

4. Determine cooking time by consulting the cookbook and set the time accordingly.

#### **IMPORTANT**

When setting the timer for less than one minute, turn past one minute; then return to desired time setting.

5. Close the door and cooking will begin. The blower and heating indicator light come on as soon as the door is closed and latched. The interior light stays on during the cooking time. The timer will gradually return to zero as cooking time elapses.

Note: The oven light may flicker and the sound of the oven cycling on and off may be heard when the heat control is at a setting below "High". This is normal and is not cause for alarm.

6. If the oven door is opened during the cooking process, the timer and all microwave energy stops instantly. As soon as the door is closed, the blower and heating indicator light come back on and the timer resumes its countdown.
7. When cooking time has elapsed, a bell will sound and the light, blower and heating indicator light will all go off.
8. Be sure to set the timer at zero when the oven is not being used.

#### **Care of the Microwave Oven**

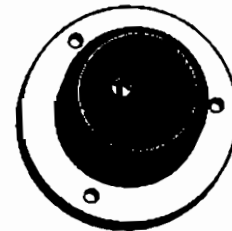
Both the inside and the outside of the oven may be cleaned with a mild soap and water solution. Do not use harsh detergents or abrasives. Make sure that water does not get into the top or back ventilation openings, as this can cause damage to the unit. The window should be washed with mild soap and water. Never use a window cleaner. The oven has a ceramic bottom which is sealed to the oven sides for easy cleaning. It is, however, breakable and should be treated the same as glass in this respect.

#### **SIBIR REFRIGERATOR**

The refrigerator in your motorhome is an absorption type which uses an ammonia-water solution for cooling. Basically, ammonia vapor is distilled from the solution by heat, produced from either gas or electricity. It is then carried to the finned condenser where it liquifies. The liquid flows to an evaporator where it creates cold temperatures by evaporating into a circulating flow of hydrogen gas. If the refrigerator, and consequently the evaporator coil, is

not level, liquid readily accumulates forming pockets which can impair or block gas circulation and cause cooling to stop.

Before operating the refrigerator when the vehicle is stationary, place bubble level provided on a flat surface on the top shelf of the food storage compartment. The refrigerator should not be operated with less than one half of the bubble showing inside the circle.



#### **CAUTION**

To obtain proper performance from the refrigerator and prevent damage to the cooling unit, make certain the motorhome is level side to side and front to rear when parked. When the vehicle is in motion, the continuous movement will not affect the refrigerator since the rolling and pitching action will prevent pockets of liquid from forming. If the vehicle is parked in an out of level position for more than one hour, the refrigerator must be turned off.

Keep in mind that as convenient as RV refrigerators are, they are not as efficient as the larger unit in your home. The absorption refrigerator relies on a free circulation of air for cooling. When placing items in the refrigerator, be careful not to fill the compartment too full or place too many items around the evaporator fins, thereby blocking necessary air circulation. Also, a longer period of time is required to cool the storage compartment on an absorption refrigerator as compared to a Freon cooled model in your home. For this reason, it is

recommended that the refrigerator be started up 12 hours before any items are placed in the cabinet, whenever possible. Do not place warm items in the refrigerator and expect them to cool within a few hours. Transfer foods from your refrigerator at home, or buy items, such as soft drinks, that have been cooled at the store, for maximum efficiency.

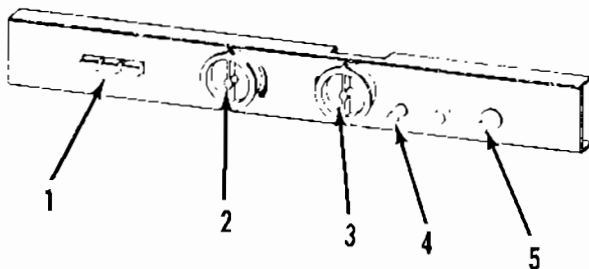
### IMPORTANT

Any attempt to measure the temperature of the cooling compartment should be made by placing a thermometer in a food substance or liquid. Measuring the air temperature may result in a false reading.

All refrigerator controls are mounted on the front of the refrigerator and are accessible by opening the food storage compartment door. Selection of LP gas, 12-volt electric or 110-volt electric operation is made with the use of push button switches which are interlocked to prevent the accidental use of more than one system at a time.

NOTE: Some motorhomes are equipped with a two-way refrigerator which operates on LP gas or 110-volt electricity only.

Once pushed in, the button will remain in until pushed again and released, at which time it will pop out, shutting off the unit.



### SIBIR REFRIGERATOR CONTROLS

1. Mode Selector Switches
2. Electric Thermostat Knob
3. Gas Thermostat Knob
4. Gas Valve Button
5. Ignition Button

### GAS OPERATION

1. Make sure refrigerator is level.
2. Turn on gas supply at the LP tank.
3. Turn gas thermostat knob to maximum.
4. Depress gas selector button
5. Push in and hold the gas valve button.
6. Push the ignition button several times.
7. Observe spark through the lens at rear of cabinet interior (behind vegetable bin). When flame shows clearly, release ignition button but hold

gas valve button for 20 seconds more to activate safety valve.

8. If flame goes out or there is difficulty in lighting burner, wait five minutes before repeating steps 5, 6 and 7.

### IMPORTANT

Air may be present in the gas lines after refilling the LP gas tank, making it necessary to repeat the lighting procedure several times.

9. If after a few hours the refrigerator compartment is found to be too cold, turn gas thermostat to a warmer setting.

NOTE: To stop gas operation, push and release the gas selector button. It will then pop out and shut the refrigerator off.

### 12-VOLT ELECTRIC OPERATION

1. Make sure refrigerator is level.
2. Turn electric thermostat knob to maximum.
3. Push electric selector button marked "12V". The switch should stay in.
4. If after a few hours the refrigerator compartment is found to be too cold, turn electric thermostat knob to a warmer setting.

NOTE: To turn off the 12V electric system, push and release the selector button. It will then pop out and shut the refrigerator off.

### CAUTION

Do not use the 12-volt system to cool the refrigerator down to operating temperature from a warm state. The low voltage (12V) operation is intended for use when the vehicle is in motion and after the refrigerator has been pre-cooled on either LP gas or 110-volt electricity operation.

The refrigerator draws current from the auxiliary battery which can be recharged by the vehicle alternator while the engine is running. When the refrigerator has not been used for some time and the interior storage space is warm, maximum amperage drain on the battery occurs when an attempt is made to cool the interior temperature to a point where the thermostat begins to cycle to maintain a set temperature.

Before starting the unit when it has not been operated for a day or more, the refrigerator should be pre-cooled by operation on gas or 110-volt electricity for 12 hours. This will ensure the refrigerator has reached operating temperature and will conserve battery power for in transit use. When the motorhome is parked, switch the refrigerator to either LP gas or 110-volt electric operation to conserve battery power. Excessive electrical drain on the auxiliary battery also eliminates its availability for emergency starting power, should the automotive battery become discharged.

**110-VOLT ELECTRIC OPERATION**

1. Make sure refrigerator is level.
2. Turn electric thermostat knob to maximum.
3. Push electric selector button marked "110 V". The switch should stay in.

4. If after a few hours the refrigerator compartment is found to be too cold, turn thermostat to a warmer setting.

**NOTE:** To turn off the 110V electric system, push and release the selector switch. It will then pop out and shut the refrigerator off.

**CHANGING OPERATION MODE**

To change from gas operation to electric or vice versa:

1. Push and release selector button presently being used.
2. Set thermostat for desired system at maximum.
3. Follow starting instruction, previously outlined, for desired mode.

**TROUBLESHOOTING REFRIGERATOR**

PROBLEM	PROBABLE CAUSE	SOLUTION
<p>Food items are not cooled sufficiently in spite of thermostat being set at "coldest".</p>	<p>Cabinet area has been filled too full and air circulation has been blocked.</p> <p>Warm items have been placed in the cabinet.</p> <p>Cooling compartment was not allowed to cool sufficiently before filling.</p> <p>Refrigerator out of level.</p> <p>Insufficient LP gas supply.</p> <p>Thermostat failed.</p>	<p>Remove unnecessary items and rearrange to provide circulation of air around the evaporator fins.</p> <p>Allow more time for cooling warm items. Utilize items that were previously cooled in the home refrigerator or a store cooler.</p> <p>In the future, start the refrigerator and allow it to cool a few hours before filling.</p> <p>Level the motorhome. If it cannot be leveled, shut the refrigerator off.</p> <p>Check LP tank and refill if necessary or switch to 110-volt electric operation.</p> <p>Have your dealer replace thermostat.</p>

# APPLIANCES

## IMPORTANT

The complex nature of repair and adjustment procedures for major appliances furnished in Winnebago and Itasca motor homes prohibits their inclusion in this manual. This manual describes procedures for removal of these appliances from the motor home and procedures for appliance installation. Refer to the appliance manufacturer's service manual for necessary service and adjustment procedures or maintenance information.



## REFRIGERATORS

### SIBIR REFRIGERATOR

Winnebago and Itasca motor homes were available with four (4) models of Sibir refrigerator during the 1977 through 1980 model years. The ET150 and the ET150/2 are both four (4) cubic foot, single door models. The ET150 operates on 110 volt A.C. electrical service and L.P. gas. The ET150/2 operates on 110 volt A.C. or 12 volt D.C. electrical service and also on L.P. gas. The ET230 and the ET230/2 are both two door models. The ET230 operates on 110 volt A.C. and L.P. gas. The ET230/2 operates on 110 volt A.C. and 12 volt D.C. electrical service and on L.P. gas.



### Refrigerator Removal (All Sibir Models)

1. Turn off L.P. supply at service valve on L.P. tank. Disconnect auxiliary battery and external power cord. Auxiliary generator must be off.
2. Disconnect L.P. line at back of refrigerator by removing 3/4" flare nut.
3. Unplug 110 volt service at the back of the refrigerator.
4. Disconnect 12 volt service at the back of the refrigerator (ET150/2 and ET230/2 only).
5. Remove two (2) screws that extend through refrigerator hold down brackets into floor (1977 and early 1978) or remove four (4) 5/16" cap screws that secure tie down brackets to the side of the refrigerator cabinet (late 1978-1980).
6. Remove refrigerator contents and accessories (shelves, crispers, drip trays, thermometers, etc.) from inside of refrigerator.
7. Lift top hinge pin out of refrigerator door, tilt the door forward slightly and lift up off bottom hinge.
8. Remove bottom hinge pin.
9. Remove four (4) plastic caps in the trim around the outside of the refrigerator. Remove the four (4) screws that were under the plastic caps. The screws extend through the refrigerator trim and into the cabinet.
10. Use a utility knife to cut the seal between the bottom of the refrigerator and the cabinet face.
11. Slide the refrigerator forward out of the cabinet. For certain models, it may be necessary to remove the refrigerator hinge brackets or loosen cabinet components to get enough clearance to pull the refrigerator out of the cabinet.
12. Measure the refrigerator width at the widest point. If it is wider than the entrance door opening, refrigerator trim must be removed to get it out of the motor home.

## INSTALLATION

To install a Sibir refrigerator in the refrigerator cabinet, perform the steps of the removal procedure in reverse order. When the refrigerator installation is complete, perform a L.P. gas leak test and check electrical operation of the refrigerator.

### CAUTION

Before installing the refrigerator in the cabinet, inspect the seams in the cabinet and the cabinet/sidewall joint. If these are not well sealed, reseal them with a bead of No. 5522 bedding compound.

## Service Information

Refer to the manufacturer's service manual for required maintenance or service information.

## NORCOLD REFRIGERATOR

A limited number of 1977 and 1978 motor homes, as well as the 1980 WD319RK and IC319RK, are equipped with the all electric Norcold DE-728 or DE-251 refrigerator. These refrigerators operate on 110 volt A.C. or 12 volt D.C. electrical service only. There is no provision for L.P. gas operation.

## Refrigerator Removal (Norcold DE-728)

1. Disconnect auxiliary battery and external power cord. Auxiliary generator must be off.
2. Remove top hinge pin from freezer door, tilt the door forward slightly and lift up off bottom hinge (not applicable to model DE251).
3. Lift top hinge pin out of refrigerator door, tilt the door forward slightly and lift up off bottom hinge.
4. Remove bottom hinge pin.
5. Remove refrigerator contents and accessories (shelves, crispers, drip trays, thermometers, etc.) from inside refrigerator.
6. Remove inverter access panel at bottom front of the refrigerator.
7. Remove one (1) screw from bottom center of inverter face. Pull inverter out of refrigerator far enough to gain access to the electrical connections. Disconnect 12 volt leads for the inverter.
8. Push inverter back into position and install mounting screw.
9. Remove four (4) plastic caps in the trim around the outside of the refrigerator. Remove the four (4) screws that are under the plastic caps. These screws go through the refrigerator trim and into the cabinet.

10. Slide the refrigerator forward until it can be tilted forward enough to reach 110 volt connection on the back of the refrigerator. Disconnect the 110 volt service.
11. Slide the refrigerator forward out of the cabinet.
12. Measure the refrigerator width at the widest point. If it is wider than the entrance door opening, refrigerator hinges must be removed to get it out of the motor home.

## INSTALLATION

To install a Norcold refrigerator in the refrigerator cabinet, perform the steps of the removal procedure in reverse order. When the refrigerator is installed, test the electrical operation.

## Service Information

Refer to the manufacturer's service manual for required maintenance and service information.

## TROUBLESHOOTING

There are basic steps in troubleshooting the Norcold dual-voltage refrigerator that, if followed, make problem pinpointing a simple process.

The three major component assemblies that will prevent operation are:

1. The compressor and system assembly
2. The inverter-transformer assembly
3. The thermostat

The description of these component assemblies follows. Please read this description carefully as it will be of valuable assistance in pinpointing the type of failure incurred, should your unit fail to operate correctly.

### 1. Compressor and System Assembly

The assembly consists of the swingmotor compressor, condenser, dryer, capillary tube, and evaporator plate. The individual function of each of these components is described in detail under "III Refrigeration". After these components have been connected to form a closed loop or circulatory system, this system is then put under high pressure testing by charging it with dry nitrogen gas and completely immersed in a water test tank to determine if any leaks are present.

The system is then thoroughly dried and put under a rigid evacuation process through use of an efficient vacuum pump. This evacuation places the system under a negative pressure devoiding it of air, moisture, and to other contaminants.

Once the required vacuum is attained, the system is then charged with a measured amount of refrigerating gas Freon - R-12 (Dichloro-Difluoro-Methane) and sealed to form a non-contaminated, closed system through which the

freon is recycled over and over again during the refrigeration process.

Should a leak occur at any time in this system which allows the freon to escape, then the refrigerating capabilities of the system are terminated.

A common symptom that the system has a leak is that the compressor runs continuously, but no cooling is obtained.

### 2. The Inverter-Transformer Assembly

This assembly consists of a dual voltage transformer, an automatic voltage selection relay, and a solid state inverter.

The inverter is in operation on D.C. only and its only function is to invert the 12 volt D.C. power supply to 11 volts A.C.

The dual voltage transformer assures that the correct A.C. voltage (20/23 V., A.C.) is supplied to the swingmotor compressor.

The automatic relay selects the voltage supply (A.C. or D.C.) and isolates one from the other so that the intermingling of the two different supply voltages is not possible.

### 3. The Thermostat

This item is an adjustable temperature cold control that senses the temperature within the refrigerator and maintains it at the desired setting.

Should this control fail, it may produce two different reactions.

- A. The refrigerator will not operate and the unit will begin defrosting, or
- B. The unit will not cycle, but will run continuously with the result that refrigeration temperatures are extremely cold, in some cases, causing foodstuffs such as milk, soft drinks, or other liquids to freeze.

Trouble shooting your refrigerator becomes much easier if the conditions of operation with relation to the malfunctions are known.

An inoperative unit, dependent upon what component has caused the malfunction, has certain symptoms; that, if known, will facilitate repairs. These symptoms are:

1. **Compressor runs continuously on either voltage supply, but no cooling is obtained.** This indicates the system has a leak causing refrigerant loss, or the compressor is faulty. In either case, the system must be replaced.
2. **Compressor runs continuously on either voltage supply and cabinet temperature is extremely cold.** In this case, the thermostat is at fault. Check the capillary bulb of the thermostat. It is located under the evaporator and should be secured directly to the evaporator plate by means of a metal fastener. If this tube does not contact the evaporator plate directly the action of

the thermostat is erratic resulting in continuous demand for compressor operation.

### 3. Compressor does not operate on either voltage.

If this condition exists, perform the following checks:

- A. Check the voltage supply (A.C. or D.C.) to assure the correct voltage is being applied to the refrigerator.
- B. Turn the thermostat knob to the maximum position of "5 or 7".
- C. Remove the rubber protective cap from the terminal on top of the compressor. Make sure it is properly connected. At this time, also check the ground wire to see that it is securely fastened.
- D. Check the circuit breaker located at the front and bottom of the refrigerator. This circuit breaker effects D.C. operation only.

If steps "A" through "D" are performed and the unit still does not operate, then the thermostat may be defective.

Remove the thermostat cover located at the rear inside of the cabinet. Also, remove the thermostat leads and bridge the two ends of the leads with a suitable strip of metal; such as a paper clip or a hair pin. (Note: If the unit is plugged in to 117 volt A.C. outlet, disconnect the supply cord before performing this step because on A.C. operation, the thermostat lead is energized by 117 volts and could be hazardous, do not disconnect green ground wire.)

If the unit runs after the lead has been shorted, then the thermostat should be replaced.

### 4. Compressor runs on A.C. but not D.C.

Before assuming that the inverter assembly is defective, check the following:

- A. D.C. connections at the inverter to see if polarity is reversed.
- B. If connections and polarity are correct, take a voltage reading. It should read 12 volts, D.C., indicating the battery is fully charged and the inline fuse of the positive supply is not blown.
- C. Short the thermostat leads. It may be that the thermostat contacts are dirty or pitted, permitting the high potential A.C. to flow but restricting the low potential D.C. Clean the contacts or replace the thermostat.
- D. If the above steps do not provide operation, then remove the transformer-inverter assembly from the bottom of the cabinet. Plug the power supply cord into a 117 volt A.C. outlet. Upon doing so, note the voltage selector relay. When A.C. is applied to the refrigerator you should hear a discernible "click" of the relay. If this "click" is not audible, check the relay movable contact

section. When the A.C. supply is removed, the movable contact armature of the relay should relax, indicating that the D.C. circuit is closed.

E. If the relay is operating normally, then the inverter or the transformer is defective. This procedure for ascertaining the defective component should be referred to an authorized service center.

F. Circuit breaker - if the light is on the circuit breaker is "open". Depress the red button. If the light again energizes the inverter or transformer is defective. Refer to authorized service center.

**5. The compressor runs on D.C. but not A.C.**

Make the following checks for the malfunction.

A. Check the A.C. voltage supply.

B. Using an A.C. voltmeter, check the voltage at the compressor by placing one probe of the voltmeter at the compressor terminal and the other probe to the ground wire. Your voltmeter should read 20 volts A.C. if you have the Model 703-DE, 704-DE, or DE251B and 23 volts if you have a Model 707-DE, 727-DE or 728-DE.

C. If you don't get a voltage reading at this check, be sure the voltage selector relay is being energized. (See 4-D)

D. If the above steps do not provide operation, then the dual voltage transformer should be replaced.

**6. The compressor operates on A.C. but not on D.C. and unit cycles intermittently regardless of thermostat position.**

A. This is an indication that one or both of the transistors in the inverter are shorted, creating an excessive load on the secondary of the dual voltage transformer. This load causes the bi-metallic element in the primary of the transformer to open and close causing intermittent operation of the unit. Both transistors should be removed if only continued A.C. operation is desired to prevent transformer failure.

The following pages contain additional troubleshooting procedures not covered by the preceding paragraphs.

**XI. TROUBLE SHOOTING**

**(A) INSUFFICIENT COOLING**

To be Checked on AC Operation

SYSTEM	CAUSES OF FAILURE	REASON FOR FAILURE	REMEDY
Compressor (Swing motor) does not run	Thermostat (cold control) Gas leaks	Pinched or broken capillary tube, leak in bellows Turn the dial up and down (CW & CCW) At some point a click should be heard and the compressor should start. If no click is observed the cold control is defective	Change the thermostat
	Defective contacts Wires loose or not connected	Check continuity of circuit and contacts with tester Check connectors on thermostat and compressor terminals	Clean contacts or change thermostat
	Open or short circuit in swing motor	Measure the resistance ( $\Omega$ ) OHMS) between the motor terminal and the ground, 0.9 ± 10% OHMS denotes normal function.	Exchange compressor
	Power cutoff	1) Blown fuse in wall receptical outlet 2) Broken wire in power supply cord 3) Bad connections in couplers 4) On DC Circuit breaker is tripped or fuse is blown	Replace fuse Repair cord Repair Reset circuit breaker
	Transformer burn-out	1) Transformer shows burned spots at input or output lead wires 2) Transformer has typical "Burn out smell" 3) Output on secondary voltage is zero or "Dead Short" to ground 4) Transformer is cold, even when power is applied	Exchange Transformer
Swing motor runs	Loss of refrigerant through pipe connections or welded parts Broken refrigerant lines. Broken wires on condenser, the seal of the electric terminal on top of the compressor has been broken when the two bottom nuts were tightened up or loos-	If the customer reports " it gradually ceases to cool the refrigerator or it takes longer to freeze ice cubes " Then the most common cause is a refrigerant leak <b>SIGNS OF REFRIGERATOR LEAK ARE:</b> 1) The compressor runs too hot and constantly (no cycling on cold control) 2) Compressor draws more than 25 amps and less than 20 volts from transformer (Voltage Drop) 3) The condenser top half or the compressor discharge tube stays cold, same as room temp	1) If warranty is still in effect the refrigerator should be returned under the condition of the warranty to the factory. 2) Authorized refrigerator

## TROUBLE SHOOTING

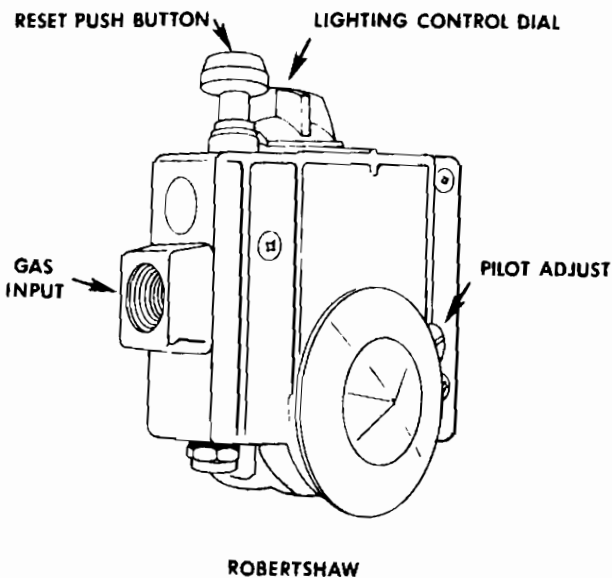
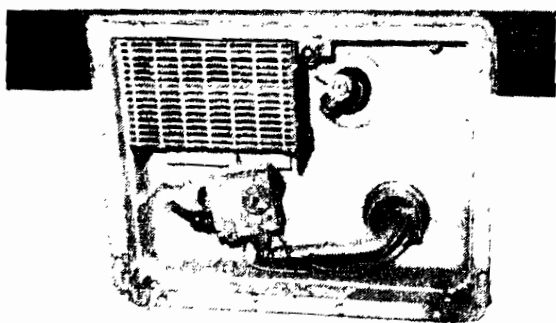
### (D) OTHER DEFECTS

SYSTEM	CAUSES OF FAILURE	REASON FOR FAILURE	REMEDY
Electricity leaks	Electricity leaks or insulation break downs can occur through "aging" or using the refrigerator in extreme ambient temperature or heavy-duty continued use.	1.) Measure the insulation resistance (OHMS) between terminal post and ground. A possible leak or break down exists, if the reading is below 1 megohm. 2.) Accumulation of dust or dirt or grease or water spots on the insulated terminal post or rubber cap can invite electricity leaks.	Disconnect wiring harness from compressor and test resistants  Clean parts
Excess frost built-up evaporator	Overloaded storage of refrigerator compartment	If too much food is stored in the cabinet the cooling air from the evaporator can be blocked, this preventing proper air circulation.	Adjust food storage, leave air passage or space.
	Frost and ice built-up on evaporator	1.) Ice and frost are bad heat conductor. Frost built-up of more than 1/4 inch should be avoided. It decreases over all cooling capacity and increases power consumption. 2.) Never put hot or steaming food in the refrigerator. 3.) Do not use sharp objects to remove ice from evaporator	Defrost refrigerator (set to "Off") remove water from evaporator and and drip pan.
No cooling after first initial installation and first start up	During shipment and storage of refrigerators, compressor oil stays in evaporator	Handling, shipping and storage can cause uneven distribution of lubrication oil.	Run compressor for 5 minutes, shut off for 3 minutes, start up for 5 minutes, shut-down for 3 minutes, start up again.

## WATER HEATERS

### ATWOOD

1977 - 1980 Winnebago and Itasca motor homes are equipped with an Atwood L.P. gas hot water heater. Various models of water heaters are available from the standard pilot ignition model, to electronic ignition models and models with an engine heat exchanger (motor aid). The "motor aid" feature utilizes the heated liquid of the motor home engine coolant system to preheat the water in the water heater tank.



### Water Heater Removal (All Atwood Models)

1. Turn off L.P. gas at service valve on the L.P. tank. Disconnect auxiliary battery and external power cord.
2. Open the exterior water heater access door.
3. Disconnect L.P. gas supply line at water heater.
4. Open relief valve and drain valve on the water heater tank and drain the tank.
5. Disconnect water inlet and outlet lines. Plug the lines to prevent water draining out.
6. If the water heater is equipped with the motor aid option, remove engine radiator cap to relieve pressure. Disconnect and plug motor aid hoses at the water heater.
7. If the water heater is an electronic ignition model, cut the electrical leads between the water heater and the "Off/On" switch. Mark the leads