40'
1997
BLUE BIRD
MOTOR COACH
OWNER'S
MANUAL

Dear BMC Owner:

Thanks for choosing BMC!

We want to personally welcome you to our Family of Friends and we invite you to visit us at our Fort Valley facilities whenever you wish. We are always happy to see you and we are deeply interested in your experiences as you use and enjoy your BMC coach. We recognize that it is our relationship to you, the BMC owner, that contributes most to the prestige of ownership of this finest over-the-road coach.

We trust that as you become more intimately acquainted with your new coach, the sound, careful thoughts behind every aspect of its design will become increasingly evident and your initial decision to choose BMC will be positively reinforced with every mile.

We acknowledge the good faith you have demonstrated in our product. All of us at Blue Bird take great pride in our handiwork and want to do everything possible to engender in you what has become the Blue Bird experience; the deep satisfaction that comes from years of a sure confidence of having chosen ... the very best.

Limited Warranty - BMC

Thank you for purchasing a new BMC. We hope you enjoy your BMC and will have no need for repairs under the warranty. If you do need such repairs, this warranty describes how to obtain them.

The BMC Division of Blue Bird Body Company gives this warranty. The terms "we," "us," and "our" in this warranty refer to BMC Division. The terms "you" and "your" in this warranty refer to the original purchaser or a new owner to whom the warranty has been transferred under the terms of this warranty.

ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY OR FITNESS, ARE LIMITED TO THE WARRANTY PERIOD OF THIS WRITTEN WARRANTY. WE WILL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM BREACH OF THIS WRITTEN WARRANTY OR ANY IMPLIED WARRANTY. Some states do not allow certain limitations to apply, so these exclusions may not apply to you.

We warrant each BMC to be free from defects in factory material or workmanship under normal use and service within the limits described below.

1. The Warranty Period is 12 months/ 12,000 miles, whichever occurs first. The Warranty Period begins on the date the vehicle is delivered to the first retail purchaser or when first placed in service as a demonstrator or company vehicle, whichever is earlier. Mileage accumulated while in the possession of the dealer is included in the 12,000 mile total. BMC Division warrants the:

    a. **Body shell (those structural metal components welded or riveted together forming floor, sidewalls, roof, front and rear sections) including rust-through.**
    b. **Paint adhesion, except when paint failure is caused by deterioration of paint from weather and exposure or damage to paint after you accept delivery of the BMC. This warranty does not cover fading of any paint.**

2. For a period of (12) months from the date of delivery to the original purchaser or first placed in service as a demonstrator or company vehicle, BMC Division warrants all other body components not covered in 1.a. and 1.b. above, excluding components warranted by other manufacturers. Your owner's package contains many of those warranties.

3. Non-Blue Bird chassis are warranted by the chassis manufacturer.

The preceding paragraphs describe the complete coverage of the warranty. Anything else is not covered. Without limiting this general statement about what is not covered, non-covered expenses include: telephone calls, loss of time, commercial loss, inconvenience, loss of use of the vehicle, towing charges, hotel or motel accommodations, equipment we do not manufacture or supply and maintenance services such as but not limited to; wiper blades, oil, filters, bulbs, fluids, front end and tag axle alignment, brake linings and drums. Damage from things we could have no control over such as: collision, modifications, misuse, lack of maintenance, misuse of electrical systems, broken glass, any part of the vehicle which fails or malfunctions as a result of work done by any other than BMC, any equipment added to the vehicle by customer or dealer, or temporary installation at the factory designed to accommodate such additions or alterations may not be covered by this warranty, parts or accessories which you or your dealer bought or installed, and BMC makes no warranty

whatsoever regarding tires.

Repair or replacement of defective parts (at the option of BMC Division) is your exclusive remedy under this warranty.

BMC Division will pay for all reusable parts and labor needed to make necessary repairs due to defects in factory material or workmanship covered under this warranty.

This warranty covers the original owner of the BMC and a subsequent owner if the subsequent owner has given us written notice and paid us a transfer fee within 30 days of the sale of the BMC. The Warranty Period is not extended by the transfer.

In order to have defects repaired under this warranty, you should promptly take your BMC to the dealer who sold it to you or to the nearest BMC dealer. (You may obtain the name and address of the nearest dealer by writing or calling us at the address and number set forth below. In the event there is some geographic or mechanical reason you cannot get to a BMC dealer, you may (with prior approval) use any capable and reputable repair facility for the repairs. The BMC dealer will make any needed repairs (or arrange for them to be made) within a reasonable time after you deliver the vehicle to that dealer. You must take the vehicle promptly to the dealer after discovering the defect and, in any event, within the Warranty Period. Warranty applications must be submitted no more than 60 days after repairs are completed.

All defective parts should be retained until BMC Division requests their return or the warranty application is paid.

You are responsible for properly operating, maintaining, and caring for your BMC in accordance with the instructions contained in your Owner's Manual.

You are responsible for keeping maintenance records, since in some instances, it may be necessary for you to show that proper maintenance has been performed.

This warranty applies to those BMC's which are legally registered and normally operated in the United States or Canada.

This warranty gives you specific rights, and you may also have other rights which vary from state to state.

All disputes arising under this warranty or alleging defects in the BMC will be presented in a non-binding mediation before any lawsuit may be filed. You must begin that mediation by filing a written demand within the Warranty Period addressed to Manager, BMC Division, Blue Bird Body Company, Fort Valley, Georgia, 31030. BMC Division hopes mediation will be successful, but if not, any lawsuit alleging a defect in the product must be filed within ninety (90) days of the scheduled mediation meeting or within one (1) year of the discovery within the Warranty Period of the alleged defect, whichever comes later.

No person, including salesmen, dealers, distributors or factory representatives of BMC Division, or Blue Bird Corporation, is authorized to make any representation or warranty covering the BMC except to refer purchasers to this limited warranty. This limited warranty is expressly in lieu of all other warranties expressed or implied and all other obligations or liabilities.

INTRODUCTION

This section of your Owner's Manual contains general hints and recommendations for using your motor home. Checklists and suggestions are offered which cover just about every phase of motor home travel.

The remaining sections of this manual describe the operation and use of the individual items and systems which comprise your motor home.

Manufacturer's manuals for components and appliances are included in your owner's kit. Please refer to these for more detailed information.

We hope that this manual will help answer questions that may arise about the use operation and maintenance of your motor home. Any suggestions or recommendations that you might have for including or expanding on material of interest will be carefully considered for incorporation in future publications. We are always interested in providing our coach owners with the most current and comprehensive information about our product.

CHECKLISTS

A little preliminary planning will go a long way to help make your trips successful and enjoyable. As an aid to planning your travels, review the following checklists. If there are any additional items that you should be reminded of, add them where you see fit. These lists are only recommendations based on the experience and suggestions of sources well-versed in motor-coach expertise. You will eventually find that a short *"walk-around"* the coach, outside and inside, will be adequate and comprehensive enough to ensure that you are ready for travel.

BEFORE YOU LEAVE

- Store valuables and important papers in a safe place.
- Arrange care for your pets.
- Cover all food to keep out mice and insects.
- Store oil, gasoline, matches and other inflammables properly; get rid of newspapers, magazines and oily rags.
- Connect timers to several inside lamps and outside lights; keep some shades open for a lived-in look.
- Discontinue newspaper, milk and other deliveries; store trash cans and outside equipment.
- If weather permits, shut down hot water and heating systems; close main water supply.
- Ask the Post Office to hold your mail.
- Have your lawn, garden and house plants cared for.
- Arrange with the Telephone Company for discontinued or *"Vacation Service"*.
- Lock all windows and doors securely.
- Leave your key with your neighbor and let them know your basic itinerary.
- Notify police.

CHECKOUT YOUR COACH - OUTSIDE

- Disconnect and stow:
  1. Electrical cord.
  2. Sewer hose (flush out).
  3. Water hose.
- Check all exterior lights for proper operation.
- Check wheel lug nuts for tightness. (See Tire/Wheel Change Procedure).
- Check tires for correct pressure. (See Tire Inflation).
- Check that all external compartments and filler openings are properly closed and/or locked.
- Check that items stored on exterior of coach are secured. (Be sure that these items present no clearance problems.)

NOTE

If the trip you are planning will take the coach well past suggested maintenance intervals, it may be advisable to perform these procedures before leaving. This may avoid unscheduled stops or interruptions during your trip.

- Check that there are no obstacles to avoid above or under the coach. Be sure that there is sufficient clearance front and rear.

CHECK YOUR AUTOMOTIVE SYSTEMS

- Check that fluid levels are normal (oil, power steering, engine coolant, windshield washers, transmissions, etc.).
- Check generator oil level, coolant level, battery condition.
- Check operation of turn signals, emergency flasher, stoplights and backup lights.
- Check that headlight high- and low-beams operate.
- Check horn operation.
- Check fuel gauge, and add fuel if needed.
- Start engine and check gauges for signs of trouble.
- Check operation of foot brakes and parking brake.

CHECKOUT YOUR COACH - INSIDE

- Close windows and vents.
- Check that cabinet doors and drawers are secured.
- Check that refrigerator door latch is in locked position.
- Check that no heavy item is stored in an overhead cabinet.
- Store large items in base cabinets.
- Check that counter tops, range top, table tops and shelves are clear of unsecured items.
- Turn off interior lights; check that entrance step is retracted. Secure and lock the entrance door.

- Adjust exterior mirrors.

WARNING

Mirrors provide needed additional driver visibility. To be effectively used, mirrors must be properly adjusted for each driver and the driver must be aware of the limitations on viewing area that exist even when mirrors are properly used.

AND, BEFORE DRIVING AWAY

- Check operation of appliances and special equipment.
- Check that fire extinguishers are fully charged.
- Check operation of interior and exterior lighting.
- Start generator and check 120 VAC system and wall outlets.
- Adjust driver's seat so that all controls are within easy reach.
- Make sure that seat is locked in position. Do not adjust driver's seat swivel or fore aft mechanism while vehicle is moving or seat could move unexpectedly, causing a loss of control.
- Check that front passenger's seat is locked in position.
- Fasten seat belts. Belts should be placed as low as possible around the hips. This places the load of the body on the strong hip bone structure instead of around the soft abdominal area and prevents sliding to in case of accident.

CAUTION

Child restraint systems are designed to be secured in vehicle seats by lap belts or the lap belt portion of a lap-shoulder belt. Children could be endangered in a crash if their child restraints are not properly secured in vehicle.

- Check that warning lights are lit when the ignition key is turned to on or start position.

SOME ITEMS YOU MIGHT WANT TO TAKE ALONG ON YOUR TRIP

NOTE

You may find that many items taken were not needed and that some items that were needed were overlooked during planning of your last trip. Make notes of these items to prevent duplicating the same errors.

- Adequate supply of prescription medicines.
- Prescription sunglasses or reading glasses.
- Camera equipment and film supply.
- Heating pads, ice bags, etc.
- Stationery, envelopes, stamps
- Telephone number list.
- Reading material

- Special pet supplies.
- Extra toilet chemicals and toilet articles.
- Spare belts for engine operated equipment.
- Spare parts for generator: suggested spares include oil filter, fuel pump, air filter, solenoid. Five quarts of approved motor oil.
- A professional-type double-action tire pressure gauge. (Included in coach.)
- Under the heading of Emergency Equipment, it is advisable to consider outfitting your coach with these items:
  1. First aid-kit
  2. Emergency highway flares
  3. Flashlight or lantern (with extra batteries)
  4. Tool kit
  5. Replacement lamp assortment
  6. Replacement fuse and breaker assortment.
  7. Trouble light with a long cord

AND SOME OTHER THOUGHTS TO CONSIDER

- Automobile insurance to cover you and your family.
- Avoid cash. Use traveler's checks and credit cards wherever possible.
- Confirm reservations well in advance of arrival.
- Make a clothing check list for everyone.

CITIZEN'S BAND TRANSCEIVER

You might also bear in mind that your coach is equipped with a CB unit (Citizen's Band receiver-transmitter). In the event of an emergency situation which requires outside assistance, remember to call for help on Channel 9. This channel is restricted to emergency use only and it is monitored 24 hours per day! Don't hesitate to use your CB if you see someone else in need of assistance.

HOT WEATHER OPERATION

Wherever possible, choose a shaded parking site so that the coach will be cooler during the hottest part of the day. The optional patio awning will be especially useful in lowering inside temperature. Air conditioning units are indispensable in hot climates. Keep in mind that their proper operation depends on adequate line voltage. Low voltage causes motors to run hotter and reduces compressor motor life. Supply voltage in some campgrounds may not be as high as necessary, especially when there are heavy loads on the lines from other air conditioners.

COLD WEATHER OPERATION

If frost or condensation accumulates in closets or cabinets during long periods of cold weather operation, leave the doors to these areas slightly ajar to provide air circulation. Be sure that roof vents are open when using the gas cooktop.

CAMPGROUND COURTESY

Don't forget the *"Golden Rule"*. Being considerate of your neighbors will help make friends. A few of the *"Do's"* and *"Don'ts"* are:

- Good housekeeping-put all litter in the proper receptacles and leave your site neat and clean.
- Don't allow your water or sewer hook-ups to leak.
- Respect your neighbor's desire to retire at an early hour. Avoid loud noises and bright lights after dark.
- Drive slowly through camp areas at any hour for the safety of pedestrians.

INSURANCE

As with your automobile, it is important that you have adequate protection with insurance coverage for personal liability, property damage, comprehensive, collision, medical payments, loss of use, etc.

Canadian and Mexican Insurance

Insurance for travel in Canada can usually be covered by your present U.S. policy for the recreational vehicle, often at no extra cost. Consult your individual company for procedures and be sure of your coverage before entry.

For travel in Mexico (at the present time) there are no U.S. insurance companies that can provide recognized Mexican coverage, with the exception of that required for travel through a narrow strip of Mexican territory in and around parts of entry and the U.S./ Mexican border.

Mexican insurance is controlled, and rates are set, by the Mexican government. There are several reliable companies handling Mexican insurance, with similar rates for the necessary coverage. The principal differences between them are the *"fringe benefits"*, received in the form of informational travelogues and other helpful information, such as dining places considered acceptable for sanitary conditions, fuel stations, and so on.

Some insurance services include detailed route maps with *"where to stay"* recommendations and *"things to see"* mile-by-mile (or kilometer-by-kilometer post). While the rates set by Mexico may seem quite expensive at first glance, you usually end up not spending quite as much as expected because you can usually arrange to hold your state-side policy in abeyance during the same period you are in Mexico, thus not having to pay unnecessarily for double coverage. In addition, you may be able to obtain substantial refunds on the Mexican collision insurance after your return to the U.S. Be sure to obtain a certification from the park operator at each location in Mexico to certify the dates that your coach was parked there. If your coach is parked for most of the time, instead of constantly traveling, your refund may be a major portion of the original cost. This feature is referred to as the *"in-storage"* credit. (It is a good idea to always check with your insurance company before taking a trip to find out whether applicable insurance rules and regulations have changed. Keep up to date on your coverage.)

Carry insurance papers at all times!

SAFETY CONSIDERATIONS

Using LP Gas

Check for leaks at the connections on the LP gas system soon after purchase and initial filling of LP tank; continued periodic checks of the system are recommended. Even though the manufacturer and dealer have already made tests for leakage, this check is advisable because of the vibrations encountered during travel. Apply a soapy water solution to the outside of gas piping connections to find gas leakage (bubbles). Do not use products that contain ammonia or chlorine. Usually, tightening of connections will be sufficient. If not, ask your authorized dealer service to make the needed repairs.

Liquefied Petroleum Gas (LPG) is heavier than air. Leaking gas tends to flow to low places, and will sometimes pocket in a low area. LP gas can usually be detected by an identifiable odor characteristic to garlic.

CAUTION

Never light a match or allow any open flame in the presence of leaking gas!

Be sure that the main LP gas supply valve is closed or galley panel switch OFF during refueling to prevent accidental ignition of gas fumes by appliance ignitors.

WARNING

When coach is to be stored in a confined area, turn off the LPG at the main tank shutoff valve or, more conveniently, at the galley systems control panel.

Your BMC has been provided with an automatic 80% fill valve to protect you from the dangers of an overfilled LPG tank.

Electrical Systems

Your coach has been engineered and checked for your complete electrical system safety. Circuit breakers and fuses are installed to protect electrical circuits from overloading. Before making modifications or additions to the electrical system, consult your dealer for assistance in obtaining a safe and secure installation.

Do not *"jump"* circuit protectors!

Emergency Stops

Always carry road flares and/or reflective triangular highway warning markers for emergency warning display Pull off the roadway as far as possible when changing flats or for other emergency situations. Turn on your hazard warning flashers when parked alongside a roadway, even if only for a short while. Have your coach occupants leave the vehicle and stand clear of the area when parked on the edge of a highway.

In Case of Tire Blowout

Michelin Tire Corp. has tested extensively and recommends the following when a blowout occurs:

1. Quickly remove foot from accelerator pedal..
2. Adjust steering as needed.
3. Stay off the brakes.
4. Keep driving until you find a safe place to pull over.

Engine Exhaust Gas

Avoid inhaling exhaust gases because they contain carbon monoxide, which by itself is colorless and odorless. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. If at any time you suspect that any exhaust fumes are entering the passenger compartment, have the cause determined and corrected as soon as possible.

The best protection against carbon monoxide entry into the vehicle body is properly maintained engine exhaust system, body and ventilation system. It is a good practice to have the exhaust system and body inspected by a competent mechanic each time the vehicle is raised for lubrication or oil change. It should also be inspected whenever a change is noticed in the sound of the exhaust system and if the exhaust system, underbody or rear of the vehicle has been damaged.

To allow proper operation of the vehicle's ventilation system, keep ventilation inlets clear of snow, leaves, or other obstructions.

Sitting in a parked vehicle with the engine on for extended periods, without proper ventilation, is not recommended!

More Safety Considerations

- Sanitize fresh water supply system periodically.
- Prevent water connection fittings from contacting the ground or drain hose to reduce chances of contamination.
- Consider using a qualified technician for repairing gas or electrical appliances.
- Check fire extinguishers periodically for proper charge.
- Avoid overloading your vehicle.
- Be careful not to cause an improper load distribution which can adversely affect roadability.
- Insure that tires are in good condition and properly inflated at all times.
- Under-inflated tires overheat and are blowout-prone!
- Check and tighten wheel lug nuts; manufacturer recommends after first 50-100 miles and every 1,000 miles thereafter.

EMERGENCY EXITS

Sliding windows, which can be easily opened, may be used as an emergency exit. Squeeze the window latch and slide window open. Emergency exit windows are identified by an EXIT decal on the glass.

OWNER'S MANUAL REQUIREMENTS:

The minimum required educational information in the owner's manual shall include:

1. A sample of the weight label's contents affixed to the unit as appropriate.
2. An explanation of the following:
   - Vehicle weight distribution
   - How to weigh the vehicle
   - These definitions:
     - -Gross Axle Weight Rating (GAWR)
     - -Gross Combination Weight Rating (GCWR)
     - -Gross Vehicle Weight Rating (GVWR)
     - -Unloaded Vehicle Weight (UVW)
     - -Net Carrying Capacity (NCC)
3. Towing guidelines.

MOTORHOME WEIGHT INFORMATION

Model _____

GVWR _____

UVW _____

NCC _____

GCWR _____

GVWR

(Gross Vehicle Weight Rating) means the maximum permissible weight of this motorhome. The GVWR is equal to or greater than the sum of the Unloaded Vehicle Weight plus the Net Carrying Capacity.

UVW

(Unloaded Vehicle Weight) means the weight of this motorhome as built at the factory with full fuel, engine oil, and coolants. The UVW does not include cargo, fresh water, LP gas, occupants, or dealer installed accessories.

NCC

(Net Carrying Capacity) means the maximum weight of all occupants including the driver, personal belongings, food, fresh water, LP gas, tools, tongue weight of towed vehicle, dealer installed accessories, etc. that can be carried by this motorhome.

(NCC is equal to or less than GVWR minus UVW).

GCWR

(Gross Combination Weight Rating) means the value specified by the motorhome manufacturer as the maximum allowable loaded weight of this motorhome with its otwed trailer or towed vehicle.

This motorhome is capable of carrying up to _____ gallons of fresh water (including water heater) for a total of _____ pounds. Reference: Weight of fresh water is 8.33 lbs./gal.; Weight of LP gas is 4.5 lbs./gal. (average).

CONSULT WEIGHT DECAL LOCATED IN COACH FOR ACTUAL WEIGHTS

VEHICLE LOADING

The Federal Certification Label, located inside and above the driver's windshield between the sun visor mounting brackets describes the maximum weight-carrying capacities of your motor home and for each axle, respectively abbreviated by "GVWR" and "GAWR".

The Gross Vehicle Weight Rating (GVWR) is the maximum motor home weight allowable with all systems filled and with passengers and supplies aboard.

Each axle also has a maximum load-bearing capacity referred to as the Gross Axle Weight Rating (GAWR).

The load capacity is the difference between the GVWR and the actual weight. This means the total weight of all food, clothing, other supplies and passengers, must not permit the load capacity to be exceeded.

To find the actual weight, with the motor home fully loaded, drive to a scale and read the weight on the front and rear wheels, separately, to determine axle loading. The load on each axle should not exceed its GAWR. If weight ratings are exceeded, move or remove items to bring all weights below the ratings.

When loading your motor home, store heavy gear first, keeping it on or as close to the floor as possible. Heavy items should be stored centrally to distribute the weight evenly between the front and the rear axles. Store only light objects on high shelves. Distribute weight to obtain even side-to-side balance of the loaded unit. Secure loose items to prevent weight shifts that could adversely affect the balance and roadability of the vehicle

COACH SERVICE-REPLACEMENT PARTS

A paint color label is located adjacent to the Federal Certification Label above the pilot's sun visor.

Data plates located on the rear of the chassis (raise rear engine compartment door for access) provide information useful for identifying your coach if you are planning on ordering parts. Identification plates provide information such as:

1. Body Serial Number
2. Model Year
3. Body Service Number
4. Chassis Serial Number
5. Chassis Service Number

ECONOMICAL DRIVING

How you drive, where you drive and when you drive — these factors all have an effect on determining how many miles you can get from a gallon of fuel. Careful maintenance will also contribute to fuel economy.

Frequent stops and starts during a trip diminish miles per gallon. Plan even short shopping trips so you can take advantage of through-streets to avoid the traffic lights. Pace your driving like the professional drivers to avoid unnecessary stops.

An idling engine also consumes fuel. If you are faced with more than a few minutes wait, and you are not in traffic, it may be advisable to shut off the engine and re-start later.

A properly lubricated vehicle means less friction between moving parts. Consult the maintenance schedules for proper lubricants, lubrication intervals and general coach maintenance scheduling.

Fuel economy is also related directly to the amount of work accomplished by the engine. Heavier loads require more power. Keep excess weight to a minimum.

TRAVELING IN YOUR MOTOR HOME

NOTES

1. **Overall height is approximately 11 1/2 feet.**
2. **It is recommended that compartment doors be locked so they do not open while in transit. There are many modern recreational vehicle parks with good facilities, including State, County and Federal Parks, where electrical, water and sewer connections are readily available. Directories are published which describe these parks in detail and list available services and hookups.**

On overnight or short weekend trips, your motor home has more than adequate holding tanks and water supply capacity in the event that campgrounds or parking sites are not equipped with these facilities.

On longer trips, where sewer connections and utility hookups are unavailable, it will be necessary to stop from time to time to dispose of holding tank wastes and replenish the water supply. Many gas stations (chain and individually-owned) have installed sanitary dumping stations for just this purpose.

When stopping for the night, park the coach in a location that is relatively level and where the ground is firm. This will ensure your comfort as well as the leveling of your refrigerator (for most efficient operation)

Making a long trip is not very different from making a weekend excursion since everything you need is right at hand and you are home wherever you travel. When packing for an extended trip, try to avoid taking non-essential items.

When planning to stay in the same location for several days, weeks, or even months, be sure to maintain the motor home level. Use leveling jacks system for this purpose.

Hook up to the water supply by attaching the water hose to the commercial water supply inlet.

Plug the electrical cable into the shoreline receptacle. Be sure to observe all grounding and connection precautions!

Connect sewage hookup into the disposal facility.

WINTER TRAVELING

- Certain precautions should be taken when traveling in your motor home during the cold winter months. Keep these suggestions in mind:
- Provide heat in the coach at all times.
- Have a plentiful supply of LPG and diesel fuel.
- If your stay is longer than overnight, and you do not use the generator, try to have a shoreline hooked up to outside AC power.
- Minimize your use of electricity if 120 vac is unavailable.
- Leave cabinet doors and wardrobe doors slightly open at night to allow for proper air circulation.

Remember that low temperatures in combination with high winds will cause an equivalent chill temperature much below that indicated by your thermometer. For instance, with an outside temperature of zero degrees, and a wind velocity of 10 miles per hour, the equivalent chill temperature would be -20 degrees F!

There is no substitute for common sense when traveling in cold weather.

GENERAL STORAGE NOTES

Closed shades will reduce fading of rugs and upholstery. Leaving an air freshener agent will minimize odors from plastics and other materials. Slight opening of windows and vents will allow air circulation without worry of water entering. Covering wheels to eliminate direct rays of the sun on tires will reduce sidewall cracking.

NOTE

Remove all items from the coach which may freeze, including canned foods, miscellaneous liquids, etc. Remove all contents of the refrigerator/freezer, clean unit and leave doors ajar.

REPORTING SAFETY DEFECTS

If you believe your vehicle has a safety defect which could cause a crash or could cause injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) in addition to notifying Blue Bird Wanderlodge.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, or Blue Bird Wanderlodge.

To contact NHTSA, you may either call the Auto Safety Hotline toll free at 1-800-424-9393 (or 366-0123 in Washington, D.C. area). Or write to: NHTSA, U.S. Department of Transportation, Washington, D.C. 20590. You can also obtain other information about Motor Vehicle Safety from the hotline.

AIR CONDITIONING/ DEFROSTING SYSTEM OPERATION

ROOF AIR CONDITIONING

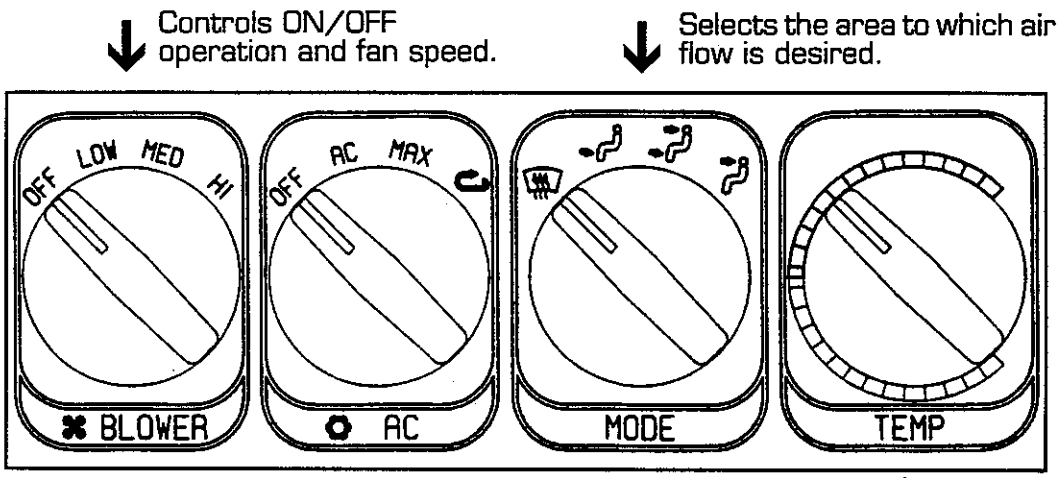
The ducted system includes (3) three 13,500 BTU air conditioning units with condensate drains.

Operation: 120 VAC is required from either generator or shoreline. The thermostat is located in the dinette area with remote temperature sensors located in the front and rear of the coach. Refer to the operator's manual in owner's kit for detailed operating instructions.

Refer to your Dometic "Comfort Control Center" manual for detailed operating instructions.

CHASSIS AIR CONDITIONING

The 30,000 BTU system has an engine driven compressor. Automotive style controls are located on the right hand side of the dash panel.



CAUTION

For proper defroster operation, do not block areas between defroster vents and windshield.

NOTE:

In hot weather, it is recommended to run the roof air units while traveling to help control the heat load inside the coach. This will require running your generator while traveling.

AIR PRESSURE SYSTEMS

INTRODUCTION

The air pressure system on your coach is supplied by an engine driven compressor. 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.

AIR BRAKES (SEE SPARTAN MANUAL FOR FURTHER DETAILS)

Your motor home is equipped with dual service air brake systems for front, rear and tag axle brakes, 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 buzzer.

OPERATION

When the coach is parked, and the engine 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.

BRAKE FAILURES

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

Protection against brake system failures is provided by fail/safe features. 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 factor, the coach should not be moved 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 accomplished.

AIR SUSPENSION SYSTEM

Air suspension bags cushion the front, rear and tag 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.

Refer to the manual in your owner's kit for additional information and maintenance instructions.

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. (This compressed air source is furnished from the front right side reservoir.) A compressed air outlet fitting and air gun are contained in the front storage compartment on the road side of the coach, convenient for inflating tires, and so on.

COMPRESSED AIR SYSTEM AIR DRYER

The air dryer has three main functions. It cools, filters, and dries the systems air. The air dryer has a filter that needs to be changed once every (2) two years, and is serviceable from either end.

APPLIANCES

INSTANT HOT (OPTIONAL)

Provides an additional hot water source at the kitchen sink. Switch is located in the kitchen base cabinet. Operates from generator or shoreline.

ICE MAKER

The ice-maker, located in the lower pantry cabinet, is designed to provide a continuous automatic supply of ice cubes. It will operate unattended providing the water supply line is open and AC power is applied to the unit. The water supply cutoff valve is located under the kitchen sink. The AC power may be supplied from shoreline, generator or inverter.

OPERATION

1. Remove lower grille.
2. Put the ON-OFF Switch, located at the top of the front grill, in the ON position.
3. Open the water supply valve, located behind the front grille (small T-shaped valve).
4. Replace lower grille.

The compressor will start. As soon as the ice maker mold reaches the proper temperature, the ice maker mechanism will fill the mold with water. The first cubes may be small because of air in the water line. Subsequent cubes will be of standard size. Approximate time for the first cycle is 45 minutes.

The following suggestions are made for best results.

- When the ice bucket is full, the ice making mechanism will shut off but the refrigeration system will continue to cycle to maintain the cube supply.

IMPORTANT

Never use an ice pick, knife, or other sharp instrument to separate cubes.

- During periods of limited usage or high ambient temperatures, it is common for cubes to fuse together. Ruffle cubes as needed.
- If ice maker is not used regularly, the ice bucket should be emptied periodically to ensure fresh cubes.
- It is normal for cubes to appear cloudy. This is nothing more than air being trapped in the water due to fast freezing. It has nothing to do with the health, taste or chemical make-up of the water. It is the same air that is in every glass of water you drink.
- To provide for higher ice rate (production of more cubes), adjust the temperature control to a warmer setting. If hollow cubes result, adjust temperature somewhat colder. For less cube production, adjust to a colder setting.

NOTE

Use a flat tip screwdriver to turn adjusting screw, located behind front grill, clockwise for colder or counter-clockwise for warmer.

- Cube size may be adjusted by changing the amount of water injected into the ice maker assembly.

  A. Remove the ice maker assembly cover.
  B. Locate the adjusting screw on the ice maker assembly control box. The adjusting screw is just below the minus (-) and plus (+) signs on the control box.
  C. Turn the adjusting screw toward the minus (-) sign (clockwise) for smaller cubes or toward the plus (+) sign (counter-clockwise) for larger cubes.
  D. Install the ice maker assembly cover.

- To stop ice production, but maintain the existing ice supply, manually raise the bin arm to the full up position.

PERIODIC CLEANING AND MAINTENANCE

- The unit is not frost free and must be defrosted periodically. To defrost, turn the unit OFF, remove cubes and prop door open at least two inches. To speed defrosting place pans or trays of hot water inside the unit.

CAUTION

DO NOT use any type of electrical heating device, ice pick, knife, or other sharp instrument to defrost, as this would damage the inner lining and void the warranty.

- Avoid the use of solvent cleaning agents, abrasives, and all cleansers that may impart taste to the ice cubes. The exterior may be cleaned with cleansers and polish as used on fine furniture.
- The front grill should be kept free of dust and lint to permit free air flow to the condenser.
- The condenser coil, located behind the front grill, should be cleaned three to four times each year. Using a brush or vacuum cleaner, remove dirt, lint and other accumulations from the condenser coil.
- The condenser fins are SHARP. DO NOT run hands over condenser fins.
- The solenoid valve inlet screen must be cleaned at least once each year as follows:
  A. Shut off the water at the water supply valve, located under the kitchen sink.
  B. Remove the entire hose connector from the solenoid valve.
  C. Use a toothbrush to clean sediment from the inlet screen. DO NOT remove the screen.
  D. Attach the hose connector to the solenoid valve. Tighten connector securely with pliers. Open the water supply valve and check for leakage at the hose connector.

STORAGE

If the unit is to be stored or not used for extended periods, it will be necessary to drain the system of water.

1. Shut off water supply at the main water source.
2. Disconnect the water supply line from the solenoid valve.
3. Disconnect the water line from the solenoid valve outlet.
4. Allow the unit to run for an hour or more to drain all the water.
5. Dry out excess water from the ice maker assembly.
6. Prop the door open at least two inches.
7. Disconnect unit from main electrical power source.
8. Leave water supply line and power cord disconnected until ready to reuse.

NOTE

The use of anti-freeze or other products of this nature is not necessary and is not recommended.

REFRIGERATOR/FREEZER

This refrigerator is equipped with a semi Automatic Energy Selector (AMES) control system, which can be set to automatically select either 120 volt AC or LP gas operation, or if desired LP gas only. The control system can manually be set to DC operation. The refrigerator controls will work down to 9.6 volt DC. Refer to the manual in your owner's kit for detailed operating instructions. Refer to section on RM 2807 3-way model.

COOKTOP (RANGE)

The gas supply for the cooktop burners is provided from the LPG tank. The cooktop is equipped with a 12 volt electric igniter. Refer to the manual in your owner's kit for detailed operating instructions.

MICRO/CONVECTION OVEN

The microwave/convection oven provides programmed microwave cooking, convection operation for crisp, even broiling, or a combination of both. (See the manual in your owner's kit for detailed operation and caution notes.) Operates from shoreline or generator.

AWNING OPERATION (OPTIONAL)

A lift handle is furnished with the patio awnings in addition to the pull rod. This 6' aluminum handle may be used to lower/raise the rafter arm from/to locked position.

For complete awning operation refer to Zip Dee Owner's Manual.

CAUTION

The patio awning is equipped with a manual lock at both ends of the awning. Before driving your coach, verify that both front and rear locks are properly engaged. Failure to lock both ends may allow the awning to unroll while in transit.

CAUTION

Be sure to raise patio awning high enough to clear the top of the entrance door.

CHASSIS SPECIFICATIONS

SEE CHASSIS OWNER'S MANUAL

TURNING RADIUS

** WALL RADIUS 39.8'

** Wall radius is the distance from the center of the turn to the outside edge of the front bumper.

NOTE
Turning Radii is with Standard 275/80R 22.5 tires

TOWING
Standard Hitch/Ball 5000 LBS
Receiver Rated @ 10,000 LBS

SHIFTER PANEL

SHIFTER

This is the push button shift selector made available with the Allison Transmission Electronic Control (ATEC). See Transmission Section for detailed description.

DO NOT SHIFT LIGHT

See the manual in your owner's kit for operating instructions.

UPPER DASH PANEL

NOTE

Some items operate at all times, some require the 12 volt master to be on, while others need the 12 volt master and the ignition on. Gauges marked with an * require the engine to be at normal operating temperature for correct readings.

**WATER TEMPERATURE*

Normal: 180 degrees to 210 degrees F
Monitors engine coolant temperature.

CAUTION

If the engine temperature gauge indicates excessively high temperatures, the engine may be overheating and should be stopped to prevent damage. Allow the engine to cool before checking the radiator coolant level.

**OIL PRESSURE*

Normal: 50 to 70 psi at cruising speed, 5 psi minimum at idle, This gauge indicates the pressure of the oil, not the amount of oil in the engine reservoir.

CAUTION

No oil pressure, or low oil pressure readings (below 25 psi) when engine is operating at cruising speeds are trouble indications! DO NOT Operate the Engine Under These Conditions!

TRANS. OIL TEMPERATURE

Indicates temperature of the transmission oil.

AIR PRESSURE FRONT/REAR - TAG AXLE PRESSURE (80-85 PSI)

Normal: 110 to 135 psi
The Dual Air Service Brake Pressure systems are engine operated and supply independent brake system air pressure for front and rear service brakes and the parking brake. During normal operation, each air pressure gauge reading will build up to 110 psi to 135 psi shortly after the engine is started. Note that, as a safety feature, the parking brake cannot be released until air pressure readings are at least 65 psi.

FUEL LEVEL

Indicates the amount of diesel fuel remaining in the tank. Note that the generator also gets its fuel supply from this tank. The gauge reads only when the ignition switch is in ON position. As a precaution against generator operation draining the fuel supply, the generator fuel pickup is shorter than the engine pickup. Separate fuel filters are provided for each fuel line.

DC VOLTS ENGINE

Registers the actual voltage at the engine batteries. With the engine running, gauge should read 14 volts (± 0.5).

DC VOLTS COACH

Normal: 14 Volts ± 0.5
Monitors the actual voltage at the coach batteries with the engine running.

SUSPENSION DUMP (LIGHT)

Indicates air suspension is dumped.

LOW AIR FRONT (LIGHT)

Warns of low air pressure on front suspension.

RADAR ON/OFF

Turns on or off power to the radar detector.

AIR COMPRESSOR MASTER

This switch operates the auxiliary air compressor (optional equipment) which is a 120 vac operated back up air compressor. See Optional Equipment for additional information.

LOW AIR REAR (LIGHT)

Warns of low air pressure on rear suspension.

LOWER DASH PANEL

MIRROR CONTROL

Switch controls both left and right mirror heads. Rotate the switch either left for the left mirror or right for the right mirror. Pushing the switch knob to the left rotates the selected mirror to the left, pushing the switch knob to the right rotates the selected mirror to the right, pushing the switch knob up rotates the selected mirror up, and pushing the switch knob down rotates the selected mirror down. The switch provided control the upper (flat) section of each mirror. The mirrors also contain a heating element to help prevent fogging over in inclement weather. The switch for the heater element is located on the lower dash panel. Just below mirror adjust switch.

MIRROR HEAT

This switch turns on thermostatically controlled heater in right and left outside mirrors. With the switch **on** the mirror heater will automatically come on to defog the mirrors.

LEFT LANDING LIGHT

At the ON position this switch turns on the landing lights on the left side of coach.

RIGHT LANDING LIGHT

At the ON position this switch turns on the landing lights on the right side of coach.

ENGINE BRAKE ON/OFF

Engages or disengages the engine brake.

ENGINE BRAKE

Switches the engine brake power from high to low. "HI" uses 6 cylinders for braking power and "LO" uses 3 cylinders for braking power.

ENGINE BRAKE

Increases (INC) or decreases (DEC) engine idle RPM from 650-800 RPM in 25 RPM increments. Is also used by the service center to move through codes during engine diagnostics.

DRIVING LIGHTS

Driving lights will only operate with headlights on high beam.

WINDSHIELD WASHER

Momentary switch.

CRUISE ON/OFF

Turns power on or off for the cruise control.

CRUISE CONTROL

1. When the desired speed is reached, press the SET/ACCEL switch to the SET position, hold for two seconds before releasing. The coach should automatically remain at that speed.

Following disengagement of the cruise control by braking, the previously set cruising speed may be obtained by depressing the Resume-Cancel switch to the Resume position for two seconds. Note that the coach should be at or above 35 MPH before attempting the Resume function. In addition, if the ignition switch has been turned off, the previous cruise speed will be erased from memory and the new cruise speed will be that speed when the Resume switch was pressed.

If a higher cruising speed is desired and the cruise is enabled, press the Set-Accel switch to the Accel position. The coach will begin to accelerate. When the higher desired cruising speed is obtained, immediately release the Accel switch. The coach should remain at the new speed.

2. This switch also functions as a PTO governor allowing selection of a constant engine RPM regardless of engine load.

WIPER DELAY CONTROL

Knob adjust wiper speed from 2 to 20 sweeps per minute when intermittent operation is selected.

WINDSHIELD WIPER

This switch turns on the wiper, windshield either high position or low position - center is OFF wiper returns to the park position.

CLEARANCE LIGHTS

This switch controls the operation of the clearance, identification and marker lights. The switch has three positions and each position has the following function. In the ON position the lights will remain lighted continuously. When the switch is in the middle (OFF) position, these lights are turned on by the headlight switch. The MOM OFF position is to flash lights as a courtesy signal when the headlight switch is ON.

SPEEDOMETER

Indicates speed and accumulated mileage (odometer) and trip meter. This is a solid-state electronic monitor.

TACHOMETER/HOURMETER

Indicates actual engine RPM (Revolutions Per Minute) when scale (0-40) reading is multiplied by 100. Idle RPM should be 600 and full load (uphill) 2500 RPM. May go to 2800 RPM under no-load conditions (downhill).

DASH DIMMER

This control will operate only when the headlight switch is in the ON position. The background lighting (electric-luminescent) for the dash can be dimmed by turning counter-clockwise and brightened by turning clockwise.

HEADLIGHTS

The Headlight switch serves two functions. Pull first position for parking lights and gauge illumination. Pull to second position for headlights, parking lights and gauge illumination. The dimmer controls brightness of all gauges in dash. Turn counter-clockwise to increase or clockwise to decrease the brightness.

A/C HEAT CONTROLS

SEE AIR CONDITIONING/DEFROSTING SYSTEM OPERATION (SECTION 1-1)

AQUA-HOT

The hydronic heat switch activates the diesel fueled portion of the Aqua-Hot heating system. Once activated, it takes approximately 30 seconds for the diesel burner to ignite. Allow 20-30 minutes for the system to reach operating temperature upon initial activation. The diesel fueled portion of the Aqua-Hot system may not be required when moderate ambient temperatures exist and/or when there is a low demand for domestic water heat, as the elctric heating element is capable of maintaining operative temperatures of 175 to 195 degrees F under these conditions.

The Aqua-Hot's engine preheating system acts as a supplemental heating source, in addition to the diesel burner and electric heating element. While traveling, the engine's heated coolant will automatically pass through the engine preheat loop, transferring heat into the Aqua-Hot's heat tank. This feature reduces the total operating hours of the diesel heater.

ENGINE HEAT

This switch engages the engine preheat pump in the Aqua=Hot heating unit, circulating the engine's coolant through the engine preheat loop, warming the engine for easy starting. Allow approximately 1-2 hours of engine preheating time (longer for colder ambient temperatures). The pump can be allowed to operate overnight if desired.

WARNING LIGHTS

Located on lower dash panel.

CAUTION

When indicators marked with ** are lit, it indicates a problem which could cause engine damage. Stop engine immediately and do not continue until problem has been corrected

LEFT TURN

When the turn signal lever is pulled down into the left turn position, this indicator flashes in conjunction with the outside directional lights.

**LOW OIL PRESSURE

(See operator's manual.)

HIGH BEAM INDICATOR

The indicator is illuminated when high beam is selected using steering column switch.

**LOW COOLANT

(See operator's manual.)

RIGHT TURN

When the turn signal lever is pushed up into the right turn position this indicator flashes in conjunction with the outside directional lights.

RIGHT HAND UPPER DASH

LIGHTER

Depress to heat the element; pops out when hot.

TAG AXLE DUMP

Switch for tag suspension air. See Air Suspension System for operation.

****CHECK ENGINE (LIGHT)***

1. Warns driver there is a problem with the engine, but it can still be driven.

Have engine checked as soon as possible.

2. Is used by the service center for on-board diagnostics.

*STOP ENGINE (LIGHT)

1. Warns driver of an engine problem that needs immediate attention. Vehicle should be stod as safely and as soon as possible and engine should be checked.

2. Is used by the service center for on-board diagnostics.

*ENGINE PROTECT (LIGHT)

Monitors oil temperature; coolant temperature; oil pressure; and intake manifold air temperature. Wans driver of excess ranges in these areas.

***NOTE: These items are given more detail in your "Cummins" Operation and Maintenance Manual for the M11 series engine included in your "Spartan" motorhome chassis owner's manual.**

RIGHT HAND LOWER DASH

STEREO AM/FM/CASSETTE

(See video and audio section.)

IGNITION SWITCH

A four-position, standard-type key switch. In OFF position (center), ignition and accessory positions are disabled and the key can be inserted or removed. In ON position (right) the battery is connected to the engine-run ignition circuits and the key can be advanced to START to start the engine, providing that the transmission selector is in neutral N position. The accessory position is not

used.

MONITOR PANEL

REAR VIEW TELEVISION MONITOR

This system consists of a rear camera and a video monitor. System is designed to give the driver a full view of the rear of the motor home to aid in backing, parking and monitoring a towed vehicle.

To operate:

1. The ignition switch must be on.
2. With the switch in stand-by, the system will automatically come on when the transmission is shifted into reverse.

3. To turn system on while driving turn the switch to the ON position.
4. Use the switch at bottom of monitor to adjust system for daytime or night time use.
5. Adjust the contrast and brightness to your preference.

DRIVER & CO-PILOT AREA

HAZARD

This switch turns on the emergency flashers. When switch is used, both left and right turn signals will flash in unison.

HORN

Operate the horn by pressing in on the center section of the wheel.

COMBINATION TURN SIGNAL/HIGH BEAM

Push lever toward dash for right turn signal, pull lever away from dash for left turn signal. Pull lever up toward steering wheel for high beam. Pull lever up toward steering wheel to return to low beam.

TILT LEVER

Pull lever up to release lock mechanism. While holding lever up, adjust the steering wheel to a comfortable position and release lever. Move the steering wheel slightly to make sure the column locks into position.

CAUTION

Always make sure that the lever is in the fully locked position in whichever detent setting is used. Do not change the wheel tilt setting while the coach is in motion.

PARKING BRAKE

The Parking Brake control is located under the lower dash, to the right of the steering column. Note that the parking brake cannot be released unless the system air pressure is at least 65 psi. Pull to set and push to release.

AIR HORN FOOT SWITCH

Operates highway horns. Located on the floor to the left of the steering column.

ACCELERATOR PEDAL

Controls engine fuel flow to select power output. See Diesel Engine Section for detailed description.

BRAKE PEDAL

The coach is equipped with a dual air brake system which includes independent systems for the front and rear service brakes. A separate reservoir and panel mounted pressure gauge is provided for each service brake system. Refer to Air Brake System Section.

SEAT CONTROLS

Electrically operated six-way seat adjustments are built into the pilot's and co-pilot's seats.

Three electric SEAT CONTROLS are used to control seat bench tilt, up-down and front-back seat movement. These seats may be rotated by a knob in the arm rest. A lever on the outboard side of seats controls back tilt. An additional switch controls lumbar support.

ELECTRICAL SYSTEMS

There are two interrelated electrical systems used in your motor home ... the 12 volt DC supply system; and the 120 volt AC supply system. The 12 volt DC system is divided into several branches, or zones, each functioning from the common 12 volt battery source. One branch provides the 12 volts required for the automotive starting, ignition and lighting systems; remaining branches supply those motor home circuits and appliances which require 12 volts DC for operation.

The 120 volt AC system includes those motor home appliances which require 120 volts for their operation, supplied from either the internal generator, or from the external 120 volt AC (or a split 240 volt AC) supply, via the shoreline hookup. The inverter will supply 120 volt power from the coach batteries to selected circuits.

12 VOLT DC SUPPLY SYSTEM

Wiring diagrams of the 12 volt supply and distribution system are included in the Illustrations and Diagrams Section.

The 12 volts supplied to all motor home appliances, outlets and accessories is routed from the batteries through a main 12 volt master switch and routed through buses to the individual branches, or zones, that are serviced from this supply. Circuit breakers are located behind the door front of co-pilot seat hood table area. The circuits supplied and fuse or circuit breaker protection at each zone are shown on the diagrams.

COACH BATTERIES

Four (4) 12 volt Marine/RV Deep Cycle batteries are located in the rear compartment on the curb side. These will provide 8.4 hours of operation, at a 25 ampere rate, when a charging source is not available.

BATTERY CHARGING

The 12 volt coach battery supply, is maintained fully-charged by either the engine alternator (when engine operates); or by battery charger. The engine battery system is normally charged by the alternator only. The coach and engine battery systems are separated by an isolator to prevent deterioration of voltage in the event of one or the other supplies becoming defective.

Batteries can become discharged because of coach 12 volt loads, while parked, without a 120 volt AC source. For overnight stops this presents no problem, with judicious use of 12 volt service, because the engine alternator will recharge the batteries rapidly during the next day's travel. When operating from shoreline or generator power, the batteries obtain the major portion of the charge during "sleeping" time, while coach loads are low, so that the battery charger can "top off" the batteries.

If it is planned to leave the coach parked without exterior power for two days or longer turn off the Master switch. This will ensure that there is minimal drain from the circuits as well as the battery disconnect switch, located in the utility compartment.

NOTE: This will disable the refrigerator!

While in transit, the DC volts gauges on the dash panel should reflect an alternator regulated setting of 14 volts (+ 0.5). When parked, with 120 volt source supplied, the DC VOLTS COACH gauge should read between 12.5 and 14.0 volts depending upon load. When parked, without 120 volt source, do not permit voltage to drop below 11.5.

AC SUPPLY SYSTEM

Motor home AC-operated appliances are supplied from either an external shoreline hookup or from the on-board generator. Selection of shoreline or generator power source is determined automatically by a remote changeover switch located in left rear road side compartment above cable storage shelf. The 120 VAC circuits are normally supplied by the shoreline power cable. Whenever the generator is started, the automatic changeover switch will detect the generator voltage and will switch to the generator in approximately 25 seconds.

CAUTION

Use of excessively long and improperly rated extension cords may cause your auto changeover system to fail prematurely. If you must use an extension cord, follow these guidelines:

- **for 30 amp receptacles: USE 10 GAUGE WIRE**
- **for 50 amp receptacles: USE 6 GAUGE WIRE**

NOTE

Occasionally you may hear a slight humming or buzzing noise coming from the vicinity of your auto changeover or relay contractor box. This is completely normal behavior.

AC CIRCUIT BREAKER AND DISTRIBUTION PANEL

The main AC Distribution Panel is located in the bedroom behind the mirrored door on the road side.

BATTERY CHARGER

140 Amp battery charger (integral with the TRACE 3000 inverter) operates when a source of 120 volts AC is supplied either from shoreline or generator and the inverter is turned on. The charger is connected to the coach batteries. The engine batteries may also be charged by anabline the auxiliary battery switch on the lower dash.

CELLULAR PHONE WIRING (OPTIONAL)

A roof mounted antenna and wiring (terminates in driver area) are supplied for cellular phone hook up.

INVERTER

A 3000 watt inverter provides auxiliary power to all user accessible interior receptacles, ice maker, front overhead television, bedroom television, and electric drapes, while in transit, from 12 volt source. It is located in the road side electrical compartment. See the manual in your owner's kit for operating instructions.

LOAD MANAGEMENT

There are two important 12v system gauges located in the driver's area which, if properly understood and occasionally monitored, will ensure proper operation and prevent an inconvenient and possibly damaging situation of discharged batteries.

On the dash are:

- Engine volt gauge for two engine batteries.
- Coach volt gauge for four coach batteries. Proper charger operation while parked will keep batteries between 12.5 and 14.0 volts depending on load.

Be sure, with load management techniques, that coach load does not exceed charger capacity. This is easily determined by ensuring that dash coach volt gauge does not drop below 11.5 volts. Should battery voltage fall below this range, remember:

CAUTION

Battery voltage below 9v will damage fluorescent light bulbs and possibly the light ballast. Turn off fluorescent lights with low battery voltage!

STORING THE COACH

If you plan to store your coach without 120 v power for (2) days or longer, be sure to turn off your master switch and inverter at both shifter panel and inverter control panel. Your objective is to minimize power drain.

With the master off, you can still expect a battery discharge of 2-4 amps because of non-mastered circuits to refrigerator, and transmission control circuits.

For storage over a (3) week time period, disconnect your batteries if there is no shore power available for the battery charger. The best storage technique is to turn off both master switches, and the battery disconnect switch located in the utility compartment.

NOTE: Do not attempt to charge the batteries or start the coach with the battery disconnect switch OFF! The charger will output detrimental AC ripple voltage which could cause damage to RVDC electronics!

ENGINE, DIESEL

(SEE ENGINE OPERATOR'S MANUAL FOR INFORMATION)

FUEL TANK

Tank is a mid-mount tank which can be filled from curb or road side. Fill fuel tanks after completing a run. Partially-filled tanks will collect moisture if the coach is allowed to sit for an appreciable length of time.

FUEL ADDITIVE

Fuel Additive Recommended for use with #2 Diesel Fuel ... US Borax Biobor JF
Fuel Additive to use per 100 gallons ... 2.8 fl. oz.

EXHAUST BRAKE RETARDER OPERATION

(See Engine Manual for information.)

POWER STEERING & HYDRAULIC COOLING FAN

(See Chassis Manual for information.)

ENGINE COOLING SYSTEM REFILL

(See Engine Manual for information.)

BATTERY MAINTENANCE

Your motor home is equipped with separate engine and coach battery systems for greater assurance that there will be sufficient voltage to crank the motor home engine.

Two engine batteries are located in the battery compartment top shelf on the curb side. The four batteries located in the curb side battery compartment lower shelf are used for coach loads.

All batteries are charged from either the alternator or battery chargers. In order for the battery chargers to operate, either the generator must be running or the coach must be connected to a shoreline supply.

To make sure that the batteries are always ready for use, periodically check and charge as necessary.

A dirty battery may eventually dissipate its charge through conductive surface contamination. Clean battery top surface with a damp cloth and dry thoroughly. Check that battery terminals and associated battery jumper terminals are tight and free of corrosion. To clean terminals, neutralize corrosive deposits with a solution of baking soda, rinse with clear water, and dry. Note that commercial type spray-on battery cleaners are available at automotive supply stores. Use as directed to keep the batteries clean. Spray-on cable and terminal protective coatings are also available, easy to use, and effective.

CAUTION

Avoid sparking of any form in the vicinity of the batteries.

CAUTION

Do not wear metal rings, watches or jewelry when working on or near the batteries, cables, solenoids, or chassis wiring. These can short out electrical wiring and cause injury.

BATTERY STORAGE IN FREEZING WEATHER

Batteries that are not kept full-charged must be given protection against freezing. Partially-charged batteries will freeze at low temperatures, so batteries must either be left charged or removed from the vehicle and stored in a warm location.

The motor home can be left connected to the shoreline AC supply and the coach battery chargers will keep the coach batteries charged. Note that even in a warm location is advisable to keep the batteries charged to prevent deterioration. The engine and coach batteries are the sealed type and require no electrolyte service.

Coat battery terminals with lubricant or protective coating to inhibit corrosion.

FANS, VENT & EXHAUST

KOOL-O-MATIC FAN

12 VDC power ventilator located in the kitchen.

OPERATION:

1. Open inlet dampers on fan.
2. Be sure windows are open to provide proper air flow cooling and ventilation.

FANTASTIC FAN/WITH RAIN SENSOR

12 VDC exhaust fan located in the bathroom.

OPERATION:

1. Open damper from control located on the face of the vanity.
2. Turn on fan from control located on the fan. Set desired speed. Switch on fan may be left on in order for the vanity (remote) switch to operate all functions.

FRESH WATER SYSTEM

WATER SUPPLY AND DISTRIBUTION SYSTEM

The dual purpose Tank Water Fill/Commercial Water inlet connection is located on the road side in the holding tank compartment. Tank Fill valve located in the same compartment, diverts the commercial water input to fill the pure water storage tank. System water pressure is provided by a water pump (located in the same compartment), rather than by tank pressurization. A water filter system filters all the water supplied to the coach.

COMMERCIAL WATER HOOKUP

When facilities are available, the Commercial Water hookup can be used to supply all coach water system requirements. In this manner, the coach water tank and pump system are automatically bypassed and water pressure is developed by the external connection. Water inlet pressure is regulated to 40-psi maximum, by a valve which is part of the city (commercial) water fill.

FILLING THE TANK - STANDARD CAPACITY APPROX. 100 GALLONS

To fill the water supply tank, connect the water hose to the commercial water inlet, open the Tank Fill valve, then turn on the water supply. When tank is full, as indicated by water overflow beneath the coach, close the Tank Fill valve, shut off the water supply and disconnect the hose. At this time, check that the Monitor panel readout indicates a full water tank. To check, press the Pure tank switch and observe that the E through F indicator segments are lit.

NOTE
The Tank Fill valve should be OPEN only when the water tank is being filled. This valve must be closed at all other times.

SANITIZING THE WATER SYSTEM

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 Water Tank** - To drain tank, open the Water Tank Drain Valve in the holding tank compartment. After tank is completely drained, close Water Tank Drain.

2. **Prepare the sanitizing solution** - using 1/4 cup of household bleach (sodium hypochlorite solution) for each gallon of water. Use one gallon of the solution for each 15 gallons of tank capacity. This procedure will result in a residual chlorine concentration of 50 ppm in the water system. If a 100 ppm concentration is required use 1/2 cup of household bleach with one gallon water to prepare the chlorine solution. Seven to eight gallons of solution will be adequate for the tank. (Approx. 100 Gallons).
3. **Add sanitizing solution to water tank** - Remove one of the 1/2" plugs from top of the f/w tank and pour solution into tank. Reinstall plug in tank. A piece of garden hose and funnel will aid in this step.
4. **Fill tank to capacity** - Connect hose to the commercial water inlet, open the Tank Fill valve and fill water tank completely. Shut off hose, and close Tank Fill valve. Turn on the water pump, 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** - 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 1 hour.
6. **Drain tank** - Open the Water Tank Drain valve and allow the tank to drain completely.
7. **Refill tank** - Close the Water Tank Drain valve and turn on the water supply to the commercial water inlet, open Tank Fill valve and fill tank completely. When the tank is full, close Tank Fill valve, shut off water supply and disconnect hose, replace fill cap and turn on water pump. When water flows from opened faucets, close them and open other faucets until water flows. This flushes the system, removing trapped air from the piping and ensures that the fresh water supply is ready for use. Run water at faucets until system is flushed of sanitizing solution.

CAUTION

Do not permit sanitizing or antifreeze solutions to enter water filter.

FILTER REPLACEMENT

This filter removes sediment taste and odor and is installed on the output side of commercial water hookup. All water is filtered before it enters the water system. Cartridge life is not more than three months, and should be changed if water flow slows or bad tastes and odor return.

WATER HEATER

With the Aqua-Hot 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 Aqua-Hot's domestic hot water loop which is an integral part of the heating system. A mixer valve has been installed to assure 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 water heater off if outside temperature is 32 degrees or lower when potable water system is not drained.

OUTSIDE FAUCET

An outside faucet is provided in the holding tank compartment.

WATER PUMP

The water pump, located in the holding tank compartment, is equipped with a factory-calibrated pressure control switch which is preset to turn the pump on when the system pressure falls below 20 psi; and turn the pump off when the pressure reaches 40 psi. If the pump has been out of service for a period of time, it is advisable to open a faucet before turning on. When water flows steadily from the opened faucet, close faucet and observe that the pump shuts off when system becomes pressurized (It may also be necessary to bleed the air from the other faucets as well.) When the potable water supply tank level is low, or empty, shut the pumps 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 in 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.

WATER PUMP SWITCH

Switches enabling the water pump are located on the systems monitor panel and in the bathroom.

The associated indicator is lit whenever power is being supplied to the pump. Turning ON a switch pressurizes the water system, with the pump operating on demand to maintain constant pressure. Continuous or erratic pump operation can indicate an empty water tank, system leakage, or air lock in the water lines.

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-offs, located on the manifold, will shut off water to any fixture in the coach.

AIR ACCUMULATOR

An accumulator in the water system will smooth out the water flow, and eliminates water hammer and pulsations from the water pump. This accumulator has a diaphragm which separates the air on top from the water so it will not become "water logged."

WATER PUMP TROUBLESHOOTING GUIDE

Symptom:
  Possible Cause:
    Corrective Action:

Pumps operate but no water flows through faucet:
  Low water level in tank.
    Add water.
  Suction line or filter clogged.
    Clear water lines and clean filter.
  Kink in 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.
    Replace diaphragm or jammed check valve.
    (See pump service instructions).

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.
    Replace upper housing.
    (See pump service instructions).

Pump operates roughly and has excessive noise and vibration:
  Intake line is restricted, kink in suction hose or fittings are too small.
    Check input hose and straighten or replace, as necessary.
  Defective water pump.
    Replace lower housing.
    (See pump service instructions)

Pump fails to start when faucet is opened:
Clogged pressure piping.
Blow out water lines with compressed air.
No voltage to pump.
Check input wiring circuit breaker and switches.
Defective water pump.
Replace upper housing or check valve.
(See pump service instructions).

Pump gives low water pressure and flow:
Defective water pump.
Replace diaphragm or motor.
(See pump service instructions).

WINTERIZING

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

DRAINING AND WINTERIZING THE FRESH WATER SUPPLY SYSTEM

The following procedures show the use of the various drain valves and controls to remove the water from the plumbing and appliances in the fresh water supply system.

1. Open the main circuit breaker box and turn off the Water Heater (and Instant Hot if equipped) circuit breakers.
2. Turn on Water Pump switch 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 hose connection should always be left open when freezing temperatures are expected. Also remove drain plugs at rear of toilet and at bottom of (optional) Instant Hot. Refer to the Ice-Maker and Toilet Manuals for winterizing these units.
3. Open the Cold Water Drains, Hot Water Drains, Tank Fill and Tank Drain valves located in road side holding tank compartment. Open Cold and Hot Water Drain valves located in the Aqua-Hot compartment.
4. Allow water to drain completely before proceeding to the next step.
5. Close all valves opened in step 3, except Hot Water Drain valve in Aqua-Hot compartment. Also, close cutoff valve at water filter.
6. Turn ON Water Purge Air Pressure switch to activate the solenoid which applies air pressure to the input water line to purge the water system. Note that it may be necessary to start the engine to build up air pressure.
7. Remove cap from cold water circuit at front of Aqua-Hot compartment and pour in 8 oz. of RV Antifreeze. Replace cap and repeat step 6. The proceed to step 8.
8. When only air remains in the lines, close Hot Drain valve in Aqua-Hot compartment and all faucets. Replace drain plugs in toilet and Instant Hot. Operate the Instant Hot valve to clear the heat exchanger of remaining water.

9. Turn Water Purge Air Pressure Switch and water pump off, and shut down engine.
10. Open all faucets (toilet valve to remain open).
11. At this point, the only water remaining in the system is contained in the P traps beneath the lavatory, shower and kitchen sink. To prevent this water from freezing and damaging the traps, put one pint of RV system anti-freeze into each drain. See WASTE SYSTEM winterizing.

NOTE

When reactivating system, make sure (optional) Instant Hot is full of water before switching on.

FREEZE PROTECTION

(See Heating System - Section 13.)

GENERATOR

GENERATOR OPERATION

The generator can be started and stopped from any of two locations within the coach, at the driver's area and at the galley panel. In addition, the generator can also be operated from the switch in the front roadside compartment.

To start the generator, push the Generator switch to the Start position and hold until the generator starts, as indicated by the indicator light. Do not hold switch on for longer than 5 seconds at a time! If the generator does not start the first time, wait a minute and try again. Release the switch when the indicator light glows. After starting, there will be a delay of approximately 25 seconds before the automatic change over switch will permit the generator to pick up the load. The generator may be stopped at any time, by holding the switch to the Stop position until the generator stops (light extinguishes).

In cold weather, it is necessary to activate the cylinder glow plugs before starting. Push start-stop switch to stop position and hold for 15-20 seconds. See operator's manual for more detailed information.

GENERATOR MAINTENANCE

Refer to Operator's Manual in your owner's kit for inspection maintenance requirements.

CAUTION

The generator tray is electrically operated and extends outward with considerable force. To extend the tray, move around to the road side and operate the tray switch in the front compartment to out position. Be sure that there is sufficient clearance in front of the tray and that nobody is in the way! Use extreme caution when observing and operating generator with tray extended.

AIR CLEANER

Cleaning Instructions:

Donaldson does authorize cleaning the Dura-Lite unit (throwaway type) but this can be impractical in most cases. If it is cleaned, the following should be observed.

Blow air into the Dura-Lite's outlet neck causing dirt to flow off the media and out the dirty air inlet opposite the normal air flow direction. This procedure keeps the abrasive contaminants away from the clean air side.

Do Not use pressurized air higher than 100 psi.

Do Not use compressed air cleaning when the filter media is wet.

OIL CHECK/CHANGE

To be on the safe side, check oil (dipstick located on road side of generator) in engine crankcase daily, or before each start, to ensure that the level is in the safe range between the upper and lower marks on the dipstick. Do not operate generator if level exceeds the upper mark, or is below the lower mark.

CAUTION

Do not check oil level while engine is operating. Engine must be stopped to obtain a true reading, as well as for safety reasons!

Whenever possible, drain the oil while the engine is still warm. To drain, place a container below the unit, open the oil drain and allow sufficient time for the old oil to drain completely. After draining, close drain plug and tighten securely.

COOLING SYSTEM

Cooling system capacity is about 12 quarts of liquid. System should be filled using equal parts of water and ethylene glycol. (A drain petcock is provided on the underside of the radiator.)

When draining the coolant, remove the cap from the top of the engine and open the engine block drain cock located below the fuel injection pump.

Check coolant level frequently and add antifreeze mixture as needed to maintain full system.

HOURS RUN METER

Meter is located on generator control panel.

GENERAL TROUBLESHOOTING

Refer to the Generator Service Manual for repair and maintenance data. Generator repairs should be accomplished by a qualified repair agency.

GENERATOR OVERLOADS

If the rated capacity of the generator is exceeded, the safeguard circuit breaker, located on the front surface of generator electrical box, will trip to protect the generator against damage. This condition could be caused by a short in the coach AC supply circuits, or by operating too many appliances simultaneously, resulting in an overload condition. If the safeguard circuit breaker trips, the generator will continue running but no AC output will be supplied. Before resetting the circuit breakers, turn off some of the coach appliances and lighting to reduce the load to within the operating limits of the generator. If this is done, and the generator breakers still trip, a short circuit is indicated. Turn off the generator, locate and correct the cause of the short circuit.

STORAGE PROCEDURES

If the generator is to be out of service for a long period of time, perform the following procedures before placing the unit in storage:

1. Drain oil from crankcase (while hot) and refill with specified oil. Run generator after change to circulate new oil.
2. Clean exterior surfaces of generator set then spread a light film of oil over any unpainted metallic surfaces which could corrode.

GENERATOR SPECIFICATIONS

Electrical Rating	12.5 KW at 120 VAC
Fuel Supply	Diesel, separate pickup in main tank
Fuel Filter Element	WL P/N 3970860
Cooling System	12 quarts
Crankcase Capacity	6.8 quarts
Oil Filter	WL P/N 6075923
Oil Specifications for Generator	
API Classification	CD 10W30/10W40 *(See Operator's Manual)*
Air Filter Element	WL P/N 6075931

HEATING SYSTEMS

The Aqua-Hot Motor Coach and Marine Heating System is an on-board heating system that provides a continuous supply of domestic hot water, as well as interior heat where and when it is needed. Both heating features are accomplished by a 50,000 BTU diesel-fired burner and a 1650 watt electric heating element (located at breaker on 110 volt/ AC load center). These two heating sources operate separately or simultaneously (during high heat demand periods) to maintain the temperature of the Aqua-Hot's 50/50 solution of water and antifreeze. In addition to domestic hot water and interior heating capabilities, the Aqua-Hot has also been designed to preheat the vehicle's engine prior to starting. This feature provides easy engine start-up on cool mornings.

The Aqua Hot Heating System is controlled by the same thermostat used for the roof air conditioning system (Section 1-1). This thermostat is located in the dinette area. Refer to your Dometic "Comfort Control Center" operation manual for detailed instructions.

NOTE

For freeze protection, leave the furnace operating to supply heat to the interior of the coach as well as the holding tank compartment.

ELECTRIC HEAT

An electric forced air heater (120 vac) is located in the bathroom. Your electric heater is provided for auxiliary heating. Since the heater draws 10-15 AC amps, operator load management becomes an important consideration.

BATHROOM HEATER OPERATION

1. On/Off thermostat control on heater must be turned on and set.
2. Bathroom thermostat must be turned on and set for temperature desired.

HEATING SYSTEM CHASSIS

(See Air Conditioning/Deforsting System Operation, Section 1-1.)

INTERIOR & EXTERIOR CARE

CORIAN TOPS

Even stubborn stains ... such as grape or beet juices ... wipe off with a damp cloth and household cleanser. Because CORIAN is solid all the way through, it cannot be harmed by abrasive cleansers and normal household cleaners.

CORIAN is strong and tough, but slicing on it with knives can cause scratches. Use a cutting board.

While CORIAN does provide an extra measure of protection (better than ordinary counter tops), it is not recommended as a hot pad. Do not place hot pots and pans directly on your CORIAN counter top.

Since it's a solid material with color and pattern all the way through, unusual damage such as cigarette burns, scratches, or other surface abuse can usually be removed using ordinary household cleansers or fine sandpaper. If the stain persists, or if the scratch is particularly deep, first use a medium sandpaper (120 or 240 grit) then fine sandpaper (320 or 400 grit) followed by circular motion buffing with a Scotch Brite pad to match the gloss of adjacent surfaces. Household cleanser, steel wool or DuPont No. 7 polishing compound can also be used if higher gloss levels are needed.

CAUTION

Certain chemicals found in the home-such as paint removers, paint brush cleaners, acid drain cleaners and certain brands of nail polish and polish removers - can harm CORIAN if left in contact even for short periods of time. These materials should be wiped away promptly and flushed with water. Depending on time of exposure, surface damage caused by these materials can sometimes extend too deeply for practical repairs.

INTERIOR CARE

The interior can be kept in good condition with the use of approved cleaning agents for wall coverings and ceilings, plastic fixtures, stainless steel, formica and so on. Never use abrasive cleaning agents on interior of refrigerators, or on the lavatory, tub/shower, or toilet, as they can cause permanent scratches. Be sure that the cleaning agent will not damage the material. Note that some plastics are incompatible with certain cleaners. Read the directions on the container before using. For the most part, the cleaners and polishes that would normally be used in your home are equally well-suited for use in your motor home.

STRESS CRACK AVOIDANCE OF LAMINATE MATERIALS

Causes of stress cracking - caused by the concentration or buildup of stresses in a particular area of a laminated assembly. When this stress becomes greater than that which the laminate can withstand, a stress crack will occur. If such stresses are allowed

to concentrate around a cutout or other such fabrication detail, one or more cracks can characteristically radiate from the sharper corners of the cutout, where, for mechanical reasons, the laminate is the weakest.

The stresses can be caused by external mechanical forces but are generally caused by the normal dimensional movements of the laminated assembly as it reacts to the surrounding environment. As with all wood based products, high pressure laminates and their substrates react to humidity changes. Under moist conditions, laminated assemblies gain moisture and expand dimensionally. When this same assembly is subjected to dry conditions, however, this moisture is lost and shrinkage results. If the laminate shrinks more than the substrate, stress cracking of the laminate surface can occur in certain areas.

STEPS TO MINIMIZE STRESS CRACKING

In extremely dry conditions, relative humidity of 10% or less, and excessively warm temperatures, generally greater than 95 degrees Fahrenheit, the following precautions should be taken when storing the coach for a length of time greater than 48 hours:

-Open a roof vent hatch to permit heat to escape from the interior of the coach

-Provide a source of moisture for the interior of the coach, such as an open container of water, to boost interior moisture content.

By reducing heat buildup and adding moisture content to the interior, less dimensional movement between the laminate and substrate should occur, thus minimizing the stress between the laminate and substrate.

EXTERIOR CARE

Exterior paint finish life can be extended by periodic cleaning and waxing. This will preserve the paint and allow easier removal of dirt and road tars. Use touch-up paint for small areas to keep the coach finish in like new condition.

Frequent washing of the coach is necessary to prevent corrosion in areas where heavy salt sprays are evident. A clear acrylic spray may be used, with care, to control corrosive effects of salt spray on metal surfaces.

CAUTION

Some car/truck wash facilities may use strong detergents or other chemicals that could cause permanent staining or streaking of exterior paint and aluminum trim. A strong alkaline solution, while useful for dissolving dirt, is a suspected harmful ingredient.

Before enlisting any commercial wash service or facility, you should determine that cleaning agents used will not damage the finish of your coach.

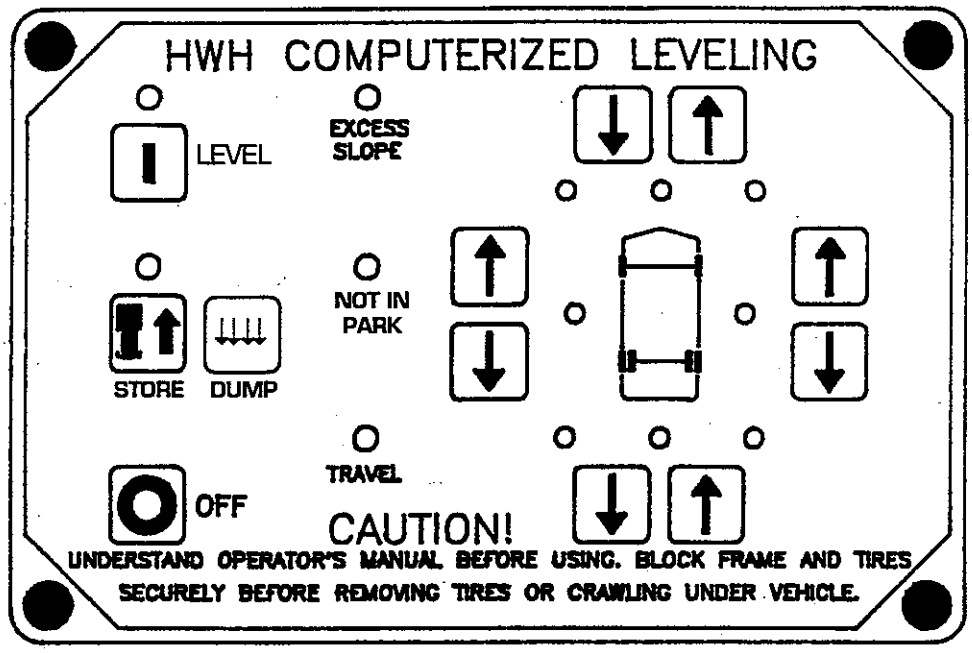
CAUTION

Avoid spraying water through the refrigerator vent door. Refrigerator PC control boards are not completely sealed and are vulnerable to an inadvertent dousing.

LEVELING JACK OPERATION

AUTOMATIC LEVELING JACKS CONTROL

The control panel is mounted on the sidewall beside the pilot.



CAUTION!

Read and understand entire operators manual before operating.

Block frame and tires securely before changing tires or crawling under vehicle. Do not use leveling jacks (or air suspension) to support vehicle while under vehicle or changing tires. Vehicle may move forward or backward without warning causing injury or death.

Keep all people clear of vehicle while leveling system is in use.

Do not over extend the rear jacks. If the weight of the vehicle is removed from one or both rear wheels, the vehicle may roll forward or backward, off the jacks.

Never place hands or other parts of the body near hydraulic leaks. Oil may cut and penetrate the skin causing injury or death.

Kickdown type leveling jacks may abruptly swing up anytime the foot clears the ground.

PANEL FUNCTIONS

1. CONTROL BUTTONS

The "OFF" button is in the lower left hand corner of the touch panel. Push the "OFF" button to stop hydraulic operation.

Top left is the "I" button with its operating light above it. Below the "I" button is the "STORE" button for retracting hydraulic jacks, with its operating light directly above it.

The remaining buttons on the right hand side of the panel are MANUAL control buttons that operate only during the manual mode. The manual buttons are the eight (8) buttons on the right half of the label, two for each of the FRONT, REAR, LEFT SIDE, and RIGHT SIDE. Pushing UP arrows will cause the coach to raise and DOWN arrows will cause the coach to lower.

2. INDICATOR LIGHTS

The four (4) yellow indicating lights are level sensing indicators. When a yellow light is "ON", it indicates that its side or end of the vehicle is low. No more than two (2) lights should be on at the same time.

The four (4) red lights surrounding the yellow level indicators are jack warning lights. They are functional only when ignition is "ON" or in "ACCESSORY". During the hydraulic mode they light when the respective jack is extended. The vehicle should not be moved while these lights are on.

The "EXCESS SLOPE" indicator will light when the leveling system cannot level the coach.

The "NOT IN PARK" indicator is "ON" when the control panel is "ON" and the park brake is not set.

The "TRAVEL" indicator is "ON" when the control panel is off, the jacks are retracted, and the ignition switch is on. Do not move vehicle unless travel light is "ON".

The "LOW BATTERY" indicator is "ON" when the controls sense low voltage set between 8.0 and 9.0 volts. The system will stop leveling functions when low voltage is detected.

GENERAL INSTRUCTIONS

Press the "OFF" button and turn the ignition switch OFF at any time to stop the operation of the system.

Any time a hydraulic leveling process is interrupted, retract the jacks according to the "JACK RETRACTION" section and then restart the leveling process.

Do not operate the system when the "LOW BATTERY" light is on. If the park brake is

not set when the "I" button is pressed, the "NOT IN PARK" light will come on and the system will not operate. It will remain "ON" only while the "I" button is pressed.

PREPARATION FOR TRAVEL

Before traveling, the red jack warning lights must be "OFF" and the travel light must be "ON". If lights are not correct for travel, retract jack as described in the "JACK RETRACTION" section.

CAUTION

Do not rely solely upon the warning indicator lights. It is the operator's responsibility to check that all jacks are up before moving the vehicle.

SYSTEM OPERATION

AUTOMATIC HYDRAULIC LEVELING

1. Place transmission in neutral position and set parking brake. Turn the ignition to the "ACC" position. Note: Coach engine must be off for leveling.

2. If the vehicle is parked on soft ground, blocks may be placed under the jacks for added support.

3. Press the (I) button to enter the hydraulic operation mode. The (I) indicator light will glow steadily.

4. Press the (I) button a second time. The (I) indicator light will start to flash. The controller starts out dumping the air bags. After 25 seconds, the system automatically extends the jacks to level the vehicle and then extends any remaining jacks until they touch the ground. In the event the jacks are unable to level the vehicle, the (excess slope) indicator light will come "on." One or more yellow level lights will be on indicating that its jack is fully extended.

5. After a pause of ten seconds the system will automatically shut off (warning indicator lights will remain on as long as the ignition is on or in the accessory position and the jacks are in extend position).

6. Turn the ignition switch to the "OFF" position.

JACK RETRACTION

1. The operator must be sure that there are no objects under the vehicle and that all people are clear of the vehicle.

2. Turn the ignition switch to "ACC" and press the (I) button one time. The (I) indicator light will glow steadily.

3. The "I" indicator light will glow steadily. Press the "STORE" button. The store

indicator light will flash. As each jack retracts, its red warning light will go out. Approximately one minute after the four red warning lights are off and the "TRAVEL" light is on the vehicle may be moved.

4. The system will automatically shut off six minutes after the four "Jacks Down" warning lights on the touch panel have gone out. If a "Jacks Down" warning light stays lit, the system will continue to run for thirty minutes. It will then shut off regardless of the touch panel warning lights. Note: DO NOT interrupt power to the control box until the red indicator light above the "I" button has gone out.

5. If jacks cannot be retracted by the above procedure see "VALVE RELEASE OPERATION" section.

MANUAL HYDRAULIC OPERATION

1. Place transmission in neutral and set the parking brake. Turn the ignition to the "ACC" position.

2. If vehicle is parked on soft ground, blocks may be placed under jacks for added support.

3. Press the (I) button. The indicator light will glow steadily.

4. Press the (DUMP) button and hold to dump air from the air bags. After the air is exhausted, advance to the next step.

5. The vehicle may be leveled using the manual raise buttons on the right half of the panel. If a yellow "LEVEL SENSING" light is "ON", that side or end of the vehicle is low. Jacks will extend (or retract) in pairs to raise (or lower) a side or end of the vehicle. When a jack is extended, approximately two (2) inches, the respective jack warning light on the right half of the panel will come on.

IMPORTANT

Do not continue to push a raise button for more than ten (10) seconds after that pair of jacks are fully extended.

6. When leveling is completed, push the "OFF" button on the leveling panel and turn the ignition switch to the "OFF" position.

VALVE RELEASE OPERATION

1. Use the valve release "T" handles for retracting only if the "STORE" button on the control panel will not retract the jacks for travel.

CAUTION

Keep away from the wheels, do not crawl under coach, keep a safe distance in front and rear of vehicle. The vehicle may drop and/or move forward or backward without warning or as the valve release is operated.

2. Locate the valve release "T" handles on the solenoid valves. The solenoid valves are located on the pump manifold assembly.
3. Allow clearance for the coach to lower.

4. Open the two outer valves slowly by turning counter clockwise. The handles may turn easily at first but as an internal spring is compressed, turning may become more difficult. The valves need only be opened enough to retract the jack.

5. Retract the front jacks by opening the two center valves as described in step 4.

6. Check that all four jacks are now retracted.

7. Close the valves by turning the release handles clockwise. Once the internal spring tension has been released, the handles will turn free for several turns. DO NOT tighten the handles past this point as internal damage may occur to the solenoid.

8. The system should now be repaired before being used again.

SERVICING OF LEVELING SYSTEM

HYDRAULIC OIL

Retract the four leveling jacks before checking oil level. Locate the pump/manifold assembly and clean any dirt away from the breather/filler cap on the oil reservoir. Check that the oil is within one (1) inch of the top of the reservoir.

The oil should be checked when the vehicle is first purchased and then once every two years. More often if there is an oil leak in the system. Use universal, multipurpose or Dexron transmission fluid. DO NOT USE brake fluid or hydraulic jack fluid. Use of these fluids can damage seals. The hydraulic tank should be filled to within one (1) inch from the top.

VISUAL INSPECTION

Periodically inspect the leveling jacks for damaged or missing parts such as pivot bolts, springs, or warning switches. Check the hydraulic lines and wiring for damage and wear.

"NOT IN PARK/BRAKE" CHECK

Set park brake. Switch ignition to the "ACC" position. Continuously press "I" button on touch panel to turn on system. Release parking brake and confirm that the "NOT IN PARK/BRAKE" indicator light comes on. Reset parking brake. Switch ignition to "OFF" position.

NOTE

If any of the above checks or inspections reveal a problem or if there are other problems or questions, consult your vehicle or coach manufacturer, or HWH Corporation for service or repair.

OPERATIONAL CHECK

Review operator manual and confirm that the system is operating correctly.

NOTE

If any of the above checks or inspections reveal a problem or if there are other problems or questions consult your nearest service center.

CAUTION

Do not drive the coach unless the air suspension system is correctly pressurized to assure even weight distribution. There must be pressure in the air bags to prevent flat spotting of tires during brake application.

CAUTION

Severe injury or death may result. Do not use the leveling system for changing tires or working under the vehicle. Keep the rear wheels in firm contact with the ground with the parking brake set. With the leveling jacks extended, there is a possibility the vehicle may move either toward the front or rear.

LPG SYSTEM

LPG SYSTEM

The coach is equipped with a permanently mounted 45 gallon (148 pounds of fuel-net) LP gas tank which is the energy source for the cooktop (range) and alternate source for the refrigerator.

LPG TANK AND CONTROLS

The LPG supply tank is located in left hand front compartment. 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 coach 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 galley panel.

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 inflammable, 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 will not function if the LP gas does not vaporize. Butane will not vaporize below 32° F. (the freezing point of water), but propane will continue to vaporize down to 44 degrees below zero. Propane has become the main type of LP gas used in RV's in recent years. Your LP supplier will have the correct type or blend for your locale. If your travels will 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.

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 is LP capacity. Close the liquid level valve. Do not use a wrench to tighten this 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.

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 dealer or LPG supplier. The correct setting is 11-14 inch water column.

OPERATION

To operate any LPG appliance, the main gas (Service) valve, must be open. Also 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 will escape 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.

CHECKING FOR LEAKS

Periodically check the LPG 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!

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 manner of use of these appliances.

Note that each gallon (4 1/4 lb) of LPG fuel produces approximately 91,500 BTU's of heat energy. The LPG tank used in your coach will furnish over 3 million BTU's.

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 BTU's
Cooktop Burners	5,200 BTU's each

LPG SYSTEM WARNINGS

WARNING

LP gas containers shall 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.

WARNING

It is not safe to use cooking appliances for comfort heat.

This warning label has been located 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, shall not be used inside the recreational vehicle. The use of this equipment inside the recreational vehicle 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 ventilating 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 will minimize 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 dealer or LPG supplier.

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:** 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 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 out, Red light 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.

In order to restore LP gas flow to the coach, use the following procedures corresponding to the events above:

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 will not relight after a shutdown. In this circumstance, wait five (5) minutes for LPG pressures to equalize before relighting.

OPTIONAL EQUIPMENT

DESCRIPTION	*AREA*
WASHER/DRYER COMBO Combo washer/dryer is installed in closet area of bath with short hanging above. Shut off valves for hot & cold water are located below combo unit. 120 VAC power is supplied by shoreline hookup or generator.	**BATH**
TOILET, MICROPHOR Includes vitreous china toilet, ultra-low water use and 12 VDC electric flush.	**BATH**
PREMIUM SOUND SYSTEM A 10 disc CD player is installed in cabinet area above windshield controlled by the radio in dash.	**DASH**
MUSICAL HORN A 100 tune PMMI musical horn is installed in dash area.	**DASH**
AIR COMPRESSOR, AUXILIARY, 120VAC A 120 VAC compressor located in an outside compartment. 12 volt switch located in the dash area operates the compressor via shoreline or generator power. The compressor provides a quick source of air for power tools or pressurizing the coach air system or tires without starting the coach engine.	**EXTERIOR**
INSTALL CELLULAR ANTENNA Cellular antenna installed on roof with wiring terminated in the hood table.	**EXTERIOR**
ZIP DEE PACKAGE This option includes the following: (2) bedroom awnings (1) driver/living room/kitchen awning (1) living room/kitchen awning (1) bath awning (when private toilet is used)	**EXTERIOR**
COMPASS W/ THERMOMETER	**INTERIOR**

DESCRIPTION	AREA
INTERIOR PACKAGE, LAMINATE Cabinetry will be laminate in lieu of standard oak.	INTERIOR
INTERIOR PACKAGE, PICKLED OAK Cabinetry will be pickled oak in lieu of standard oak	INTERIOR
INTERIOR PACKAGE, WALNUT Cabinetry will be walnut in lieu of standard oak.	INTERIOR
DINETTE, 4-SEAT BOOTH A 4-seat booth dinette is installed in lieu of standard table and chairs.	KIT./DINETTE
BOOTH DINETTE, CONVERTIBLE a 4-seat booth dinette is installed in lieu of standard table and chairs. Booth converts into a sleeper.	KIT./DINETTE
EXTENSION TABLE AND FOLDING CHAIRS This installs an extension table w/12" leaf and two folding chairs covered in same fabric as standard dinette chairs.	KIT./DINETTE
KONSTANT HOT	KIT./DINETTE
LOVESEAT IN LEATHER A loveseat installs opposite the sofa covered in leather in lieu of table and chairs.	LIVING ROOM
LOVESEAT IN FABRIC A loveseat installs opposite the sofa covered in companion chair fabric in lieu of table and chairs.	LIVING ROOM
RECLINER W/LARGE TABLE A Flexsteel recliner and large table replace two swivel chairs and small table.	LIVING ROOM
LEATHER PACKAGE Includes companion chairs and dinette chairs in leather.	LR/DINETTE
STATE CERTIFICATION, CALIFORNIA	STATE DECAL
STATE OPERATING DECAL, FLORIDA	STATE DECAL
STATE OPERATING DECAL, TENN.	STATE DECAL
STATE OPERATING DECAL, WASHINGTON	STATE DECAL

SAFETY & SECURITY FEATURES

FIRE EXTINGUISHER

A portable, multi-purpose dry chemical fire extinguisher is located behind the rear living room companion chair. A second fire extinguisher is located in an outside coach compartment. To use, release the clamp and remove the fire extinguisher from the bracket, pull safety pin from handle, squeeze handle and apply chemical under flame.

SMOKE DETECTOR

A smoke detector is installed on the ceiling in the galley/dinette area. A warning label is attached to the exterior of the smoke detector.

LP GAS LEAKAGE DETECTOR

The gas leakage detector, is located in the galley/dinette area. In the event of an LP leak, the unit sounds an alarm and closes the main LPG supply by deactivating the solenoid valve located in the high pressure gas line just before the regulator. See LPG Leak Detector System for additional information.

MIRRORS

All interior mirrors meet ANSI A119, and 297.1 codes, for your safety.

CARBON MONOXIDE DETECTOR

The carbon monoxide detector is located in the galley/dinette area. In the event that carbon monoxide is detected the unit sounds an audible alarm and the green control light will flash on and off. When the carbon monoxide unit is in the alarm condition you need to get outside the vehicle as soon as possible into fresh air. Your recreational vehicle should be checked by a service center for the possible source and elimination of the carbon monoxide.

POWER CORDS & HOOK UP

Your coach is supplied with a permanently attached 50 amp power supply inlet on the exterior (road side rear) and a 50 to 30 amp adaptor for hook up to external power source.

Note that 50A cord has a ground pin which provides proper electrical system grounding.. The ground pin is your personal protection from electrical shock hazards. **Do not use any adapter, cheater, or extension cord that will break the continuity of the grounding circuit. Never remove the grounding pin for convenience of being able to make a connection to a non-grounded receptacle!**

Never operate your coach with a "hot skin"! If you can feel even a slight "tingling" shock from touching the coach body while standing outside on the ground, immediately disconnect the electrical hookup until the trouble is located. This fault is usually caused by a break in the grounding circuit, which should be continuous from the coach skin or frame to the distribution panel board to the ground pin on the power supply cord, and from there to the park receptacle and earth ground.

SHORELINE OPERATION (COMMERCIAL POWER)

CAUTION

Your motor home has been wired in accordance with the National Electrical Code. All 120 volt AC wiring is two-wire service with ground; all 240 volt wiring is three-wire service with ground. For personal safety, check the polarity detector indicators on the power line monitors to be sure that lines are properly connected and grounded.

CAUTION

During thunderstorms lightening strikes may detrimentally impact the electrical system of your coach just as it would your home. To avoid potential catastrophic damage to sensitive electronic devices in your coach, disconnect shore power and cable television service prior to electrical storms reaching maximum intensity.

CAUTION

If the ground pin is used as a starting point for insertion of the 50 amp plug, the possibility exists that an over voltage condition will occur on the 120 volt lines, i.e., the neutral pin of the plug will not make contact at the same time the two 120 volt pins and thus, without the neutral pin making contact as a voltage reference 240 volts may be presented to the 120 volt appliances.

Therefore, to reduce the possibility of over voltage, switch off the 50 amp main breakers located in the 120 volt AC load center prior to insertion and removal of the 50 amp plug. In addition, insert and remove the 50 amp plug straight into the receptacle instead of tilting the plug. (See Power Cord Hookup Illustration in last section of manual.)

For purposes of safety, observe all precautions when making SHORELINE connections. Poor grounding or incorrectly-wired receptacles can cause personal harm as well as equipment damage or fire hazards. Check reverse polarity indicator in shoreline/utility compartment to verify correct polarity and grounding of hookup.

APPENDIX 1

FAULT CODES FOR ENGINE DIAGNOSTICS FOR CUMMINS M11

CELECT HEX	FAULT CODE	FMI	LAMP	SAE STANDARD DESCRIPTION PID/SID (REF J1587)	SAE STANDARD FAILURE MODES IDENTIFIER (FMI) DESCRIPTION (REF J1587)
01	112	7	NONE	NOT USED	DATA ERRATIC, INTERMITTENT or INCORRECT
04	115	2	RED	ENGINE SPEED	DATA ERRATIC, INTERMITTENT or INCORRECT
05	121	10	YELLOW	ENGINE SPEED	ABNORMAL RATE OF CHANGE
06	122	3	YELLOW	BOOST PRESSURE	VOLTAGE ABOVE NORMAL or SHORTED HIGH
07	123	4	YELLOW	BOOST PRESSURE	VOLTAGE BELOW NORMAL or SHORTED LOW
08	124		NONE	NOT USED	
09	125		NONE	NOT USED	
0A	131	3	RED	% ACCELERATOR POSITION	VOLTAGE ABOVE NORMAL or SHORTED HIGH
0B	132	4	RED	% ACCELERATOR POSITION	VOLTAGE BELOW NORMAL or SHORTED LOW
0C	133		NONE	NOT USED	
0D	134		NONE	NOT USED	
0E	135	3	YELLOW	ENGINE OIL PRESSURE	VOLTAGE ABOVE NORMAL or SHORTED HIGH
0F	141	4	YELLOW	ENGINE OIL PRESSURE	VOLTAGE BELOW NORMAL or SHORTED LOW
10	142		NONE	NOT USED	
11	143	1	ENGINE PROTECTION	ENGINE COOLANT TEMPERATURE	DATA VALID BUT BELOW NORMAL OPERATIONAL RANGE
12	144	3	YELLOW	ENGINE COOLANT TEMPERATURE	VOLTAGE ABOVE NORMAL or SHORTED HIGH
13	145	4	YELLOW	ENGINE COOLANT TEMPERATURE	VOLTAGE BELOW NORMAL or SHORTED LOW
14	151	0	ENGINE PROTECTION	ENGINE COOLANT TEMPERATURE	DATA VALID BUT ABOVE NORMAL OPERATIONAL RANGE
15	152		NONE	NOT USED	
16	153	3	YELLOW	INTAKE MANIFOLD AIR TEMP	VOLTAGE BELOW NORMAL or SHORTED HIGH
17	154	0	YELLOW	INTAKE MANIFOLD AIR TEMP	VOLTAGE BELOW NORMAL or SHORTED LOW
18	155	0	ENGINE PROTECTION	INTAKE MANIFOLD AIR TEMP	DATA VALID BUT ABOVE NORMAL OPERATIONAL RANGE
19	211		NONE	NOT USED	
1A	212	3	YELLOW	ENGINE OIL TEMPERATURE	VOLTAGE ABOVE NORMAL or SHORTED HIGH
1B	213	4	YELLOW	ENGINE OIL TEMPERATURE	VOLTAGE BELOW NORMAL or SHORTED LOW
1C	214	0	ENGINE PROTECTION	ENGINE OIL TEMPERATURE	DATE VALID BUT ABOVE NORMAL OPERATIONAL RANGE
1D	215		NONE	NOT USED	
1E	221	3	YELLOW	BAROMETRIC PRESSURE	VOLTAGE ABOVE NORMAL or SHORTED HIGH
1F	222	4	YELLOW	BAROMETRIC PRESSURE	VOLTAGE BELOW NORMAL or SHORTED LOW
20	223		NONE	NOT USED	
21	224		NONE	NOT USED	

CELECT HEX	FAULT CODE	FMI	LAMP	SAE STANDARD DESCRIPTION PID/SID (REF J1587)	SAE STANDARD FAILURE MODES IDENTIFIER (FMI) DESCRIPTION (REF J1587)
22	225		NONE	NOT USED	
23	231		NONE	NOT USED	
24	232		NONE	NOT USED	
25	233		NONE	NOT USED	
26	234	0	RED	ENGINE SPEED	DATA VALID BUT ABOVE NORMAL OPERATIONAL RANGE
27	235	1	ENGINE PROTECTION	COOLANT LEVEL	DATA VALID BUT BELOW NORMAL OPERATIONAL RANGE
28	241	2	YELLOW	ROAD SPEED	DATA ERRATIC, INTERMITTENT OR INCORRECT
29	242	10	YELLOW	ROAD SPEED	ABNORMAL RATE OF CHANGE
2A	243	4	YELLOW	ENGINE RETARDER STATUS	VOLTAGE BELOW NORMAL or SHORTED LOW
2B	244		NONE	NOT USED	
2C	245	4	YELLOW	FAN CLUTCH DEVICE	VOLTAGE BELOW NORMAL OR SHORTED LOW
2D	251		NONE	NOT USED	
2E	252		NONE	NOT USED	
2F	253		NONE	NOT USED	
30	254	4	RED	FUEL SHUTOFF VALVE	VOLTAGE BELOW NORMAL or SHORTED LOW
31	255	3	YELLOW	AUXILIARY SOLENOID	VOLTAGE ABOVE NORMAL or SHORTED HIGH
32	311	6	YELLOW	INJECTOR CYLINDER #1	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
33	312	6	YELLOW	INJECTOR CYLINDER #5	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
34	313	6	YELLOW	INJECTOR CYLINDER #3	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
35	314	6	YELLOW	INJECTOR CYLINDER #6	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
36	315	6	YELLOW	INJECTOR CYLINDER #2	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
37	321	6	YELLOW	INJECTOR CYLINDER #4	CURRENT ABOVE NORMAL or GROUNDED CIRCUIT
38	322	5	YELLOW	INJECTOR CYLINDER #1	CURRENT BELOW NORMAL or OPEN CIRCUIT
39	323	5	YELLOW	INJECTOR CYLINDER #5	CURRENT BELOW NORMAL or OPEN CIRCUIT
3A	324	5	YELLOW	INJECTOR CYLINDER #3	CURRENT BELOW NORMAL or OPEN CIRCUIT
3B	325	5	YELLOW	INJECTOR CYLINDER #6	CURRENT BELOW NORMAL or OPEN CIRCUIT

CELECT HEX	FAULT CODE	FMI	LAMP	SAE STANDARD DESCRIPTION PID/SID (REF J1587)	SAE STANDARD FAILURE MODES IDENTIFIER (FMI) DESCRIPTION (REF J1587)
3C	331	5	YELLOW	INJECTOR CYLINDER #2	CURRENT BELOW NORMAL or OPEN CIRCUIT
3D	332	5	YELLOW	INJECTOR CYLINDER #4	CURRENT BELOW NORMAL or OPEN CIRCUIT
3E	333	12	YELLOW	CONTROLLER	BAD INTELLIGENT DEVICE or COMPONENT
3F	334	2	YELLOW	ENGINE COOLANT TEMPERATURE	DATA ERRATIC, INTERMITTENT, or INCORRECT
40	335		NONE	NONE	
41	341		NONE	NONE	
42	342	12	RED	CALIBRATION MEMORY	BAD INTELLIGENT DEVICE or COMPONENT
43	343	12	YELLOW	CONTROLLER	
44	344		NONE	NOT USED	
45	345		NONE	NOT USED	
46	351	12	YELLOW	CONTROLLER	BAD INTELLIGENT DEVICE or COMPONENT
47	352	4	YELLOW	CONTROLLER	VOLTAGE BELOW NORMAL or SHORTED LOW
48	353		NONE	NOT USED	
49	354		NONE	NOT USED	
4A	355		NONE	NOT USED	
4B	411	3	NONE	NOT USED	
4C	412	3	YELLOW	SAE J1587/J1922 DATA LINK	VOLTAGE ABOVE NORMAL or SHORTED HIGH
4D	413	4	NONE	NOT USED	
4E	414	9	NONE	NOT USED	
4F	415	1	ENGINE PROTECTION	ENGINE OIL PRESSURE	DATA VALID BUT BELOW NORMAL OPERATIONAL RANGE
50	421		NONE	NOT USED	
51	422	2	YELLOW	COOLANT LEVEL	DATA ERRATIC, INTERMITTENT or INCORRECT
52	423		NONE	NOT USED	
53	424		NONE	NOT USED	
54	425		NONE	NOT USED	
	426	3	YELLOW	SAE J1939 DATA LINK	VOLTAGE ABOVE NORMAL or SHORTED HIGH
55	431	3	YELLOW	% ACCELERATOR POSITION	DATA ERRATIC, INTERMITTENT or INCORRECT
56	432	11	RED	% ACCELERATOR POSITION	DATA ERRATIC, INTERMITTENT or INCORRECT
57	433	2	YELLOW	BOOST PRESSURE	DATA ERRATIC, INTERMITTENT or INCORRECT
58	434	4	YELLOW	POWER SUPPLY	VOLTAGE BELOW NORMAL or SHORTED LOW

APPENDIX 2

WORLD TRANSMISSION ELECTRONIC CONTROLS TROUBLE SHOOTING MANUAL

CONTENTS

5-1 DIAGNOSTIC CODE MEMORY

Diagnostic codes are logged in a list in memory (sometimes referred to as the queue), positioning the most recently occurring code first and containing up to five codes. The codes contained in the list have the information recorded as shown in the chart below. Access to the code list position, main code, sub code and active indicator is through either the shift selector display or the Pro-Link diagnostic tool. Access to the ignition cycle counter and event counter is through the diagnostic tool only.

CODE LIST POSITION	MAIN CODE	SUB CODE	ACTIVE INDICATOR	IGNITION CYCLE COUNTER	EVENT COUNTER
d1	21	12	YES	00	10
d2	41	12	YES	00	04
d3	23	12	NO	08	02
d4	34	12	NO	13	01
d5	56	11	NO	22	02
Displayed on shift selector display and diagnostic tool			YES= Active= "MODE ON"	Ignition cycle counter and event counter are not available on shift selector display	

NOTE: All information is available with a diagnostic tool.

The following paragraphs define the different parts of the code list.

A. Code List Position:
The position 1 through 5 which a code occupies in the code list in memory. Positions are shown as "d1" (Diagnostic Code #1) through "d5."

B. Main Code:
The general condition or area of fault detected by ECU.

C. Sub Code:
The specific area or condition under the main code in which the condition was detected.

D. Active Indicator:
Will be turned "on" when a fault condition is active (shift selector will display "MODE ON" or the diagnostic tool will display "YES"). Will be set of "off" when conditions exist to indicate fault condition is gone.

E. Ignition Cycle Counter:
Used to clear diagnostic codes that are inactive from the code list in memory. Counter is incremented each time a normal ECU powerdown occurs following clearing of the Active Indicator. Code will be cleared from the code list when the counter exceeds 25.

F. Event Counter:
Used to count the number of occurrences of a diagnostic code that occur prior to the incident being cleared from the code list. The most recent code will be in position d1. If the most recent code is one which is already in the code list, that code will be moved to position d1, the Active indicator will be turned "on" (shift selector will display "MODE ON" or the diagnostic tool will display "YES"), the Ignition Cycle Counter is cleared, and 1 is added to the Event Counter.

G. Clearing the Active Indicator and code records from the Code List in memory:
If the conditions causing a diagnostic code to be set are cleared, the Active Indicator can be manually cleared by holding the "MODE" button down continuously for 3 seconds until a tone is heard from the shift selector. To clear code records from the list, hold the "MODE" button down continuously for ten seconds until a second tone sounds. All diagnostic records in the list that are not active will then be cleared and the remaining records will then be moved up the list.

5-2 CODE READING AND CODE CLEARING PROCEDURES

Diagnostic codes can be read and cleared by two methods: by using the Pro-Link 9000 diagnostic tool or by using the shift selector display. The use of the Pro-Link 9000 diagnostic tool is described in the instruction manual furnished with each tool. The method of reading and clearing codes described in this section refers to only entering the Diagnostic Display Mode by the proper button and/or lever movements on the shift selectors.

The Diagnostic Display Mode may be entered for viewing of codes at any speed. Codes can be cleared only when the output speed = 0 and no output speed sensor failure is active.

The following descriptions explain how to use the shift selectors to read and clear codes:

A. Reading Codes:

1. Enter the diagnostic display mode by pressing the ↑ and ↓ (up arrow and down arrow) buttons at the same time on a push button selector, or by momentarily pressing the display mode button on a lever shift selector. (NOTE: If a DO NOT SHIFT condition is present at this time, the lever should be in the same position as it was at the time of code detection. If not, this shift selector tone will sound continuously.)

   NOTE: If an oil level sensor is present, then oil level will be displayed first. Diagnostic code display is achieved by depressing the up and down arrows or display mode button a second time.

2. Read the first code in the first of five code positions on the digital display on the shift selector. For example, we will read Code 25 11 in the first position. The display will change every two seconds as follows:
   a. Code list position - "d1"
   b. Main code - "25"
   c. Sub code - "11"
   d. Display will repeat cycle of a., b. and c. above.

3. Press the "MODE" button momentarily to view the second position (d2) in the same way as 2. above.

4. To view the third, fourth and fifth positions (d3, d4 and d5), momentarily press the "MODE" button as explained above.

5. Pressing the "MODE" button momentarily after the fifth position is displayed will cause the sequence of code positions to start over with the first position.

6. Any code which is active will be indicated by the "MODE ON" indicator (active indicator) being turned on while in that code position (while in the normal operating mode, the "MODE ON" indicator is turned on to indicate secondary mode operation).

7. Any code position in the list which does not have a diagnostic code logged will display "–" for both the main and sub code displays. All positions after a code position without any code will also not contain any codes.

B. Clearing Codes:

1. Clearing of the active indicator is automatically done at ECU powerdown on all but code 69 34 (see code chart).

2. Some codes will clear the active indicator automatically when the condition causing the code is no longer detected by the ECU (see code chart).

3. Manual clearing is possible while in the diagnostic display mode and after the condition causing the code is corrected (output speed must be zero).

   a. To clear all active indicators, hold the "MODE" button down continuously for 3 seconds until the shift selector tone sounds for 0.5 seconds.

   b. Release the "MODE" button to return to normal operating time. If the condition causing the code was not active at the time, the active indicator will turn off.

CAUTION: If clearing a code while locked in a Forward or Reverse position (fail-to-range), the transmission will still be in Drive or Reverse when the clearing procedure is completed. Neutral must be manually selected.

C. Exiting the Diagnostic Display Mode:
The diagnostic display mode can be exited by any of the following procedures:

1. Press the ↑ and ↓ (up arrow and down arrow) buttons at the same time on a push button shift selector or momentarily pushing the display mode button on a lever selector.

2. Press any range button, D, N or R, on a push button selector (the shift will be commanded if it is not inhibited by an active code) or move the shift lever to any position other than the one it was in when the diagnostic display mode was activated (if the shift is inhibited, the ECU will continue to command the current range and sound the tone continuously until the lever is returned to its original position).

3. Do nothing and wait until the calibrated time (approximately 10 minutes) has passed and the system automatically returns to the normal operating mode.

4. Turn off power to the ECU (turn off the vehicle at the ignition switch).

5. After the clearing the active indicator procedure described above has been performed.

D. Clearing Records from the Code List in Memory:

If the requirements for manual clearing the active indicator have been satisfied, and the "MODE" button is held down continuously for ten seconds while in the display mode until a tone sounds, all diagnostic records in the code list that are not active will be cleared and the remaining records will be moved up in the code list.

5-3 ABBREVIATIONS FOUND IN THE CODE CHART

The following responses are used throughout the following chart to command safe operation when diagnostic codes are set.

•DNS (Do Not Shift) Response

-Turn off lockup clutch and inhibit lockup operation.

-Inhibit all shifts.

-Turn on DO NOT SHIFT lights.

-Pulse the tone generator for 8 seconds when the condition is first detected.

-Blank the select digit in the display.

-Ignore any range selection inputs and disable the button feedback tone for the push button shift selector or sound the tone continuously if the shift lever is moved to a direction other than the one selected when the condition was first detected.

•SOL OFF (Solenoid Off) Response

-All solenoids are commanded off (turning solenoids "A" and "B" off electrically causes them to be on hydraulically).

•RPR (Return to Previous Range) Response

-When the ratio of C3 pressure switch tests associated with a shift are not passed, the ECU commands the same range as commanded at the beginning of the shift.

•NNC (Neutral No Clutches) Response

-When certain ratio or C3 pressure switch tests are not passed, the ECU commands a neutral condition with no clutches applied.

5-4 DIAGNOSTIC CODE LIST AND DESCRIPTION

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
12	12	Oil level, low	No	No upshifts above a calibration range
	23	Oil level, high	No	No upshifts above a calibration range
13	12	ECU input voltage, low	Yes	DNS, SOL OFF (Hydraulic default)
	13	ECU input voltage, medium low	No	None; Shift adaptive feature will not function.
	23	ECU input voltage, high	Yes	DNS, SOL OFF (Hydraulic default)
14	12	Oil level sensor, low	No	None
	23	Oil level sensor, high	No	None
21	12	Throttle position sensor, low	No	Use throttle default value
	23	Throttle position sensor, high	No	Use throttle default value
22	14	Engine speed sensor reasonableness test	No	Use default engine speed
	15	Turbine speed sensor reasonableness test	Yes	DNS, Lock in current range
	16	Output speed sensor reasonableness or rapid decel test	Yes	DNS, Lock in current range
23	12	Primary shift selector or RSI link fault	No	Hold in last valid direction
	13	Primary shift selector mode function fault	No	Mode change not permitted

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
23	14	Secondary shift selector or RSI link fault	No	Hold in last valid direction
	15	Secondary shift selector mode function faulty	No	Mode change not permitted
24	12	Sump oil temperature, cold	Yes	DNS
	23	Sump oil temperature, hot	No	No upshifts above a calibration range
25	00	Output speed reasonableness test, detected at 1 speed L	Yes	DNS, Lock in current range (L)
	11	Output speed reasonableness test, detected at 0 speed, 1st	Yes	DNS, Lock in current range (1st)
	22	Output speed reasonableness test, detected at 0 speed, 2nd	Yes	DNS, Lock in current range (2nd)
	33	Output speed reasonableness test, detected at 0 speed, 3rd	Yes	DNS, Lock in current range (3rd)
	44	Output speed reasonableness test, detected at 0 speed, 4th	Yes	DNS, Lock in current range (4th)
	55	Output speed reasonableness test, detected at 0 speed, 5th	Yes	DNS, Lock in current range (5th)
	66	Output speed reasonableness test, detected at 0 speed, 6th	Yes	DNS, Lock in current range (6th)
	77	Output speed reasonableness test, detected at 0 speed, R	Yes	DNS, Lock in current range (R)
32	00	C3 pressure switch open, L range	Yes	DNS, Lock in current range (L)
	33	C3 pressure switch open, 3rd range	Yes	DNS, Lock in current range (3rd)
	55	C3 pressure switch open, 5th range	Yes	DNS, Lock in current range (5th)

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
32	77	C3 pressure switch open, R range	Yes	DNS, Lock in current range (R)
33	12	Sump oil temperature sensor, low	No	Use default value of 200º F (93º C)
	23	Sump oil temperature sensor, high	No	Use default value of 200º F (93º C)
34	12	EEPROM, factory cal. compatibility number wrong	Yes	DNS, SOL OFF (Hydraulic default)
	13	EEPROM, factory cal. block checksum	Yes	DNS, SOL OFF (Hydraulic default)
	14	EEPROM, power off block checksum	Yes	Use previous location, or fact. calibration and reset adaptive
	15	EEPROM, diagnostic queue block checksum	Yes	Use previous location, or clear diagnostic queue
	16	EEPROM, real time block checksum	Yes	DNS, SOL OFF (Hydraulic default)
35	00	Power interruption (code set after power restored)	No	NONE (Hydraulic default during interruption
	16	Real time EEPROM write interruption	Yes	DNS, SOL OFF (Hydraulic default)
36	00	Hardware/software not compatible	Yes	DNS, SOL OFF (Hydraulic default)
41	12	Open or short to ground, A solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	13	Open or short to ground, B solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	14	Open or short to ground, C solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	15	Open or short to ground, D solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
41	16	Open or short to ground, E solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	21	Open or short to ground, F solenoid circuit	No	Lock-up inhibited
	22	Open or short to ground, G solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	23	Open or short to ground, H solenoid circuit	No	Retarder allowed, differential lock inhibited
	24	Open or short to ground, J solenoid circuit	No	Low & 1st inhibited
	25	Open or short to ground,	No	K solenoid operation inhibited
	26	Open or short to ground, N solenoid circuit	No	Low and 1st inhibited
42	12	Short to battery, A solenoid circuit	Yes	DNS, Lock in a range
	13	Short to battery, B solenoid circuit	Yes	DNS, Lock in a range
	14	Short to battery, C solenoid circuit	Yes	DNS, Lock in a range
	15	Short to battery, D solenoid circuit	Yes	DNS, Lock in a range
	16	Short to battery, E solenoid circuit	Yes	DNS, Lock in a range
	21	Short to battery, F solenoid circuit	No	Lock-up inhibited
	22	Short to battery, G solenoid circuit	Yes	DNS, Lock in a range
	23	Short to battery, H solenoid circuit	No	Retarder allowed, differential lock inhibited

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
42	24	Short to battery, J solenoid circuit	No	Low and 1st inhibited
	25	Short to battery, K solenoid circuit	No	K solenoid operation
	26	Short to battery, solenoid circuit	No	Low and 1st inhibited
43	21	Low side driver, F solenoid circuit	No	Lock-up inhibited
	25	Low side driver, K solenoid circuit	No	K solenoid operation inhibited
	26	Low side driver, N solenoid circuit	No	Low and 1st inhibited
44	12	Short to ground, A solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	13	Short to ground, B solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	14	Short to ground, C solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	15	Short to ground, D solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	16	Short to ground, E solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	21	Short to ground, F solenoid circuit	No	Lock-up inhibited
	22	Short to ground, G solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	23	Short to ground, H solenoid circuit	No	Retarder allowed, differential lock inhibited
	24	Short to ground, J solenoid circuit	No	Low and 1st inhibited

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
44	25	Short to ground, K solenoid circuit	No	K solenoid operation inhibited
	26	Short to ground, N solenoid circuit	No	Low and 1st inhibited
45	12	Open circuit, A solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	13	Open circuit, B solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	14	Open circuit, C solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	15	Open circuit, D solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	16	Open circuit, E solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	21	Open circuit, F solenoid circuit	No	Lock-up inhibited
	22	Open circuit, G solenoid circuit	Yes	DNS, SOL OFF (Hydraulic default)
	23	Open circuit, H solenoid circuit	No	Retarder allowed, differen differential lock inhibited
	24	Open circuit, J solenoid circuit	No	Low and 1st inhibited
	25	Open circuit, K solenoid circuit	No	K solenoid operation inhibited
	26	Open circuit, N solenoid circuit	No	Low and 1st inhibited
51	10	Offgoing ratio test (during shift) 1 to L	Yes	DNS, RPR
	12	Offgoing ratio test (during shift) 1 to 2	Yes	DNS, RPR
	21	Offgoing ratio test (during shift) 2 to 1	Yes	DNS, RPR

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
51	23	Offgoing ratio test (during shift) 2 to 3	Yes	DNS, RPR
	43	Offgoing ratio test (during shift) 4 to 3	Yes	DNS, RPR
	45	Offgoing ratio test (during shift) 4 to 5	Yes	DNS, RPR
	65	Offgoing ratio test (during shift) 6 to 5	Yes	DNS, RPR
52	01	Offgoing C3PS test (during shift) L to 1	Yes	DNS,RPR
	08	Offgoing C3PS test (during shift) L to N1	Yes	DNS, NNC
	32	Offgoing C3PS test (during shift) 3 to 2	Yes	DNS, RPR
	34	Offgoing C3PS test (during shift) 3 to 4	Yes	DNS, RPR
	54	Offgoing C3PS test (during shift) 5 to 4	Yes	DNS, RPR
	56	Offgoing C3PS test (during shift 5 to 6	Yes	DNS, RPR
	71	Offgoing C3PS test (during shift) R to 1	Yes	DNS, NNC
	72	Offgoing C3PS test (during shift) R to 2	Yes	DNS, NNC
	78	Offgoing C3PS test (during shift) R to N1	Yes	DNS, NNC
	79	Offgoing C3PS test (during shift) R to 2 (R to NNC to 2)	Yes	DNS, NNC
	99	Offgoing C3PS test (during shift N3 to N2	Yes	DNS, RPR

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
53	08	Offgoing speed test (during shift) L to N1	Yes	DNS, NNC
	18	Offgoing speed test (during shift) 1 to N1	Yes	DNS, NNC
	28	Offgoing speed test (during shift) 2 to N1	Yes	DNS, NNC
	29	Offgoing speed test (during shift) 2 to N2	Yes	DNS, RPR
	38	Offgoing speed test (during shift) 3 to N1	Yes	DNS, NNC
	39	Offgoing speed test (during shift) 3 to N3	Yes	DNS, RPR
	48	Offgoing speed test (during shift) 4 to N1	Yes	DNS, NNC
	49	Offgoing speed test (during shift) 5 to N1	Yes	DNS, NNC
	58	Offgoing speed test (during shift) 5 to N1	Yes	DNS, RPR
	59	Offgoing speed test (during shift) 5 to N3	Yes	DNS, RPR
	68	Offgoing speed test (during shift) 6 to N1	Yes	DNS, NNC
	69	Offgoing speed test (during shift) 6 to N4	Yes	DNS, RPR
	78	Offgoing speed test (during shift) R to N1	Yes	DNS, NNC
	99	Offgoing speed test (during shift) N2 to N3 or N3 to N2	Yes	DNS, RPR
54	01	Oncoming ratio test (after shift) L to 1	Yes	DNS, RPR

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
54	07	Oncoming ratio test (after shift) L to R	Yes	DNS, NNC
	10	Oncoming ratio test (after shift) 1 to L	Yes	DNS, RPR
	12	Oncoming ratio test (after shift), 1 to 2	Yes	DNS, RPR
	17	Oncoming ratio test (after shift) 1 to R	Yes	DNS, NNC
	21	Oncoming ratio test (after shift) 2 to 1	Yes	DNS, RPR
	23	Oncoming ratio test (after shift) 2 to 3	Yes	DNS, RPR
	27	Oncoming ratio test (after shift) 2 to R	Yes	DNS, NNC
	32	Oncoming ratio test (after shift 3 to 2	Yes	DNS, RPR
	34	Oncoming ratio test (after shift) 3 to 4	Yes	DNS, RPR
	43	Oncoming ratio test (after shift) 4 to 3	Yes	DNS, RPR
	45	Oncoming ratio test (after shift) 4 to 5	Yes	DNS, RPR or SOL OFF (Hydraulic default)
	54	Oncoming ratio test (after shift) 5 to 4	Yes	DNS, RPR
	56	Oncoming ratio test (after shift) 5 to 6	Yes	DNS, RPR
	65	Oncoming ratio test (after shift) 6 to 5	Yes	DNS, RPR
	70	Oncoming ratio test (after shift) R to L	Yes	DNS, NNC

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
54	71	Oncoming ratio test (after shift) R to 1	Yes	DNS, NNC
	72	Oncoming ratio test (after shift) R to 2	Yes	DNS, NNC
	80	Oncoming ratio test (after shift) N1 to L	Yes	DNS, RPR
	81	Oncoming ratio test (after shift) N1 to 1	Yes	DNS, RPR
	82	Oncoming ratio test (after shift) N1 to 2	Yes	DNS, RPR
	83	Oncoming ratio test (after shift) N1 to 3	Yes	DNS, RPR
	85	Oncoming ratio test (after shift) N1 to 5	Yes	DNS, RPR
	86	Oncoming ratio test (after shift) N1 to 6	Yes	DNS, RPR
	92	Oncoming ratio test (after shift) R to 2, (R to NNC to 2)	Yes	DNS, NNC
	92	Oncoming ratio test (after shift) N1 to 2, (N1 to NNC to 2)	Yes	DNS, RPR
	93	Oncoming ratio test (after shift) N3 to 3	Yes	DNS, RPR
	95	Oncoming ratio test (after shift) N3 to 5	Yes	DNS, RPR
	96	Oncoming ratio test (after shift) N4 to 6	Yes	DNS, RPR
	97	Oncoming ratio test (after shift) 2 to R, (2 to NNC to R)	Yes	DNS, NNC
55	17	Oncoming C3PS test (after shift) 1 to R	Yes	DNS, NNC

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
55	27	Oncoming C3PS test (after shift) 2 to R	Yes	DNS, NNC
	80	Oncoming C3PS test (after shift) N1 to L	Yes	DNS, RPR
	87	Oncoming C3PS test (after shift) N1 to R	Yes	DNS, RPR
	97	Oncoming C3PS test (after shift) 2 to R or NVL to R (2 to NNC to R)	Yes	DNS, NNC
56	00	Range verification test, L	Yes	DNS, 1st, Low, or SOL OFF (Low)
	11	Range verification test, 1st	Yes	DNS, 6th
	22	Range verification test, 2nd	Yes	DNS, 6th or 5th
	33	Range verification test, 3rd	Yes	DNS, 5th or SOL OFF (4th)
	44	Range verification test, 4th	Yes	DNS, 3rd or 5th
	55	Range verification test, 5th	Yes	DNS, SOL OFF (5th or 3rd)
	66	Range verification test, 6th	Yes	DNS, 5th, 3rd, or SOL OFF (3rd)
	77	Range verification test, R	Yes	DNS, N2 or N3
57	11	Range verification C3PS test, 1st	Yes	DNS, SOL OFF (3rd)
	22	Range verification C3PS test, 2nd	Yes	DNS, 3rd
	44	Range verification C3PS test, 4th	Yes	DNS, 5th or SOL OFF (3rd)
	66	Range verification C3PS test, 6th	Yes	SOL OFF 5th, DNS
	88	Range verification C3PS test, N1	Yes	DNS, N3

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
57	99	Range verification C3PS test, C3PS test, N2 or N4	Yes	DNS, N3
61	00	Retarder oil temperature hot	No	None
62	12	Retarder oil temperature sensor, low	No	None
	23	Retarder oil temperature sensor, high	No	None
63	00	Special function input	No	Depends on special function
64	12	Retarder modulation request sensor, low	No	Retarder operation inhibited
	23	Retarder modulation request sensor, high	No	Retarder operation inhibited
65	00	Engine rating too high	Yes	DNS
66	00	Serial communications interface fault	No	Use default throttle values
69	12	ECU, A solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default)
	13	ECU, B solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default)
	14	ECU, C solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default)
	15	ECU, D solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default)
	16	ECU, E solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default)
	21	ECU, F solenoid driver open	No	Lock-up inhibited
	22	EDU, G solenoid driver open	Yes	DNS, SOL OFF (Hydraulic default

MAIN CODE	SUB CODE	DESCRIPTION	DO NOT SHIFT LIGHT	INHIBITED OPERATION DESCRIPTION
69	23	ECU, H solenoid driver open	No	Retarder allowed, differential lock inhibited
	24	ECU, J solenoid driver open	No	Low and 1st inhibited
	25	ECU, K solenoid driver open	No	K solenoid operation inhibited
	26	ECU, N solenoid driver open	No	Low and 1st inhibited
	32	ECU, SPI communications link fault	No	Hold in last valid direction
	33	ECU, central operating processor (COP) timeout	Yes	Reset ECU, shutdown ECU on 2nd occurrence (power loss: hydraulic defaults)
	34	ECU, EEPROM write timeout	Yes	DNS, SOL OFF (Hydraulic defaults)
	35	ECU, EEPROM checksum	Yes	Induce COP timeout (reset ECU)
	36	ECU, RAM self test	Yes	Induce COP timeout (reset ECU)
	41	ECU, I/O ASIC addressing test	Yes	Induce COP timeout (reset ECU)