PROGRAM screen.

PROGRAM CHANNELS

MODE   TV   CABLE

AUTO PROGRAM

MANUAL PROGRAM

MANUAL PROGRAM

ENTER CHANNEL   DELETE — — ADD
        121   RETURN
                    CH SELECT

Adding or deleting channels

2

Press to select channel (or number keys).

MANUAL PROGRAM

ENTER CHANNEL   DELETE — — ADD
        121   RETURN
                    CH SELECT

3

Press to add channels to memory (Channel number turns blue).

Press to delete channels from memory (Channel number turns yellow).

4 Repeat steps 2 and 3 to continue adding or deleting channels.

MENU

Press to exit from the MENU screen.
This returns the set to the normal viewing condition.

BLUE BIRD
Coachworks®
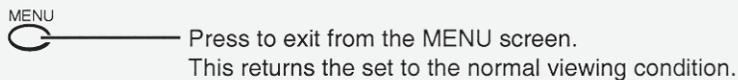
4-16.2.18 ASPECT Controls

The color monitor will allow you to enjoy viewing the picture at its maximum size, including wide screen cinema format picture.
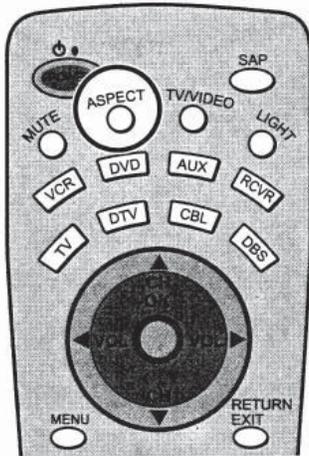
ASPECT **ASPECT Button**

The aspect mode changes each time the ASPECT button is pressed.

JUST ⟶ ZOOM ⟶ FULL ⟶ NORMAL
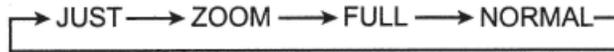
NOTE: When a 1080i signal is being received, the mode is set to FULL, and aspect switching is not possible.

Mode	Picture	Explanation
NORMAL		NORMAL mode will display a 4:3 picture at its standard 4:3 size.
JUST		JUST mode will display a 4:3 picture at its maximum size but with aspect correction applied to the sides of the screen so the elongation is only apparent at the left and right edges of the screen. The size of the picture will depend on the original signal.
ZOOM		ZOOM mode magnifies the central section of the picture.
FULL		FULL will display the picture at its maximum size but with slight elongation.

4-16.2.19 Picture Adjustments

1 Press the MENU button to display the MENU screen and select ADJUST.
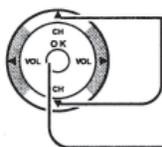
Press to select PICTURE ADJUST.
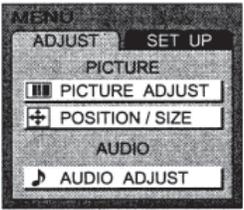
Press to display the PICTURE ADJUST screen.

2 Press to select the menu to adjust.
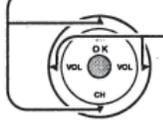
Select the desired level by looking at the picture behind the menu.
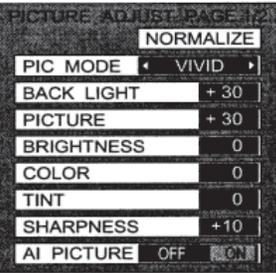
NORMAL is displayed at default.
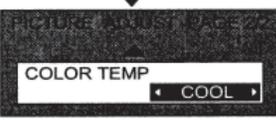
PIC MODE PICTURE MODE is stored for TV, VIDEO1, VIDEO2, COMPONENT1, COMPONENT2 and HDMI individually.

→ STANDARD ←→ CINEMA ←→ VIVID ←
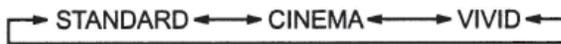
MODE	Function
STANDARD	Displays standard image.
CINEMA	Ideal for watching movies in a dark room.
VIVID	Displays a clear screen with contrast of light and dark.

BACK LIGHT, PICTURE, BRIGHTNESS, COLOR, TINT, SHARPNESS, AI PICTURE, COLOR TEMP

You can change the level of each item (BLACK LIGHT, PICTURE, BRIGHTNESS, COLOR, TINT, SHARPNESS, AI PICTURE and COLOR TEMP) for each MENU (STANDARD, CINEMA, and VIVID) according to your personal preference.

Item	Function
BACK LIGHT	Luminance of the back light is adjusted.
PICTURE	Selects proper brightness and density for the room.
BRIGHTNESS	Adjusts for easier viewing of dark pictures such as night scenes.
COLOR	Adjusts the level of color
TINT	Adjusts for flesh tone color.
SHARPNESS	Adjusts the degree of sharpness.
AI PICTURE	Displays black and white colors more clearly when turned ON.
COLOR TEMP	Increase or decrease WARM (red) and COOL (blue) colors to suit personal preference.

To reset to standard setting:
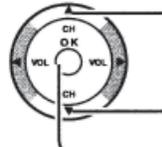
Press to select NORMALIZE.

Press OK.

BLUE BIRD
Coachworks®
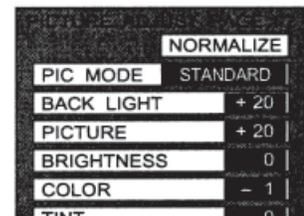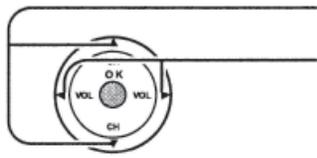
3 ADVANCED ADJUST

Press to select PIC MODE.
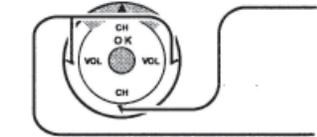
Select STANDARD or CINEMA.

Press down to PAGE 2 and
Select ADVANCED ADJUST.
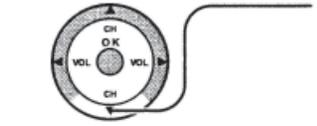
Press to select ADVANCED
ADJUST ON.
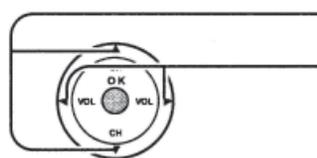
Press to go to NEXT PAGE.
ADVANCED ADJUST will be
Shown.
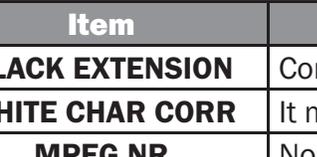
Press to select the menu to adjust.

Select the desired level by looking at
The picture behind the menu.

NORMAL is displayed at default.

PICTURE ADJUST PAGE 1/2	
	NORMALIZE
PIC MODE	STANDARD
BACK LIGHT	+ 20
PICTURE	+ 20
BRIGHTNESS	0
COLOR	− 1
TINT	0
SHARPNESS	0
AI PICTURE	OFF ON

COLOR TEMP
◄ NORMAL ►

ADVANCED ADJUST
OFF ON

ADVANCED ADJUST	
	NORMAL
BLACK EXTENSION	+ 8
WHITE CHAR CORR	+ 8
MPEG NR	0
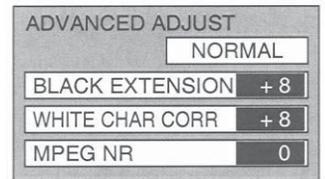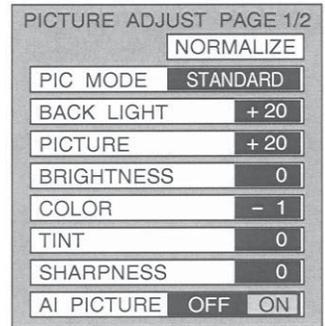
Item	Function
BLACK EXTENSION	Contrast level will be improved.
WHITE CHAR CORR	It makes white characters brighter.
MPEG NR	Noise unique to DVD, STB, etc. will be reduced.

4-16.2.20 Position/Size Adjustment
This function will adjust the picture position / size for easy viewing.

1 Press MENU button to display MENU
screen and select adjust.

Press to select POSITION/SIZE.

Press to display POSITION/SIZE control.
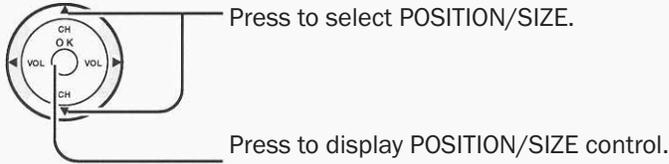
2 **[Picture Position Adjustment]**
It will work for "ZOOM" mode only.

Press to move picture vertically for the
best view.
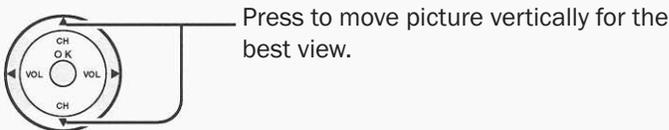
3 **[Picture Size Adjustment]**
It will work for "NORMAL" and "ADJUST" mode only.

Press to select.
Size 1: reduced black bar.
Size 2: widened black bar.

To return to previous screen:

RETURN
EXIT
Press to return.

To reset to standard setting:

Press OK.

MENU
ADJUST | SET UP
PICTURE
PICTURE ADJUST
POSITION / SIZE
AUDIO
AUDIO ADJUST

POSITION/SIZE
NORMAL
NORMALIZE
SIZE
1
RETURN

ZOOM

Size1

Size2

BLUE BIRD
Coachworks®
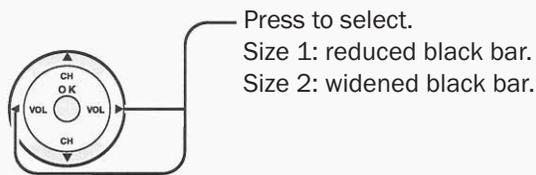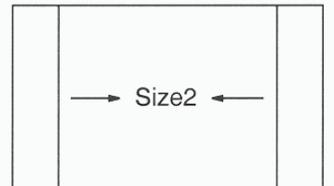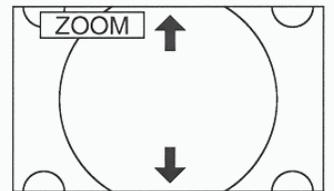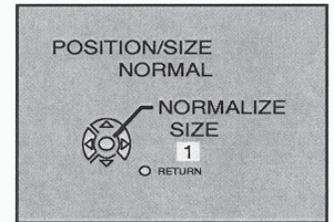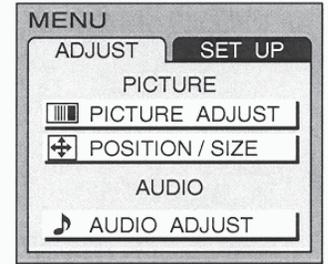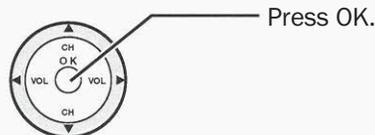
4-16.2.21 Audio Adjustments

1 Press the MENU button to display the MENU screen and select ADJUST.

Press to select AUDIO ADJUST.

Press to display the AUDIO ADJUST Screen

2

Press to select the menu to adjust.

Select the desired level by listening to the sound.

NORMAL is displayed at default.

```
MENU
 ADJUST    SET UP
     PICTURE
 ▦ PICTURE ADJUST
 ⊕ POSITION / SIZE
     AUDIO
 ♪ AUDIO ADJUST
```

```
AUDIO ADJUST
                  NORMAL
 MODE      ◀ DYNAMIC ▶
 BASS             + 10
 TREBLE           + 8
 BALANCE           0
 SURROUND   OFF   ON
 EQUALIZER  OFF   ON
 STEREO  SAP   MONO
 HDMI IN          AUTO
```

MODE
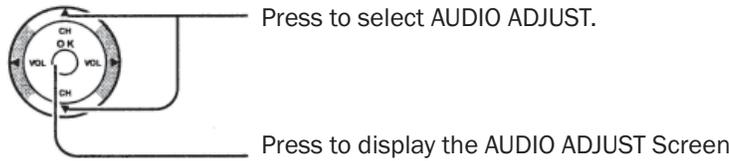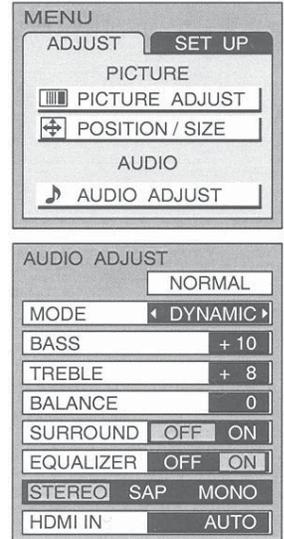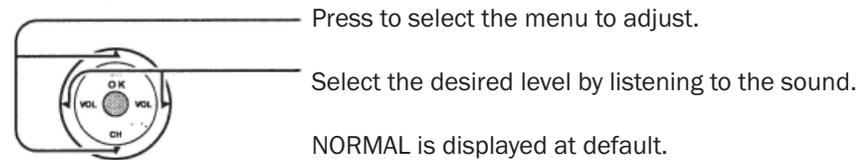
→ AUTO ←→ STANDARD ←→ DYNAMIC ←

MODE	FUNCTION
AUTO	Automatically adjusts quiet sound and loud sound for ease of listening.
STANDARD	Emits the original sound.
DYNAMIC	Gives contrast to sound.

BASS, TREBLE, BALANCE, SURROUND, EQUALIZER

You can change the level of each item, (BASS, TREBLE, BALANCE, SURROUND, EQUALIZER) For each MODE (AUTO, STANDARD and DYNAMIC) according to your personal preference.

ITEM	FUNCTION
BASS	Adjusts low sounds.
TREBLE	Adjusts high sounds
BALANCE	Adjusts left and right volume
SURROUND	To enjoy a concert hall effect, turn SURROUND to ON when a stereo signal is available.
EQUALIZER	To make voice sound clear. Normally set to ON.

Selecting STEREO/SAP/MONO

STEREO ←→ SAP ←→ MONO

Note:

Red display	: With signal
White display	: No signal
White display	: MONO

ITEM	FUNCTION
STEREO	Two channel Audio reception.
SAP	Second Audio Programming (*typically used for bilingual audio*)
MONO	Use when stereo signal is weak

HDMI IN

Perform input switching of analog audio input (for DVI) and digital audio input (for HDMI) when using the HDMI terminal

→ AUTO ←→ DIGITAL ←→ ANALOG ←

AUTO	Set use of analog audio input when digital audio signal is not available.
DIGITAL	Forces use of digital audio input signal transmitted via the HDMI terminal.
ANALOG	Forces use of analog audio input signal transmitted via separate RCA terminals.

4-16.2.22 Lock Feature

In the United States, the V-CHIP consists of two rating systems, which are MPAA (MOTION PICTURE) and TV PARENTAL GUIDELINES. Its function is to block programs by the rating data in the XDS data packets sent from broadcasting stations. The user can select which rating programs should be blocked by the LOCK MENU options.

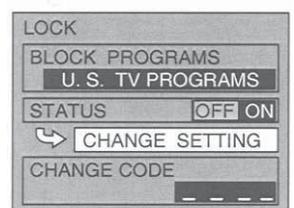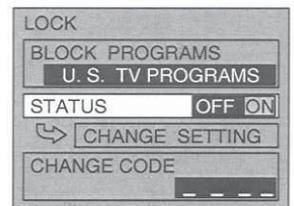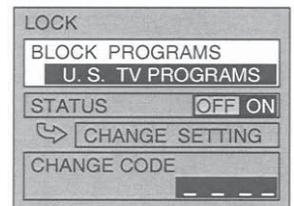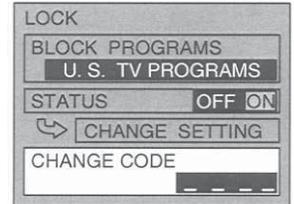Press the MENU button to display the MENU screen and select SET UP.

Press to select LOCK.
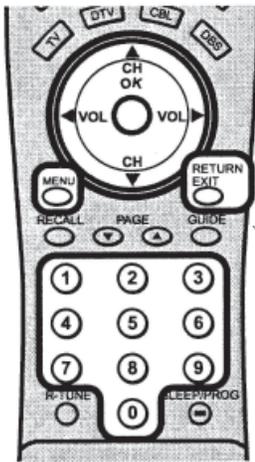
Press to display the LOCK screen
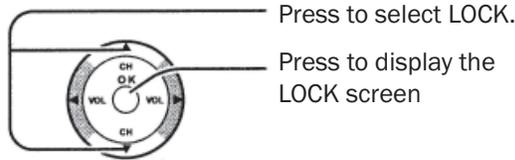
Input code
Enter any 4 digit number as a password.
These numbers will be needed when Deactivating the LOCK function.

While entering a code, by pressing the up ▲ or down ▼ buttons you can input a new code again.

After entering your secret code for the first time, the onscreen display will Change to CHANGE CODE. And you can change the Input code.
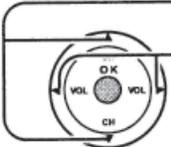
NOTE: Use a code that is easy to remember and record it in a safe place.

1 Selecting broadcasts to lock.

Press to select BLOCK PROGRAMS.

Press to select U.S. MOVIES, U.S. TV PROGRAMS, CANADIAN ENGLISH Or CANADIAN FRENCH.

→ U.S. MOVIES ←→ U.S. TV PROGRAMS ←
→ CANADIAN ENGLISH ←→ CANADIAN FRENCH ←

2 Press to select STATUS.

Press to select ON or OFF.

3 Press to select CHANGE SETTING.

Press to display the next screen.

MENU
ADJUST   SET UP
LANGUAGE
PROGRAM CH
LOCK
CLOSED CAPTION
INPUT LABEL
OTHER ADJUST

LOCK
BLOCK PROGRAMS
U. S. MOVIES
STATUS   OFF ON
CHANGE SETTING
ENTER CODE FIRST

LOCK
BLOCK PROGRAMS
U. S. TV PROGRAMS
STATUS   OFF ON
CHANGE SETTING
CHANGE CODE

LOCK
BLOCK PROGRAMS
U. S. TV PROGRAMS
STATUS   OFF ON
CHANGE SETTING
CHANGE CODE

LOCK
BLOCK PROGRAMS
U. S. TV PROGRAMS
STATUS   OFF ON
CHANGE SETTING
CHANGE CODE

LOCK
BLOCK PROGRAMS
U. S. TV PROGRAMS
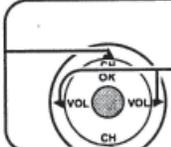STATUS   OFF ON
CHANGE SETTING
CHANGE CODE
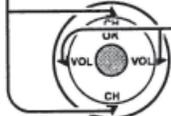
For U.S. TV PROGRAM to lock

1

Press to select VIEW NR PROGRAMS?

Press to select NO or YES.

NO   : Cannot view programs with NR signals
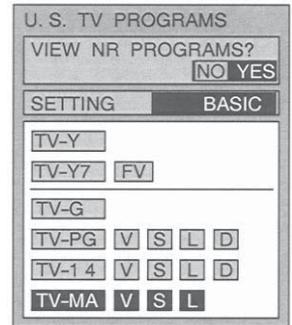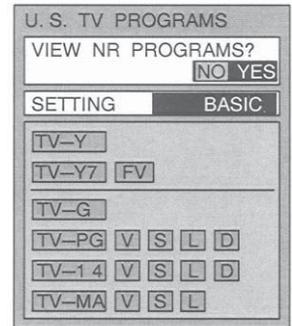YES : Can view programs with NR signal.

2

Press to select SETTING.

Press to select BASIC or DETAILED.

→ BASIC ←→ DETAILED ←

3

Press to select rating.

BASIC: Change the selected title.

DETAILED: The cursor selecting the title can be moved to select options displayed on the right.

Press to lock or unlock the rating.

Lock: Red
Unlock: Green

Locking and unlocking

• When a title field is selected, all ratings below this rating are selected.
• When options within an option field are selected, ratings below this rating within the same field are selected.
• Ratings displayed in green are unlocked and those displayed in red are blocked programs.

    1.   Ratings for children: These ratings are divided into ranks as follows.

TV-Y			
TV-Y7	FV	TV-Y → TV-Y7 → TV-Y7-FV	
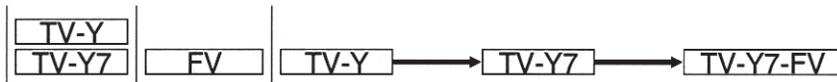
    2.   Ratings for teenagers: These ratings can be created out of these major categories to form various combinations. These combinations are described in the paragraphs to follow.
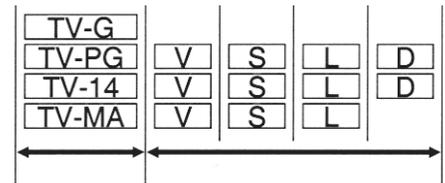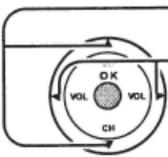
TV-G				
TV-PG	V	S	L	D
TV-14	V	S	L	D
TV-MA	V	S	L	

To return to previous screen: RETURN EXIT   Press to return.

To end adjustments: MENU   Press to exit from the MENU screen. This returns the set to the normal viewing condition.
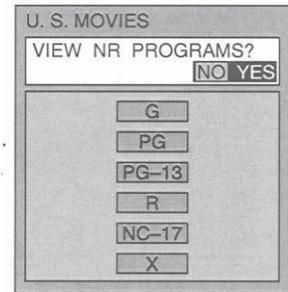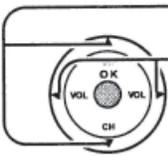
For U.S. MOVIES to lock

1

Press to select VIEW NR PROGRAMS?

Press to select NO or YES.

NO   : Cannot view programs with NR signals.
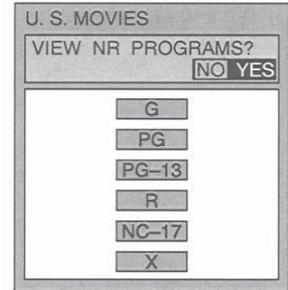YES : Can view programs with NR signal.

2

Press to select rating.

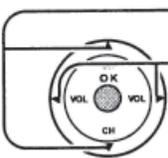Press to lock or unlock the rating.

Lock: Red
Unlock: Green

Rating
    G   : General audience
    PG   : Parental guidance suggested
              Under 13 years old
    R   : Restricted
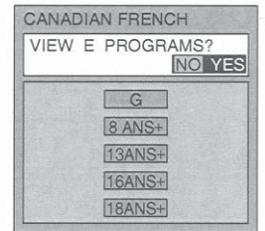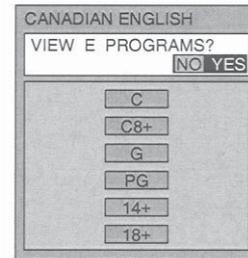   NC17 : No one under 17 is admitted
    X   : Pornography

For CANADIAN ENGLISH / CANADIAN FRENCH to lock
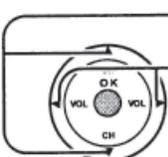
1

Press to select VIEW E PROGRAMS?

Press to select NO or YES

2

Press to select rating.

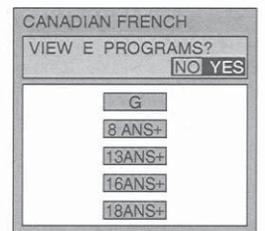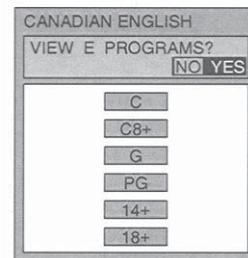Press to lock or unlock the rating.

Lock: Red
Unlock : Green

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CANADIAN ENGLISH RATINGS CHART

E	Exempt - Exempt programming includes: news, sports, documentaries and other information programming, talk shows, music videos, and variety programming.
C	Programming intended for children under age 8. No offensive language, nudity or sexual content.
C8+	Programming generally considered acceptable for children 8 years and over. No profanity, nudity or sexual content.
G	General programming, suitable for all audiences.
PG	Parental Guidance suggested. Some material may not be suitable for children.
14+	Programming contains themes or content which may not be suitable for viewers under the age of 14. Parents are strongly cautioned to exercise discretion in permitting viewing by pre-teens and early teens.
18+	18+ years old. Programming restricted to adults. Contains constant violence or scenes of extreme violence.

CANADIAN FRENCH RATINGS CHART

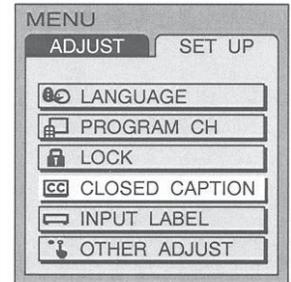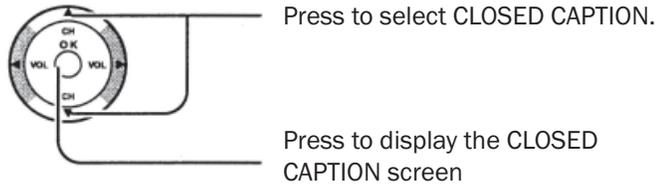|	
E	Exempt - Exempt programming.
G	General - Programming intended for audience of all ages. Contains no violence, or the violence content is minimal or is depicted appropriately.
8 ANS+	8+ General - Not recommended for young children. Programming intended for a broad audience but contains light or occasional violence. Adult supervision recommended.
13 ANS+	Programming may not be suitable for children under the age of 13 - Contains either a few violent scenes or one or more sufficiently violent scenes to affect them. Adult supervision strongly suggested.
16 ANS+	Programming may not be suitable for children under the age of 16 - Contains frequent scenes of violence or intense violence.
18 ANS+	18+ years old. Programming restricted to adults. Contains constant violence or scenes of extreme violence.

To return to previous screen:　　RETURN EXIT　　Press to return.
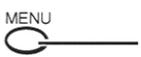
To end adjustments:　　MENU　　Press to exit from the MENU screen.
　　　　　　　　　　　　　　This returns the set to the normal viewing condition.

4-16.2.23 Closed Captions

This unit has a built in decoder that provides a visual depiction of the audio portion of a television program in the form of written words across the screen (white or colored letters on a black background). It allows the viewer to read the dialogue of a television program or other information.
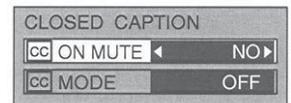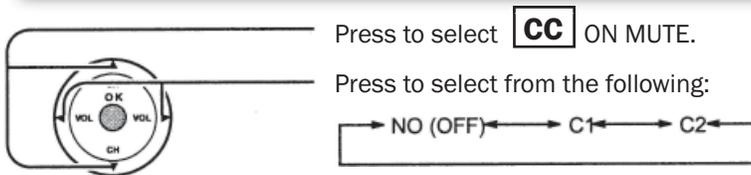
1 Press the MENU button to display the MENU screen and select SET UP.

Press to select CLOSED CAPTION.

Press to display the CLOSED CAPTION screen

```
MENU
 ADJUST    SET UP
 LANGUAGE
 PROGRAM CH
 LOCK
CC CLOSED CAPTION
 INPUT LABEL
 OTHER ADJUST
```
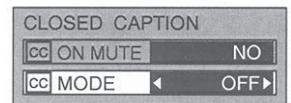
2 CC **ON MUTE**

Activates the On-Screen Closed Caption feature, when the MUTE button on the Remote Control is pressed. To deactivate, press the MUTE button again.

> **NOTE:** This feature functions when the Closed Caption Mode is in the "OFF" position. The program being viewed must be broadcast with Closed Caption.

Press to select CC ON MUTE.

Press to select from the following:

→ NO (OFF) ← → C1 ← → C2 ←

```
CLOSED CAPTION
CC ON MUTE  ◄    NO ►
CC MODE          OFF
```

3 CC **MODE**

Activates the On-Screen Closed Caption feature. When activated this feature will remain on until OFF is selected in this menu.

Press to select CC MODE.

Press to select from the following:

→ OFF ← → C1 ← → C2 ←

```
CLOSED CAPTION
CC ON MUTE        NO
CC MODE  ◄    OFF ►
```
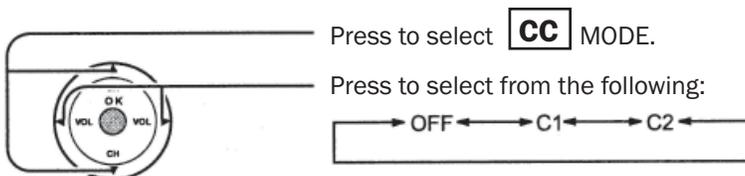
CAPTION OFF - Recommended mode when Closed Caption is not being used.

CAPTION C1 - For video related information that can be displayed (up to 4 lines of script strategically placed on the television screen so that it does not obstruct relevant parts of the picture).

CAPTION C2 - Another mode used for video related information.

To return to previous screen: RETURN EXIT   Press to return.

To end adjustments: MENU   Press to exit from the MENU screen.
This returns the set to the normal viewing condition.

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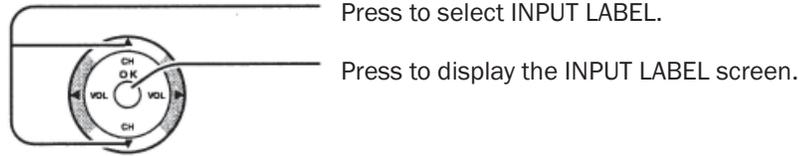# 4-16.2.24 Customizing the VIDEO INPUT labels
Display for each VIDEO INPUT can be changed to match with the connected device (VCR, DVD Player etc.).

1 Press the MENU button to display the MENU screen and select SET UP.

Press to select INPUT LABEL.

Press to display the INPUT LABEL screen.

2 Press to select the VIDEO INPUT.

COMPONENT1 ⟷ COMPONENT2
HDMI ⟷ VIDEO2 ⟷ VIDEO1

Press to change the INPUT LABEL.

Each INPUT LABEL has the following choices.

COMPONENT1(COMPONENT2, VIDEO1, VIDEO2 or HDMI) ⟷ VCR ⟷ LD
[BLANK] ⟷ DTV ⟷ DVD ⟷ GAME
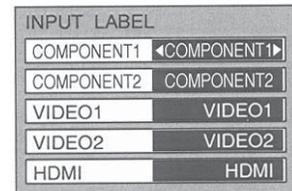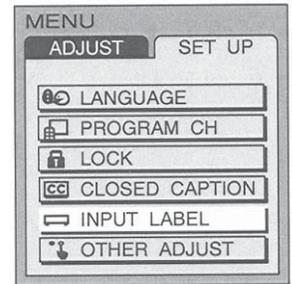
4-16.2.25 Other Adjust

1 Press the MENU button to display the MENU screen and select SET UP.

2 Press to select OTHER ADJUST.

Press to access OTHER ADJUST.

3 Press to select the item that you would like to change.

Press to select desired condition.
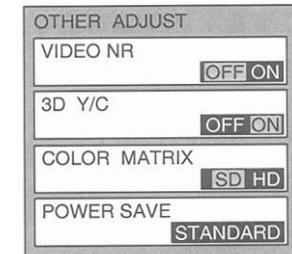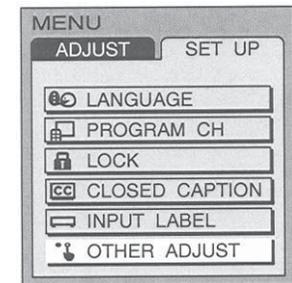
VIDEO NR
Reduce video noise in the picture.

Selection condition: ON ⟷ OFF

3D Y/C FILTER
Minimizes noise and cross color in the picture.
Not available for COMPONENT VIDEO.

Selection condition: ON ⟷ OFF

COLOR MATRIX
Displays input signals (480p signals) in a natural color.
Automatically adjusts color parameters for HD (high definition) and SD (standard definition).

Selection condition: SD ⟷ HD

POWER SAVE
The POWER SAVE will be suitable for watching at night and power consumption will be reduced.

Selection condition: STANDARD ⟷ SAVING

4-16.2.26 Operational Peripheral Equipment Using the Remote Control

Programming the Illuminated Remote Control Using Access Codes

The Universal Remote Control can be programmed to operate many manufacturers' components, using the component function button for VCR, DVD, AUX, RCVR, TV, DTV, CABLE or DBS. Follow the procedures for programming your Remote Control with or without a code for the component.

Determine the manufacturer of the component and look in the table for the code.

1 Confirm that the external component is plugged in and operating.

2 Turn the component off.

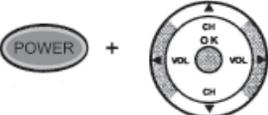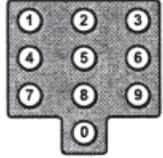**3** Press and hold POWER and OK together, for at least 5 seconds. After 5 seconds, all the illuminated mode keys will begin to flash. Release the POWER and OK keys.

4 Press the mode key. The mode key will illuminate steadily, all others will go out.

5 Enter the 3-digit component code using the Remote Control numeric keypad.

6 Press the Remote Control POWER to test the component. If the procedure is successful, the component will turn on.

Default Modes for Remote Control

Device	Operates	Default
TV	TV (Panasonic Only)	Panasonic TV Codes
DTV	DTV (Panasonic Only)	Panasonic DTV Codes
CABLE	CABLE (Preset)	Panasonic CABLE Codes
DBS	DBS (Preset)	Panasonic DBS Codes
VCR	VCR (Preset)	Panasonic VCR Codes
DVD/CD	DVD and CD (Preset)	Panasonic DVD Codes
AUX	Personal Video Recorders, Tape and VCR2	Panasonic Personal Video Recorders Code
RCVR	Audio Receiver (Preset)	Panasonic RCVR Code

Helpful Hints: Unsuccessful Code

If the component does not operate with the Remote Control, repeat the procedure using another code. (Some brands have multiple codes). If an incorrect code is entered, or if the procedure takes longer than 30 seconds, the programming will fail.

Programming the Illuminated Remote Control Using Access Codes

This procedure searches all codes and is called the "sequence method."
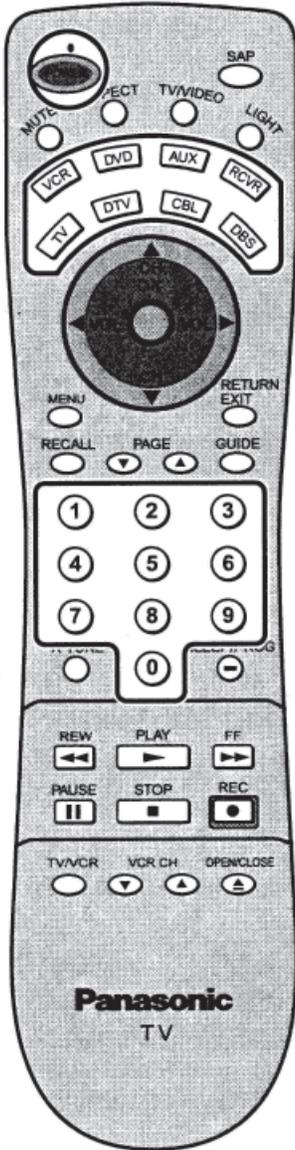
1 Confirm that the external component is plugged in and on.

2 Turn the component off.
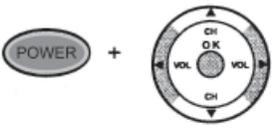
3 POWER + [OK pad]   Press POWER and OK together, for at least 5 seconds.
After 5 seconds, all the illuminated mode keys will begin to flash.
Release the POWER and OK key.

4 [VCR DVD AUX RCVR DTV CBL TV DBS]   Press the mode key.
The mode key will illuminate steadily, all others will go out.
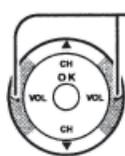
5 [OK pad]   Press to move forward to the next code, or to move backward.

6 POWER
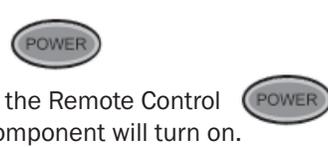
Press the Remote Control   POWER   to test the component. If the procedure was successful, the component will turn on.

> **NOTE:** Repeat the above steps until the component code is found. It may take many attempts before the correct code is found.

7 [OK pad]   After the code is found, press OK to store the code.

> **NOTE:** The step and set mode will start from the current device (not the beginning of the list, except for the first time).

4-16.3.27 Infrared Codes Index

The remote control is capable of operating many brands of peripheral equipment. Refer to previous section for programming procedures.

> **NOTES:** The remote control memory is limited and therefore some models may not operate. The remote control is not designed to control all features available in all models.
>
> After entering the proper infrared code, press the desired Mode Selection Button on the remote control. Refer to sections *Illuminated Remote Control* and *Programming the Illuminated Remote Control Using Access Codes* for details on operating peripheral equipment using the remote control.

4-16.3.27 Infrared Codes Index

The remote control is capable of operating many brands of peripheral equipment. Refer to previous section for programming procedures.

> **NOTES:** The remote control memory is limited and therefore some models may not operate. The remote control is not designed to control all features available in all models.
>
> After entering the proper infrared code, press the desired Mode Selection Button on the remote control. Refer to sections *Illuminated Remote Control and Programming the Illuminated Remote Control Using Access Codes* for details on operating peripheral equipment using the remote control.

Infrared Remote Codes for Specific Components								
Helpful Hint: Write down the code numbers for your components in the space provided below. This will serve as a handy reference whenever you need to reprogram your remote control.								
CABLE				VCR				CD				
DBS				RCVR				LD				
Other Component				Other Component				Other Component				
Other Component				Other Component				Other Component				

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Codes for VCR

Brand	Code	Brand	Code
Admiral	335	Orion	320, 326
Aiwa	332	Panasonic	321, 322, 323, 324
Akai	314, 315, 316, 329	JC Penney	300, 305, 310, 311, 324, 339, 345
Audio Dynamic	311, 339	Pentax	300, 311, 345
Bell & Howell	305, 313	Philco	320, 323, 324, 326, 331, 343
Broksonic	320, 326	Phillips	323, 324, 331
Canon	323, 325	Pioneer	323
Citizen	306	Proscan	300, 301, 302, 323, 324, 331, 333, 345, 346
Craig	305, 306, 329	Quasar	321, 322, 323, 324
Curtis Mathes	324, 345	Radio Shack	305, 309, 324, 333, 336, 340
Daewoo	301, 324, 343	RCA	300, 301, 302, 323, 324, 331, 333, 345, 346
DBX	310, 311, 339	Realistic	305, 309, 324, 336, 340
Dimensia	345	Samsung	302, 304, 333
Emerson	303, 319, 320, 325, 326, 343	Sansui	320, 326, 339, 352
Fisher	305, 307, 308, 309, 313	Sanyo	305, 309, 313
Funai	320, 326, 334	Scott	301, 302, 304, 309, 320, 326, 338, 340, 347, 348
GE	324, 333, 345	Sears	300, 305, 306, 307, 308
Goldstar	306	Sharp	335, 336
Gradiente	334	Shintom	317
Hitachi	300, 323, 345	Signature 2000	335
Instant Replay	323, 324	Singer	317
Jensen	339	Sony	328, 329, 330
JVC	310, 311, 334, 339	Sylvania	323, 324, 331
Kenwood	306, 310, 311, 339	Tashiro	306
LXI	300, 305, 306, 307, 308, 309	Tatung	310, 311, 339
Magnavox	323, 324, 331	Teac	310, 311, 339
Marantz	310, 311, 339	Technics	321, 322, 323, 324
Marta	306	Teknika	324
Memorex	309, 324	Toshiba	301, 346
MGA	338, 340, 341, 347, 348	Vector Research	311
Minolta	300, 345	Wards	306, 309, 335, 336, 344
Mitsubishi	338, 340, 341, 347, 348	Yamaha	305, 310, 311, 339
Multitech	304, 347	Zenith	306, 344
NEC	310, 311, 334, 339		
Olympic	343, 324		
Optimus	306, 321, 328, 335		

Codes for Personal Video Recorders

Brand	Code	Brand	Code	Brand	Code
Panasonic Relay	100	Phillips Tivo	101	Sony Tivo	102

Codes for DVD

Brand	Code	Brand	Code
Denon	100	Saba	101
Ferguson	101	Samsung	110
JVC	109	Sharp	108
Mitsubishi	105	Sony	104
Nordmende	101	Technics	100
Panasonic	100	Thomson	101
Phillips	103	Toshiba	103
Pioneer	102	Yamaha	100
RCA	101	Zenith	107

Codes for Cassette Deck

Brand	Code	Brand	Code
Aiwa	223, 224, 225	Phillips	222
Denon	231	Pioneer	204
Fisher	203	RCA	226, 227, 228
Jensen	214	Sansui	205, 210
JVC	229, 230	Sharp	231
Kenwood	200, 207	Sony	219, 220
Marantz	202	Teac	210, 211, 215
Nakamichi	205	Technics	216, 218
Onkyo	208, 209, 213	Yamaha	201, 202
Panasonic	216, 218		

Codes for VCR

Brand	Code	Brand	Code
Admiral	226	Optimus	208, 218, 220, 222
Aiwa	233, 235	Panasonic	224, 225, 227
Carver	229	Phillips	229, 230
Denon	242	Pioneer	208
Emerson	239	Quasar	224, 225, 227
Fisher	205	RCA	231, 237, 238, 247
Harman/Kardon	219, 220, 221, 223	Sansui	210, 246
Hitachi	207	Sanyo	205
Jensen	234	Scott	210, 246
JVC	240, 241, 245	Sharp	242, 243
Kardon	223	Sherwood	220
Kenwood	200, 201, 211, 245	Sony	228
LXI/Sears	236	Soundesign	244
Magnovox	229, 232	Teac	212, 216, 218
Marantz	229	Technics	224, 225, 227
McIntosh	221	Victor	240, 241, 245
Nakamichi	210	Yamaha	202, 203, 204
Onkyo	214, 215		

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Codes for Receivers

Brand	Code	Brand	Code
Admiral	120	Optimus	103, 127, 130, 131
Aiwa	125, 126	Panasonic	118, 119, 121
Denon	134, 135, 136	Phillips	123
Fisher	104	Pioneer	105, 107
Garrard	113	Quasar	118, 119, 121
Harman Kardon	115, 123	RCA	103, 105, 127, 130, 131
Jensen	129	Sansui	103, 111, 139
JVC	132, 133	Sharp	134, 137
Kenwood	100, 108	Sony	122
Magnavox	127	Soundesign	138
Marantz	124	Teac	111, 112, 113
McIntosh	116	Technics	118, 119, 121
Nakamichi	106	Victor	132, 133
Onkyo	109, 114	Yamaha	101, 102

Codes for Cable Box

Brand	Code	Brand	Code
ABC	124	Pulsar	105, 132
Archer	125, 132	Puser	115
Cableview	105, 132	RCA	115
Citizen	105, 122	Realistic	132
Curtis	112, 113	Regal	112, 118, 140, 141, 142, 145
Diamond	124, 125, 132	Regency	134
Eagle	129	Rembrandt	105, 132, 137
Eastern	134	Samsung	105
GC Brand	105, 132	Scientific Atlanta	111, 112, 113
Gemini	122	Simark	101, 105
General	111, 119, 120, 121, 122, 123	Sprucer	105, 110
Instrument/Jerrold	124, 125, 126, 127	Stargate	105, 132
Hamlin	112, 118, 140, 141, 142, 145	Teleview	101, 105
Hitachi	103, 124	Texscan	144
Macom	103, 104, 105	Tocom	135
Magnavox	133	Toshiba	104
Memorex	130	Unika	125, 132
Movietime	105, 132	Universal	122, 132
Oak	102, 137, 139	Videoway	106
Panasonic	109, 110, 114	Viewstar	129, 130
Phillips	106, 107, 128, 129, 130	Zenith	100, 117
Pioneer	101, 116	Zenith/Drae Satellite	100

Codes for DBS

Brand	Code	Brand	Code
Dish Network (Echostar)	105, 115, 116	Panasonic	104
Echo Star	105	Phillips	101, 102
Express VU	105, 115	Proscan	106, 109, 110, 113
G.E.	106	RCA	106, 109, 110, 113
G.I. (General Instrument)	108	Sony	107
Gradiente	114	Star Choice	103, 106
Hitachi	103, 111, 112	Toshiba	100
HNS (Hughes)	103	Uniden	101, 102
Magnavox	101, 102		

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4-16.3.28 Mode Operational Key Chart

This chart defines which keys are operational after programming (if needed), while in the selected remote control mode TV, DTV, CABLE, DBS, VCR, DVD. . .etc.

KEY NAME	TV MODE	DTV MODE	CABLE MODE	DBS MODE
POWER	POWER	POWER	POWER	POWER
SAP	SAP ON/OFF	–	–	STB AUDIO TRACK
MUTE	MUTE	TV MUTE	CBL MUTE	STB MUTE
ASPECT	TV ASPECT	DTV ASPECT	–	STB ASPECT
TV/VIDEO	TV INPUT SW	TV INSPUT SW	TV INSPUT SW	TV INPUT SW
LIGHT	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS
(navigation pad)	CHANNEL UP/DOWN	NAVIGATION UP/DOWN	CABLE CHANNEL UP/DOWN	STB NAVIGATION UP/DOWN
	ACTION	ACTION	ENTER	STB ACTION
	VOL + / -	NAVIGATION RIGHT/LEFT	CABLE VOL + / -	STB NAVIGATION RIGHT/LEFT
MENU	MENU	MENU	–	STB MENU
RECALL	DISPLAY	PROGRAM INFO.	TV DISPLAY	STB PROG. INFO
RETURN EXIT	EXIT	EXIT (EPG) ELECTRONIC PROGRAM GUIDE	–	STB EXIT
PAGE	–	STB PAGE UP/DOWN	–	STB PAGE UP/DOWN
GUIDE	–	GUIDE (EPG) ELECTRONIC PROGRAM GUIDE	–	STB GUIDE
(number pad)	Select Channel	Select Channel	Select Channel	Select Channel
R-TUNE	PREVIOUS CHAN OR VIDEO MODE	PREVIOUS STB CHAN	CABLE PREVIOUS	STB PREVIOUS
SLEEP/PROG	SLEEP	DTV PROGRAM/DASH	–	STB PROGRAM/DASH
REW FF	–	–	–	–
PLAY	–	–	–	–
PAUSE	–	–	–	–
STOP	–	–	–	–
REC	–	–	VCR RECORD	–
TV/VCR	–	–	–	–
VCR CH	–	–	CABLE CH CHANNEL UP/DOWN	–
OPEN/CLOSE	–	–	–	–
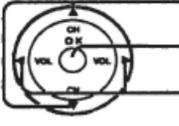
KEY NAME	VCR MODE	DVD MODE (DVD)	DVD MODE (CD)	AUX MODE (VCR2)	AUX MODE (TAPE)	RCVR MODE
POWER	POWER	POWER	POWER	POWER	POWER	POWER
SAP	–	–	–	–	–	–
MUTE	TV MUTE	TV MUTE	RCVR MUTE	TV MUTE	RCVR MUTE	RCVR MUTE
ASPECT	–	–	–	–	–	–
TV/VIDEO	TV INPUT SW	TV INSPUT SW	–	TV INSPUT SW	TV INPUT SW	TV INPUT SW
LIGHT	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS	REMOTE BUTTONS
(nav up/down)	TV CHAN UP/DOWN	NAVIGATION UP/DOWN	NEXT/PREVIOUS TRACK	TV CHANNEL UP/DOWN	–	TUNER +/-
(select)	TV ACTION	SELECT	–	TV ACTION	–	–
(volume)	TV VOLUME +/-	NAVIGATION UP/DOWN	RCVR VOLUME UP/DOWN	TV VOLUME +/-	RCVR VOLUME +/-	RCVR VOLUME +/-
MENU	–	DVD MENU	–	–	–	–
RECALL	ONSCREEN VCR DISPLAY	DVD DISPLAY	TIME FORMAT	ON SCREEN VCR DISPLAY	–	–
RETURN EXIT	–	–	–	–	–	–
PAGE	–	SKIP +/-	SKIP +/-	–	–	–
GUIDE	–	TITLE	NEXT TRACK	–	–	–
(number pad)	Select Channel	Select Chapter Number	Select Track Number	Select Channel	–	1....AV1 2....AV2 3....AV3 4....AV4 5....CD 6....TUNER 7....PHONO 8....TAPE 9....AUX
R-TUNE	–	DVD TITLE	NEXT DISC	–	DECK A/B	–
SLEEP/PROG	–	–	–	–	–	–
REW FF	VCR REW/FF	SKIP SEARCH <<REW/>>FF	SEARCH REW/FF	VCR REW/FF	TAPE REW/FF	SURROUND +/-
PLAY	PLAY	PLAY	PLAY	PLAY	PLAY	–
PAUSE	PAUSE	PAUSE	PAUSE	PAUSE	PAUSE	–
STOP	STOP	STOP	STOP	STOP	STOP	–
REC	VCR RECORD	–	–	VCR RECORD	TAPE RECORD	–
TV/VCR	TV/VCR SWITCH	–	–	TV/VCR SWITCH	–	–
VCR CH	VCR CHANNEL UP/DOWN	SLOW +/-	RANDOM/REPEAT	VCR CHANNEL UP/DOWN	–	CENTER +/-
OPEN/CLOSE	–	OPEN/CLOSE	OPEN/CLOSE	–	OPEN/CLOSE	–

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4-16.3.29 Troubleshooting

Before requesting service for this LCD TV, check the chart below for a possible cause of the problem you are experiencing. Some simple checks or a minor adjustment on your part may eliminate the problem and restore proper operation. If you are in doubt about some of the check points, or if the remedies indicated in the chart do not solve the problem, consult your dealer for instructions.

| Symptom	Cause and Remedy	Section to Reference
Power supply does not go on	• Is power supply plug unplugged from the outlet? • If power will not go on with the remote control, is the power supply of the TV "Off"?	– How to Connect the HDMI Terminal
Remote control cannot be operated	• Is battery exhausted, or is battery polarity wrong? • Is the remote control receiver illuminated with strong light from a fluorescent lamp etc? • Are you using the special-purpose remote control for this equipment? (The unit will not operate with another remote control.)	4-16.1.14 – –
Image shakes, or image is unclear	• Is there deterioration, breakage or disconnection of the antenna or antenna wire? • Is the antenna wire connected correctly?	– Connecting antenna wire
There are spots on the picture, or the screen shakes	• Is the system affected (by radio wave interference or induced electromagnetic waves) by external sources (automobiles or trains, high-voltage wires, neon, motors, magnetized steel frame, or iron rain shutters, etc)? →Turn off the power supply, and try changing the equipment setup location. If that has no effect, separate magnet-proofing will be required.	–
The image appears doubled or tripled	• Is the antenna direction shifted? • Are reflected electromagnetic waves being received from mountains or buildings?	–
A color pattern appears, or colors disappear	• Is the equipment being affected by another TV (electromagnetic interference)? → Changing the TV setup location may lead to improvement.	–
The channel number disappears from the screen	• Has the RECALL button been pressed? → Press the "RECALL button" again. If the system is switched to external input and there is no external signal video, the number will disappear.	–
When the image is not stable, the screen turns completely white for a moment	• This occurs when the signal driving the liquid crystal is lost, and is not a malfunction.	Location of Controls
The screen goes dark momentarily when the channel is changed.	• The screen is darkened for a moment to conceal noise generated when changing channels.	–
The TV makes a hissing noise occasionally	• If the screen and audio are not abnormal, this sound is caused by slight expansion and contraction of the cabinet due to changes in room temperature. It has no effect on performance.	–
The screen display shakes with video input	• When input is switched to "video input", this may occur if there is no signal at the video/audio input terminal.	–
A black band appears momentarily when selecting channels with video	• This is due to noise generated when changing channels.	How to connect input terminals
Both edges of the screen, or columns or window frames, appear bent	• They may appear bent due to the received channel or some DVD software. This is not a malfunction.	–
The image from the connected equipment does not appear	• Are plugs securely inserted into each terminal? → Securely insert plugs all the way.	How to connect input terminals
The main unit is hot to the touch	• The main unit radiates heat, so some parts of the console reach a high temperature. This is not a problem for performance or quality. • Set up at a location with good ventilation. Do not cover the ventilation holes of the console with a tablecloth, etc., and do not place on top of other equipment (like a video deck).	–

Troubleshooting Continued

Symptom		Cause and Remedy	Section to Reference
H D M I	Poor Video (Example: Snow noise, no picture, picture runs, etc.)	• Check HDMI cable is connected securely. • Turn the power supply of the TV set and connected equipment ON/OFF. • Check compatibility of connected signal. Change settings of connected equipment to make signal compatible. • Is the input source from the equipment that is EIA/CEA-861/861B compliant consumer electric device?	12
	Poor Audio	• Set audio of connected equipment to L.PCM. • Check setting of HDMI INPUT under AUDIO ADJUST. • If the problem with the digital audio connection persists, change to an analog audio connection.	24

4-16.3 Panasonic 20" Television

This system is installed in the bedroom area. Basic operating instructions can be found in this section.
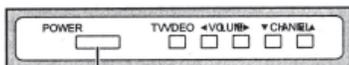
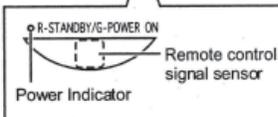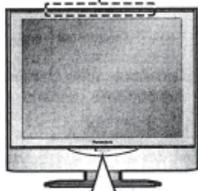## 4-16.3.1 Power On/Off
Connecting the Plug to the Wall Outlet
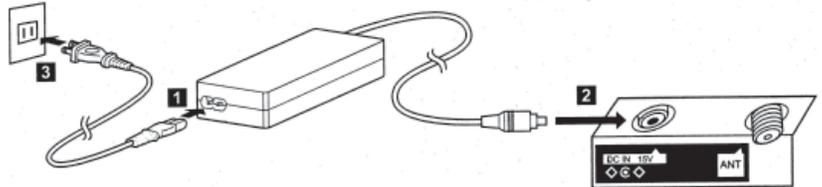
✎   **NOTE:**

• The TV and AC adaptor will still consume some power as long as the power cord is still inserted into the wall outlet.
• Be sure to use the power cord and AC adapter included in the accessories.
• Usage of AC adapters other than specified may cause malfunctions.

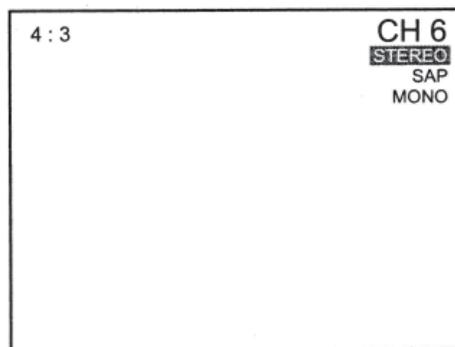## 4-16.3.2 How to Turn the Power On

Press the Main POWER switch on the tv to turn the set on. POWER-ON: Green

When the set is on or in standby mode press the Main POWER switch on the TV to turn the set off.

POWER-OFF: No light

Example: The screen below is displayed for a while after the TV is turned on. (Setting condition is an example.)
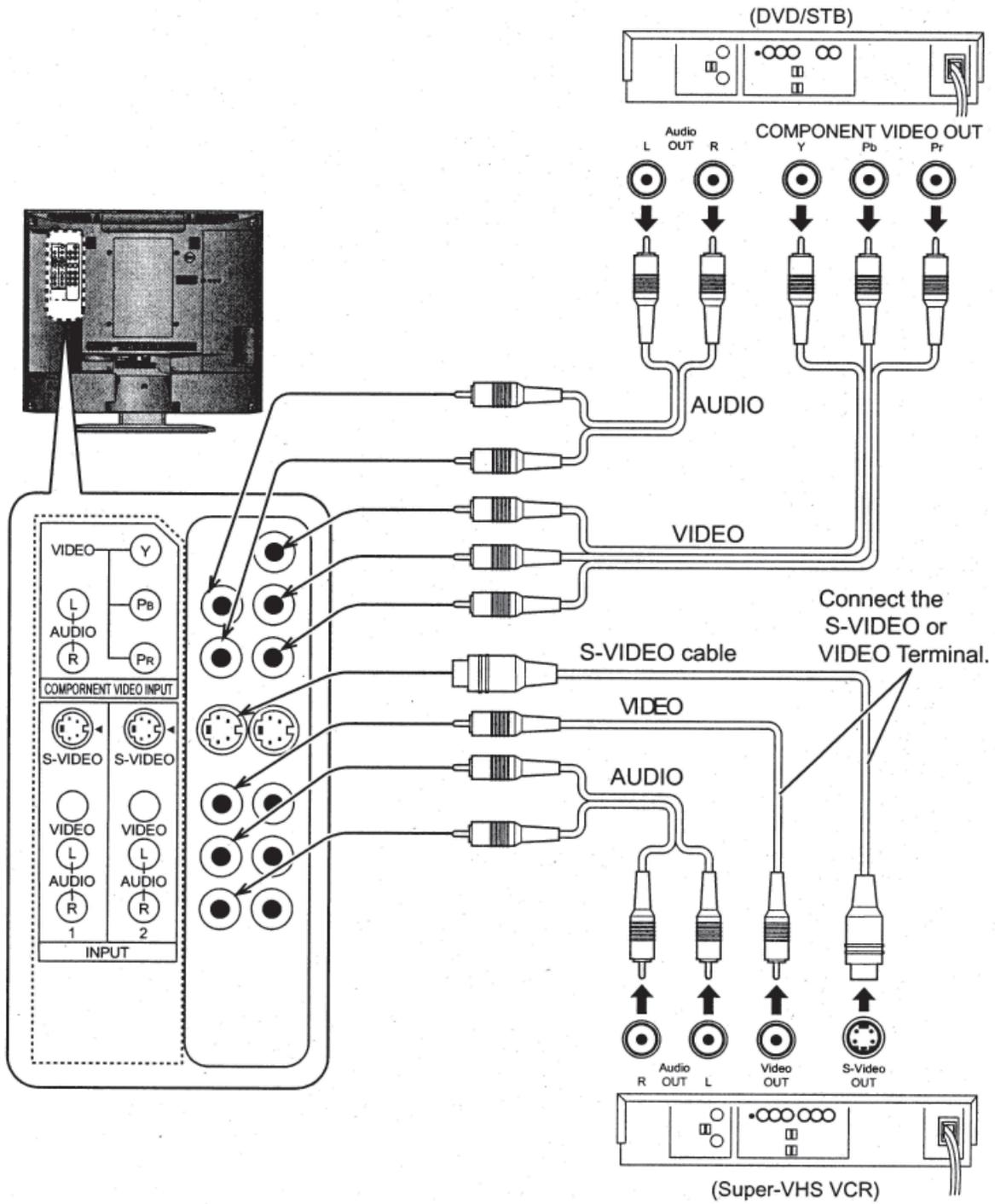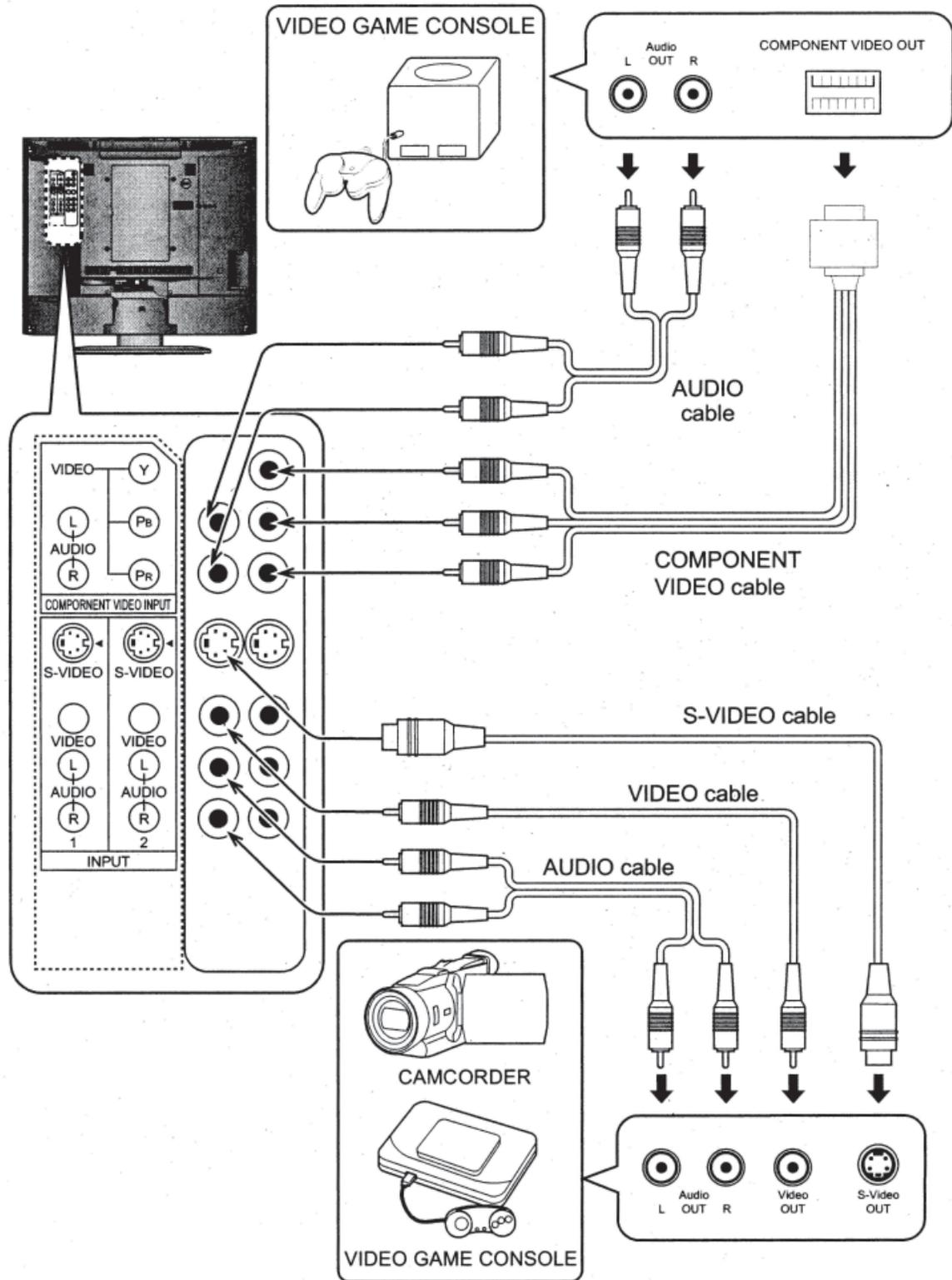

Press the POWER button on the remote control to turn the TV off: Red (standby)

Press the POWER button on the remote control to turn the TV on: Green

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4-16.3.3 How to Connect the Input Terminals

Connect VCR and other peripheral equipment

VIDEO GAME CONSOLE

Audio OUT R   COMPONENT VIDEO OUT
L

AUDIO cable

COMPONENT VIDEO cable

VIDEO — Y
L   PB
AUDIO
R   PR
COMPORNENT VIDEO INPUT
S-VIDEO   S-VIDEO
VIDEO   VIDEO
L   L
AUDIO   AUDIO
R   R
1   2
INPUT

S-VIDEO cable

VIDEO cable

AUDIO cable

CAMCORDER

VIDEO GAME CONSOLE

Audio OUT R   Video OUT   S-Video OUT
L

4-16.3.4 Playing a VCR or Other Peripheral Equipment

This equipment can also be connected to the rear terminals to play a Camcorder, VCR, Laser Disc Player or a DVD Player.
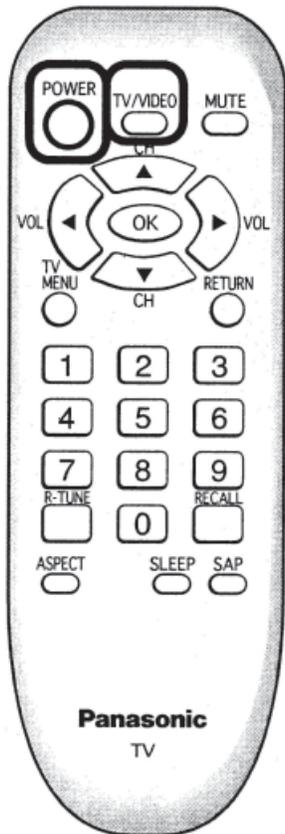
Make sure that the TV is in standby mode.

Connect the S-Video outputs or the Video outputs per illustration at right

To S-Video output or Video output
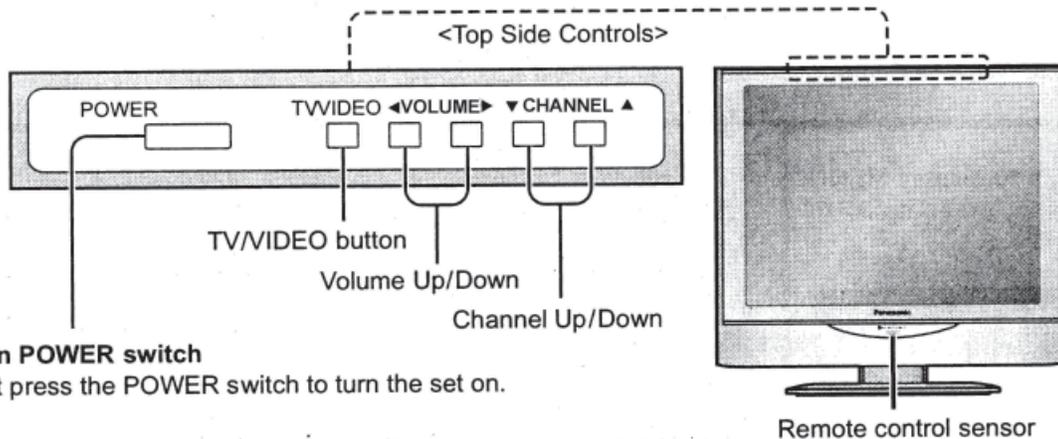
To Audio output
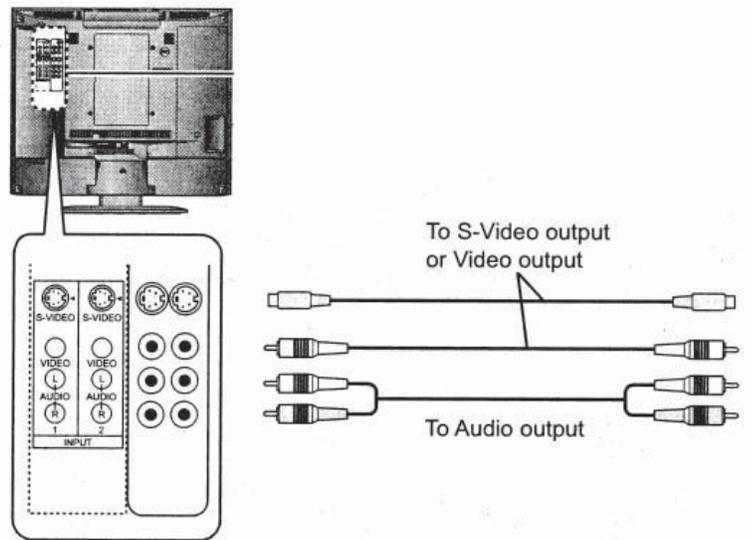
Turning the power on and switching input modes.

1. Turn the TV on by pressing Power button on remote.

2. Press TV/VIDEO button on remote to toggle between the different modes. For instance one press is Video 1, pressing this a second time is Video 2, this is used for playing a VCR tape, Pressing again, Component will appear. Use this to play a DVD.

> **NOTE:** When the remote control is unavailable, input modes can also be switched using the TV/VIDEO button on the TV set.

4-16.3.5 Basic Controls

<Top Side Controls>

POWER   TV/VIDEO ◄VOLUME► ▼ CHANNEL ▲

TV/VIDEO button

Volume Up/Down

Channel Up/Down

Remote control sensor

Main POWER switch
First press the POWER switch to turn the set on.

Operate your Remote control pointed to the Remote control sensor
(Within about 6 meters in front of the TV set.)

Power button
Press to turn this set ON or OFF.
(See page 13)
Note:
The LCD TV's power cord must first be plugged into the wall outlet and then turned on at the Main POWER switch.

Changes to the next channel up Moves cursor upward during menu mode.

Reduces volume Moves cursor to the left during menu mode.

Increases volume Moves cursor to the right during menu mode.

Changes to the next channel down Moves cursor downward during menu mode.

MENU button
Press to display MENU screen, press again to clear.

Direct program number Selection buttons

R-TUNE button
Switches to previously viewed channel or video mode.

ASPECT button

     → 4 : 3 ——— → 16 : 9 —

TV/VIDEO button
The input mode changes each time this button is pressed.

POWER   TV/VIDEO   MUTE

CH ▲

VOL ◄ OK ► VOL

TV MENU   ▼ CH   RETURN

1 2 3
4 5 6
7 8 9
R-TUNE 0 RECALL
ASPECT   SLEEP   SAP

Panasonic
TV

MUTE button
Press to mute the sound.
Press again to reactivate sound.
Sound is also reactivated when power is turned off or volume level is changed.

RETURN button
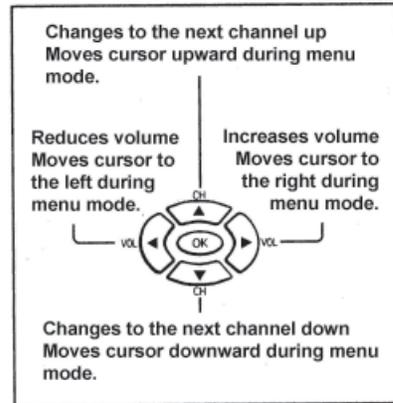Press to return to the previous screen.

RECALL button
Press to display channel, sleep timer and other options.

SAP button
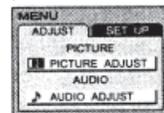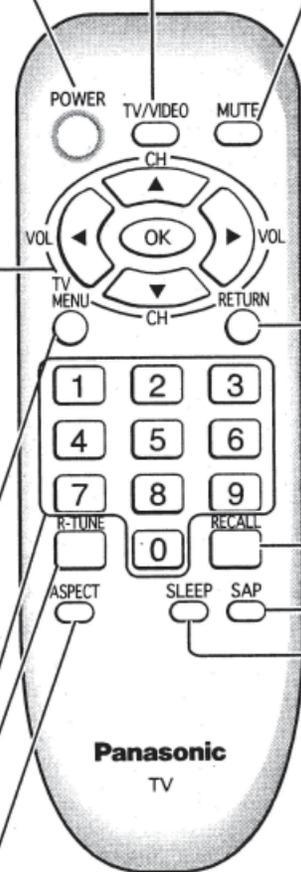Selects Audio mode (See page 21).

┌→ STEREO ——→ SAP ——→ MONO ┐

SLEEP button
The LCD TV may be preset to switch to stand-by after a fixed period. The setting changes to 30 minutes, 60 minutes, 90 minutes and 0 minutes (SLEEP timer cancelled) each time this button is pressed.

⏱30 ——→ ⏱60 ——→ ⏱90 ┐
┗————— ⏱ 0 ◄———┘
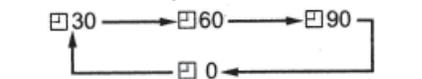
When 3 minutes remain, " ⏱ 3 " will flash. The SLEEP timer is cancelled if a power interruption occurs. Before the timer automatically turns the power off, the remaining time will blink on the screen ("3" for 3 minutes, "2" for 2 minutes and "1" for 1 minute before the power goes off).

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4-16.3.6 Remote Control Battery Installation

Replacing the Batteries - Replace batteries by following the steps below:

Requires Two AA Batteries

1. Open the battery cover.
2. Install the batteries as shown in the battery compartment. (Polarity + or - must match the markings in the compartment).
3. Replace the cover

CAUTION!!　　*Precaution on battery use* - Incorrect installation can cause battery leakage and corrosion that will damage the remote control transmitter.
Observe the following precautions:
• Always use new batteries when replacing the old set.
• Do not attempt to charge, short-circuit, disassemble, heat or burn used batteries.
• Battery replacement is necessary when remote control acts sporadically or stops operating this unit.

NOTES:
• Do not drop, apply shock to or step on the remote control.
• Do not spill water on the remote control.
• Do not place objects between the remote control and remote control receiver.
• Do not use remote controls for other equipment at the same time.
• If the TV does not operate even when operating the remote control from a close range, it is time to replace the batteries.
Refer to the label on the back of the remote control for directions on replacing batteries or follow steps above.

4-16.3.7 Maintenance

To clean this unit, wipe with a soft, dry cloth. If the surfaces are extremely dirty, use a soft cloth dipped in a soap and water solution or a weak detergent solution.

• Use eyeglass cleaner to remove stubborn dirt from the LCD.
• Never use alcohol, paint thinner or benzene to clean this unit.
• Before using a chemically treated cloth, read the instructions that came with the cloth carefully.

CAUTION!!　　If water or similar substances get inside the monitor via the liquid crystal panel surface, a malfunction may result.