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Dear Born Free Owner,

We are extremely happy that you have decided to purchase a new Born Free Motorcoach. We are confident you will have many years of enjoyable use with your new motorcoach.

This owner's manual has been prepared to help you enjoy using your Born Free to its fullest by understanding all of its features. We suggest you read the manual thoroughly and carry it in a convenient place in your coach, where you can refer to it if any questions should arise. The manufacturers and suppliers of the truck chassis, as well as those of the accessories and appliances used in the Born Free, have also included literature and information about their products. We recommend that you review this material carefully as it can be very helpful. Also, the manufacturers have included warranty registration cards that need to be filled out and mailed promptly (10-15 days) in order to properly register your purchase for warranty repairs.

At Born Free, we test and evaluate each motorcoach produced, continually looking for ways to make our product even better. Improvements, regardless of how large or small, are incorporated into the Born Free Motorcoach as they are produced. Consequently, this service manual may or may not reflect all of the current features and improvements. This service manual is intended to acquaint you with the proper servicing and repairing of your Born Free and is to be used as a guide only. Should you need assistance, please call our service department at 1-800-247-1835.

*Thank you and happy motoring!
The Born Free Motorcoach Staff*

NOTE: Because it is impractical to make frequent literature changes, specifications and equipment described in this service manual must be subject to change without notice.



BORN FREE MOTORCOACH, INC.
Hwy. 169 North, P.O. Box 39
Humboldt, IA 50548
(515) 332-3755 • 800-247-1835

LIMITED WARRANTY

Owner _____ Serial # _____
Address _____ Date _____
City _____ State _____ Zip _____
Lienholder _____ City _____ State _____ Zip _____

Year	Make	Model	Serial No.	Odometer	Code	Class	

As the manufacturer of this coach, Born Free Motorcoach issues this LIMITED WARRANTY to the original purchaser. THIS WARRANTY AND ALL IMPLIED WARRANTIES ARE LIMITED IN DURATION TO ONE (1) YEAR OR 12,000 MILES FROM THE DATE OF DELIVERY TO THE ORIGINAL RETAIL PURCHASER.

A warranty card is provided to the original purchaser of all "Born Free" coaches. This card must be filled out and returned to the factory within thirty (30) days of the purchase date or "NO WARRANTY WILL APPLY."

Born Free warrants to the original purchaser that all Born Free units will be free from defects in materials or workmanship for a period of one (1) year or 12,000 miles of use from date of purchase, whichever comes first. Any warranty, whether expressed or implied, rests solely with the seller. This Limited Warranty is expressly conditioned on the purchaser's use of the product in conformance with the instruction manual provided with the unit. The Limited Warranty, however, does not include: the chassis or truck upon which the unit is mounted, brake control and its component parts, battery isolator, jack systems, torsion axle and tires, battery, water heater, city water fill, furnace, water pump, generator, converter, air conditioner, curtains and cushions, refrigerator, bathroom module, stove, oven and power hood, LP tank, gauges and regulator, air ride system, or any other optional equipment or equipment specified by the purchaser. When furnished or attached, these items are covered solely by the warranty of the manufacturer of such product, commonly known as pass-through warranty. Names and addresses of pass-through warranted products is included with your warranty package. If you have further questions, contact Born Free Motorcoach, Inc.

During said one (1) year period, Born Free Motorcoach will, at its option, repair or replace any part manufactured by it, which upon examination by Born Free Motorcoach is found to be defective as to material or workmanship under normal use and service. Any unit which the consumer claims to be defective must be examined by Born Free's nearest authorized warranty service facility. All transportation cost under this warranty, including return to the factory, if necessary, are to be borne by the purchaser (and prepaid by him). This warranty does not include normal maintenance and service and does not apply to a unit or any part thereof which has been subject to misuse, negligence, accident, overloading, or improper maintenance, repair, or storage, so as in Born Free's judgment to affect adversely its performance.

There is no other express warranty. Born Free Motorcoach hereby disclaims any and all implied warranties including, but not limited to, those of merchantability and fitness for a particular purpose, to the extent permitted by law. The duration of any implied warranties which cannot be disclaimed is limited to the time period (one year or 12,000 miles) as specified in the express warranty. Liability for consequential, incidental, or special damages under any and all warranties is excluded to the extent permitted by law.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Born Free Motorcoach, Inc. reserves the right to make changes in design and changes or improvements upon its products without imposing any obligation upon itself to install the same upon any previously manufactured products.

THIS WARRANTY DOES NOT COVER NOR APPLY TO LOSS OR EXPENSE:

- To any loss caused by negligence, misuse or failure to perform required servicing, or any mechanical failure caused by the lack of proper and necessary amount of coolants or lubricants.
- To repairs and/or replacement not authorized by Born Free Motorcoach or to any mechanical alterations to the vehicle not recommended by the manufacturer of the vehicle.
- To liability for damage to property or injury to or death of any person arising out of the operation, maintenance or use of the described vehicle in this warranty whether or not related to the parts covered within.
- To loss caused by wear and tear, unless actual mechanical breakdown occurs.
- To any loss caused by collision or upset, breakage of glass, missiles, falling objects, fire, theft or larceny, explosion, earthquake, windstorm, hail, water, flood, malicious mischief or vandalism, riot or civil commotion, lightning, nuclear contamination, freezing, smoke, or from any other cause whatsoever except as provided in this warranty.
- For delays, however caused, shall the manufacturer be liable for the value of loss of use of the described vehicle.
- If there has been any tampering or alteration to the odometer.
- When the mechanical breakdown is the direct result of a mechanical or structural defect, wherein the manufacturer has publicly announced its responsibility by a recall for the purpose of correcting such defect.
- For any loss, damage or injury to persons or property resulting from failure of any of the parts of the described vehicle, the repair or replacement of which are covered under the terms and conditions of this warranty.
- To loss caused directly or indirectly by neglect of the Warranty Holder to cause to be performed all periodic maintenance services as are required and recommended by the manufacturer of the described vehicle, or while the described vehicle is out of the care, custody, or control of the Warranty Holder.
- Generator, all electrical systems, electrical wiring, electrical appliances, television and television antenna.

As the first retail owner and purchaser you must:

- Conduct the inspection and test outlined on this written warranty before you take possession of the vehicle, including the "test drive" required.
- You must complete in legible detail the attached warranty registration on the date that you take delivery of the vehicle. The warranty registration must be returned to Born Free Motorcoach in order to comply with federal law; namely the Motor Vehicle Safety Act.
- You must perform the care and maintenance steps and procedures set out in the Owners Manual, at your own cost, and use the vehicle for its intended purposes.
- In the event that within the one year or 12,000 mile period after you take delivery of this vehicle a defect in parts or workmanship should develop which is attributable to the manufacturer's work, you must contact the Born Free Motorcoach Customer Service Dept. promptly and discuss the problem with the customer service representative. If a problem arises while you are traveling, you can reach our Customer Service Dept. by calling 1-800-247-1835.
- If the defect is covered by the manufacturer's warranty, the correction of such defect attributable to the manufacturer will be performed at the manufacturer's expense. If the defect is not attributable to the manufacturer's work or covered by the warranty, you will be so advised.
- In most instances the work to correct defects will be undertaken within a reasonable period of time. However, delays may result from unpredictable factors over which the manufacturer has no control. In these cases the appointed date for scheduling warranty work and the completion of the work thereof may necessarily be prolonged. If the time indicated is not in reason, you may contact the Born Free Customer Service Dept. to make other arrangements to expedite the correction.
- In the event of a disagreement between you as the owner and the manufacturer as to whether a defect is attributable to the manufacturer's work, or covered by the warranty or corrected in a timely and prompt manner, the question and issue must be submitted to an impartial qualified arbitrator for decision before either you or the manufacturer may pursue any legal remedy in the courts. The fees or charges made by such independent arbitrator shall be paid by the party against whom the arbitrator rules.
- In the event of a dispute in which the arbitrator rules against the manufacturer, if the manufacturer fails to correct the defect at its own expense, you, as the original retail purchaser of the vehicle, have the right to bring suit against the manufacturer for damages and other legal and equitable relief in any court of competent jurisdiction in any state or the District of Columbia or in a proper United States District Court, if jurisdiction is present.

Such rules and regulations as may be advised by the Federal Trade Commission under authority given it by the Magnuson-Moss Warranty-Federal Trade Commission Improvement Act (Act of Jan. 4, 1975, Public Law 93-367) as it relates to service contracts and/or warranties, are reference incorporated herein.

NOTICE

Warranty Information Ford Econoline

If you have a Ford warranty problem with your unit, you must take it to an authorized Ford dealer first.

This must be done for any warranty coverage from Ford. If the Ford dealer can not fix your unit, he can authorize you to have it fixed at another service center. You must receive this authorization in writing.

Failure to comply with the above procedure will void your warranty coverage from Ford.

For "on-the-road" emergency service, call 1-800-241-FORD, in Georgia call 1-800-282-0959, for 24-hour-a-day service.

Born Free Motorcoach, Inc.



Vendor Warranty and Service Phone Numbers

NAME OF COMPANY	WARRANTY PHONE #
A&E Awning	(800) 544-4881
Ahlrich Cabinets (1993 and older RV, all Show)	(712) 335-3949
Air Lift Company (Air Rides, 1993 and newer)	(800) 727-9009
Alumax Doors	(219)-295-6393
Atwood Water Heater (1994 and newer)	(815) 877-5700
Auto Climate Control (Show only)	(800) 937-9674 or (903) 677-3161
Autopage Burglar Alarm	(310) 618-2002
A&M Distributing (1989 and older Vet and Show)	(219) 294-2538
Barker TV Booster	(616) 965-2371
Best Plastics Storage Pods	(616) 641-5811
Delta Power Plus Booster Amplifier	(616) 965-2371 (same as Barker and Delta TV antenna)
Dicon Smoke Alarm	(708) 850-7255
Dicor Versa Liner	(219) 264-2699
Dometic Refrigerator	(519) 653-4390
Duo-Therm (heat strip and roof mount AC)	(800) 544-4881 <i>MODEL 600315,421 S/N 52818838</i>
Elkhart Door and Shades	(800) 348-7559
Elixir Industries (windows and vents, early 80's)	(800) 421-1942
Emerson 9" Television and Video Cassette	(800) 388-8333
Fan-Tastic Vent	(800) 521-0298 or (810) 395-4045



Phone Numbers Continued

NAME OF COMPANY	WARRANTY PHONE #
Firestone Air Ride (1993 and older)	(317) 773-0650
Fletcher Cabinets (1994 and newer RV's)	(515) 573-2021
Flexsteel	(319) 556-7730
Ford Roadside Assistance	(800) 241-3673
Ford Service Locator	(800) 444-3311
Ford Motorhome Warranty	(313) 323-7932
Generac Generators	(414) 544-4811
Heart Interface Inverter	(206) 872-7225 or (800) 446-6180
Hehr International Windows	(800) 835-2244
Hellwig (overload springs)	(209) 734-7451
Honda Generator	(213) 604-2400
Interstate Battery	(800) 747-2425
KEC TV (tri-star)	(800) 456-3340
Kwikkee Step	(800) 736-9961
Larson Monitor Panel (mid to late 80's)	(800) 456-4498
Magic Chef	(800) 688-1120
Magnatek Converter	(219) 356-7102
Magnavox Television	(813) 278-4242
Manchester LP Tank	(314) 221-8710
Marshall Brass LP Regulator	(616) 781-3901
Maxon CB	(319) 664-3768
Michelin Tire	(800) 847-3435

Phone Numbers Continued



NAME OF COMPANY	WARRANTY PHONE #
Moen Sink	(501) 268-3521
Norcold Refrigerators	(800) 826-5045
Onan Generator and Remote Start.....	(800) 888-6626
Packmaster Storage Pods.....	(303) 469-3324
Panasonic Microwave	(219) 295-2441
Panasonic TV	(800) 447-4700
Prior Products (tag axles)	(800) 527-4848
RC Industries (fire extinguishers).....	(201) 937-5400
RV & Sea (sleeping bags)	(714) 830-1292
Sharp	(800) 798-8012
Shurflo Water Pump	(800) 762-8094 or (800) 854-3218 (Corp.)
Suburban Furnace	(615) 775-2131
Surepower Multi Battery Isolater	(503) 692-5360
Ten Tek Gas Alarm	(708) 850-7255
Thetford Toilet	(800) 521-3032
Thin Lite (fluorescent lights)	(805) 987-5021
Uniden CB.....	(317) 842-2483
Vollrath Faucet.....	(219) 294-5611
Vortec Throttle.....	(219) 482-4204
Walter Kidde Fire Extinguisher	(800) 654-9677
Wedgewood Oven Cooktop	(615) 643-4556
Westinghouse Ground Fault Circuit Breaker.....	(412) 244-2000
White-Rodgers Thermostat	(615) 775-2131

Born Free Recreational Vehicle Specifications

(Cabover models only)

	21' Models	24' Models	26' Models	
BUMPER TO BUMPER OVERALL LENGTH	21' 11-1/2"	24' 7-1/2"	26' 4-1/2"	
FRONT OF FRONT BUMPER TO REAR OF CAB	88-1/2"	88-1/2"	88-1/2"	
CUT FLOOR LENGTH	164-3/8"	198"	219-3/8"	
HEIGHT AT TOP OF FRONT VENT	112"	114-1/2"	117"	10
REAR OF ROOF HEIGHT	107-1/2"	107-1/2"	108-1/2"	10
HEIGHT WITH ROOF AIR	(11") 118-1/2"	118-1/2"	119-1/2"	10
HEIGHT WITH ROOF POD	(15") 122-1/2"	122-1/2"	123-1/2"	10
BODY WIDTH	95-1/2"	95-1/2"	95-1/2"	8
BODY WIDTH WITH AWNING	98-1/2"	98-1/2"	98-1/2"	9
WIDTH ACROSS MIRRORS EXTENDED IN DRIVING POSITION	110"	110"	110"	10
WIDTH ACROSS MIRROR HDWE/MIRRORS FOLDED	98"	98"	98"	9
REAR BUMPER DEPTH	12"	12"	12"	1
INTERIOR FLOOR WIDTH	88-3/4"	88-3/4"	88-3/4"	8
INTERIOR HEIGHT	76-1/2"	76-1/2"	76-1/2"	7
CHASSIS WHEELBASE	158"	158"	176"	15
APPROXIMATE BASE WEIGHT**	9,800 LBS.	10,500 LBS.	11,200 LBS.	

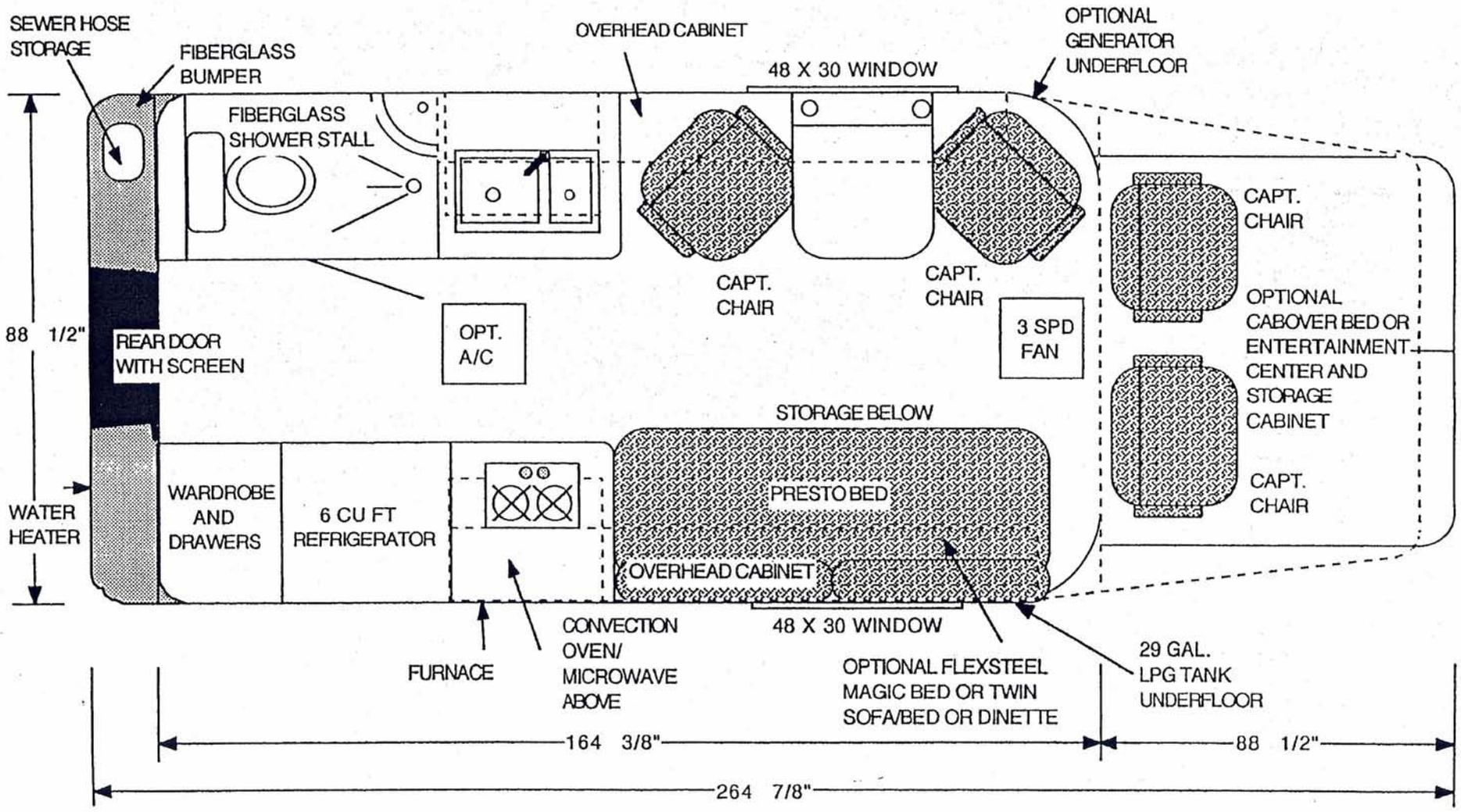
ALL SPECS ARE SUBJECT TO CHANGE AND ARE APPROXIMATES ONLY.

**BASE WEIGHT IS LESS OPTIONS, PASSENGERS, AND CARGO.

Tank Capacities

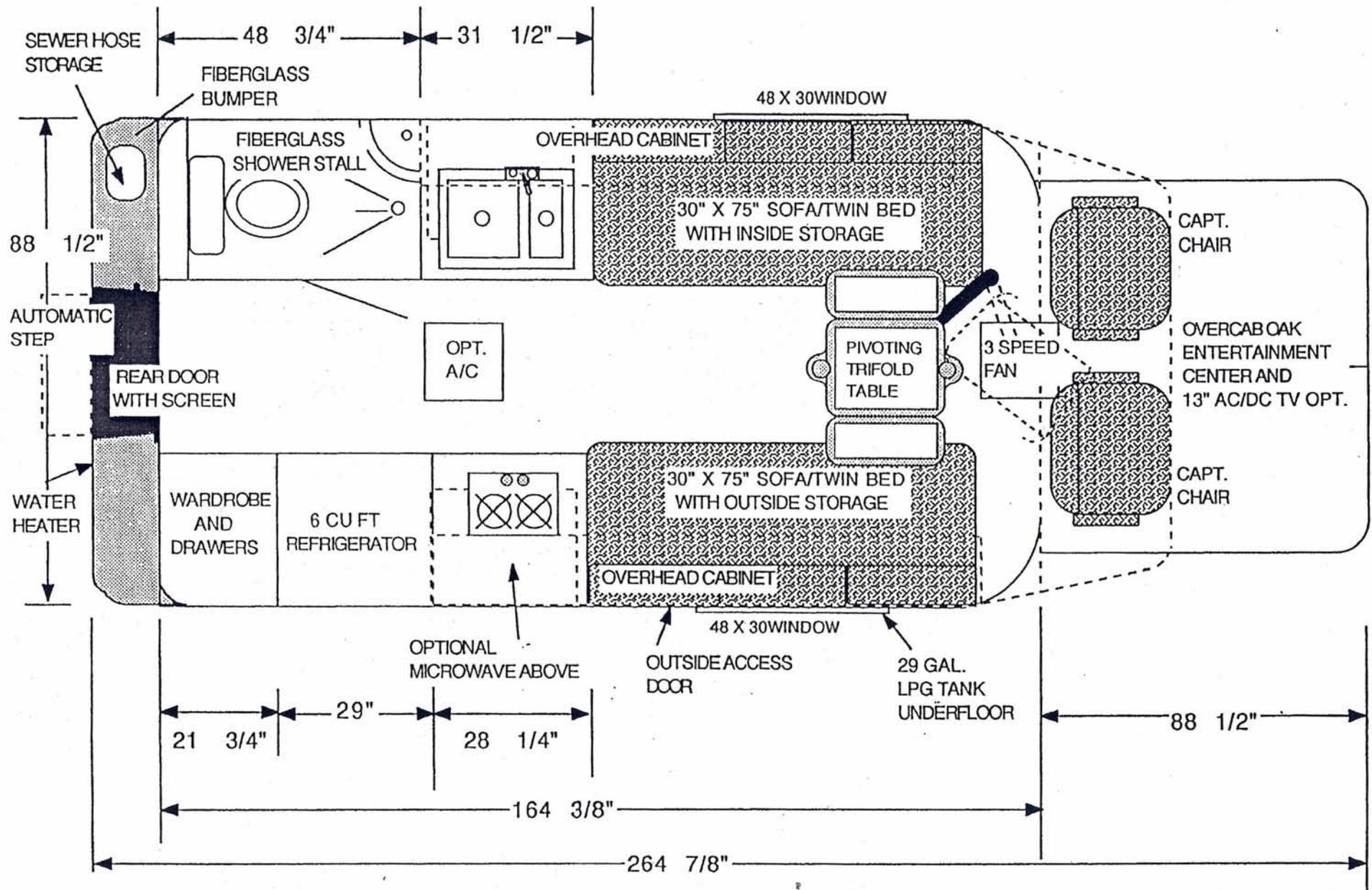
	21' RD & BFT	24' REAR BATH	24' REAR SIDE BED	26' REAR BATH	26' REAR SIDE BED
Fuel	35 gal.	35 gal.	35 gal.	35 gal.	35 gal.
LP	23 gal.	23 gal.	23 gal.	23 gal.	23 gal.
Fresh Water	35 gal.	35 gal.	35 gal.	35 gal.	35 gal.
Grey Water	13-1/2 gal.	20 gal.	25 gal.	20 gal.	25 gal.
Black Water	13 gal.	25 gal.	20 gal.	25 gal.	20 gal.
Water Heater	6 gal.	6 gal.	6 gal.	6 gal.	6 gal.

BORN FREE 21' REAR DOOR

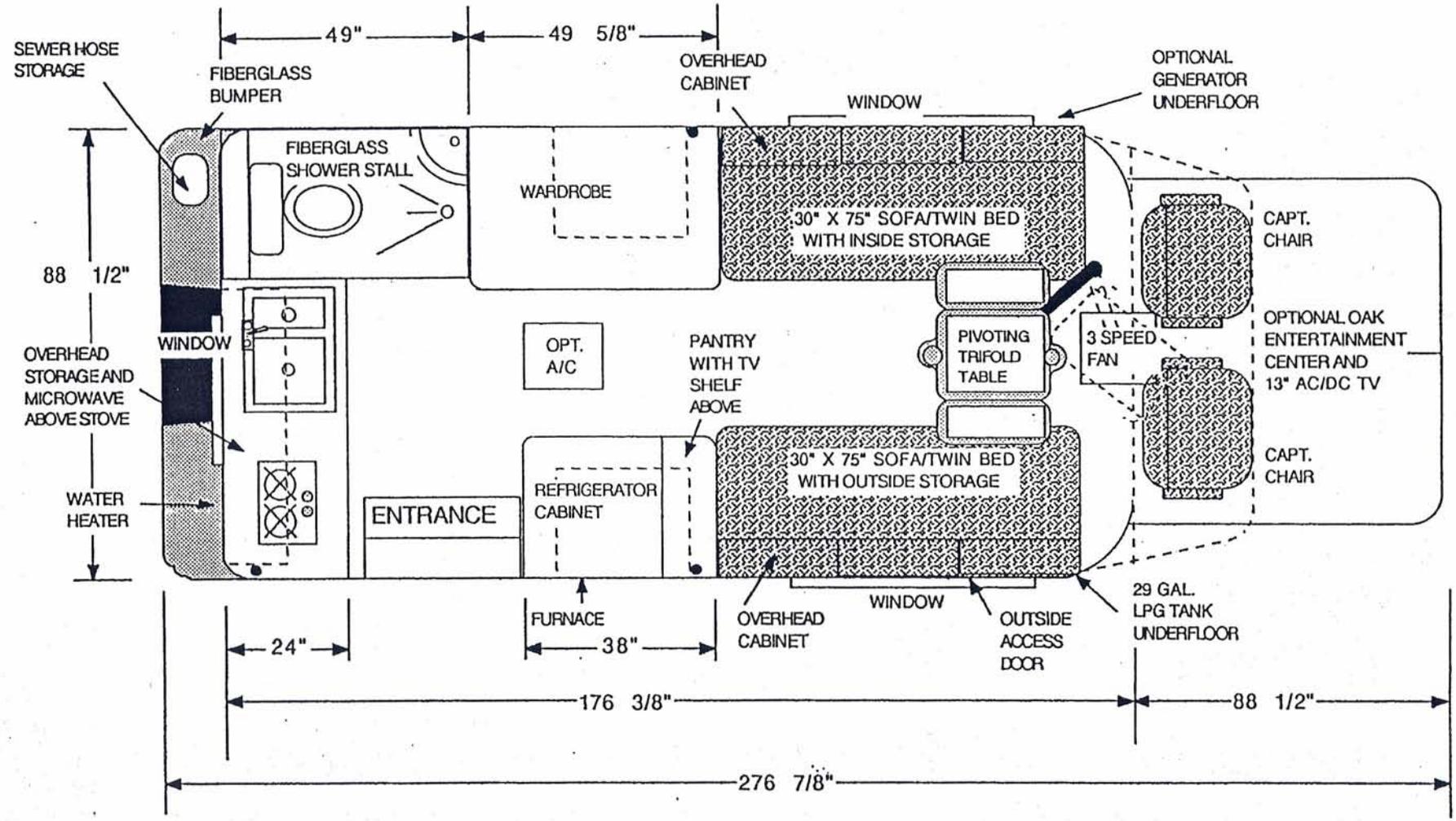


BORN FREE 21' BFT

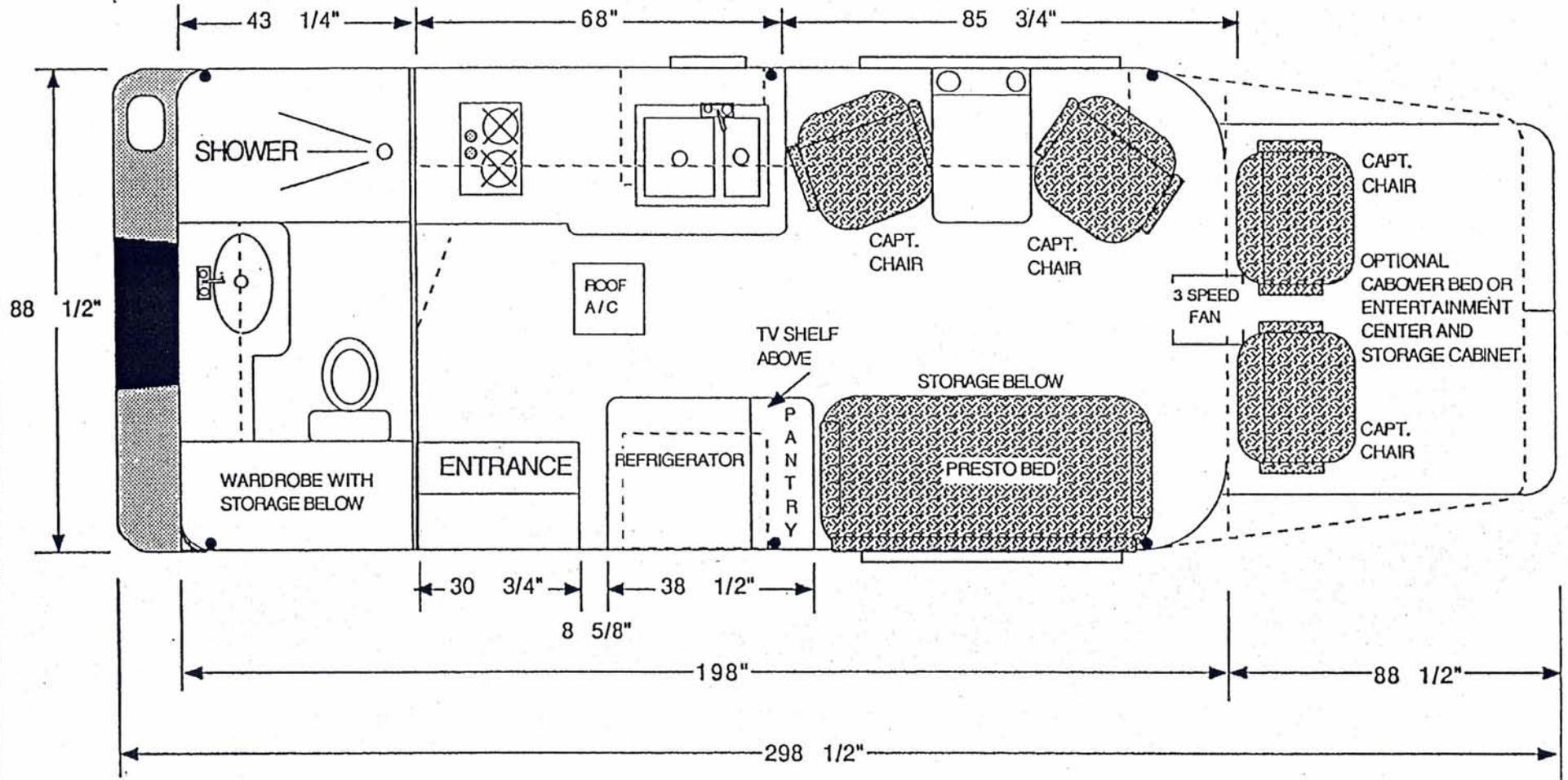
A COMPLETE MOTOR HOME BUILT FOR TWO



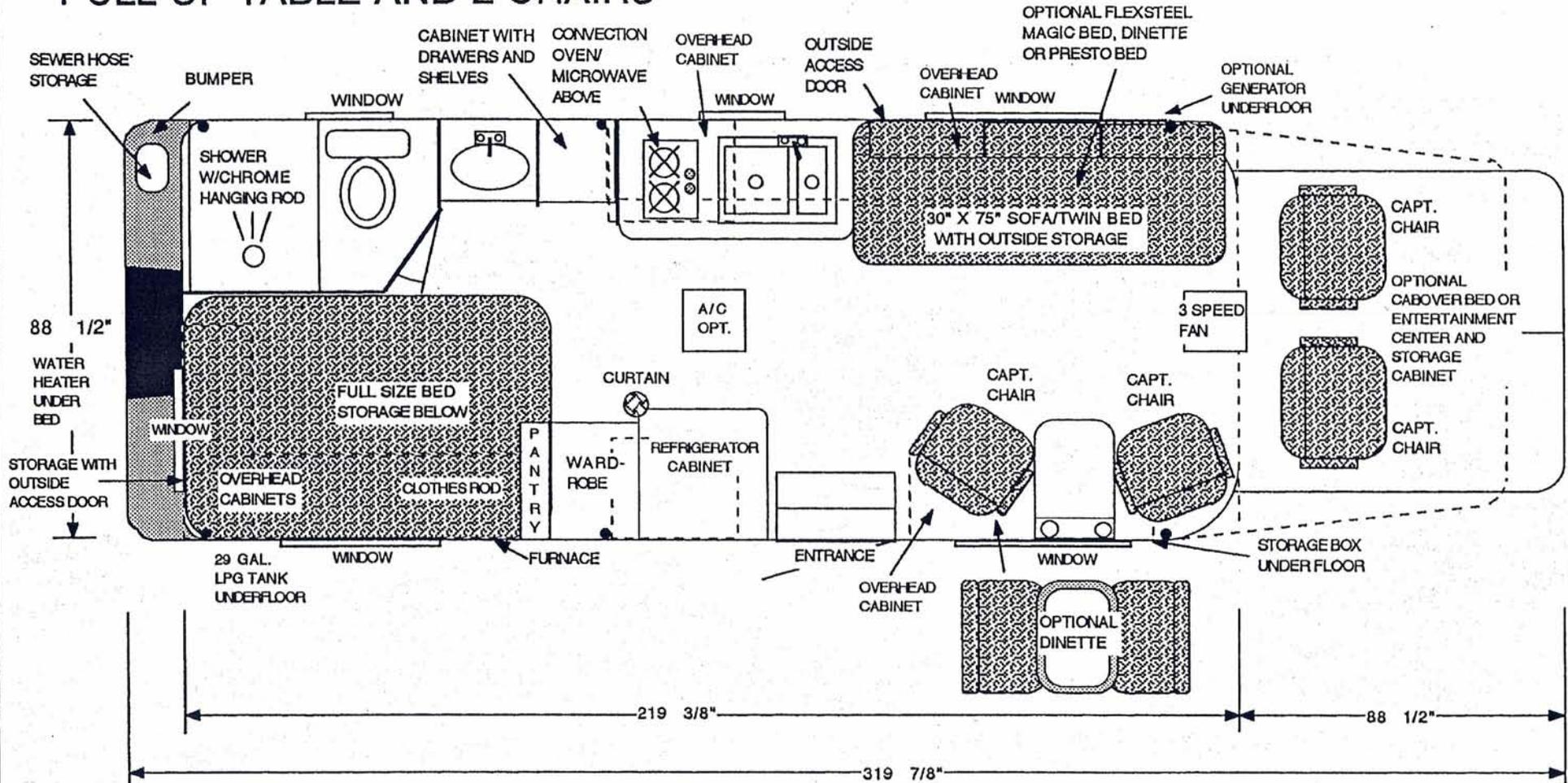
BORN FREE 23' BFT REAR KITCHEN "BUILT FOR TWO"



BORN FREE 24' REAR BATH



BORN FREE 26' REAR BED PULL-UP TABLE AND 2 CHAIRS



Tire Inflation and Vehicle Loading

We have developed a guideline for tire and air suspension pressure that we would encourage you to follow so that you maintain the high level of satisfaction with your new Born Free Motorcoach.

Quite often we find that customers who report poor tire wear, handling, or excessive road vibration are driving with either the tires or air suspension system over-inflated. Many times service technicians over-inflate tires and air suspensions to a level equal to larger trucks. We advise you to routinely check these pressures to prevent unwarranted wear.

Ford Recommended Pressures

	Front Tires	Rear Tires	Air Bags
RVs	65 PSI	60 PSI	55 PSI
Showmobiles	65 PSI	60 PSI	55 PSI
Vet Units	65 PSI	60 PSI	55 PSI

Driving Tips

Your new Born Free Motorcoach will drive very much like your "family car." The biggest difference in handling will come from an increase in weight, width, height, and length. All of these differences will become second nature to you in just a few miles of driving. You will be able to drive your Born Free at interstate speeds, just like your car; but it will take a bit longer to achieve the maximum driving speed. The vehicle will slow down more when climbing an incline because of the added weight. When maneuvering a pass, allow yourself more time and room for overtaking and cutting back. Your Born Free is also wider and consideration should be taken when maneuvering in a tight place.

When maneuvering in a tight place, it is best if you have your co-pilot get out and walk with the coach as it moves. Station that person at the left rear of the coach where you can observe their signals.

As you become more familiar with your Born Free, you will become more aware of the additional weight, length, and width. However, height will have to be a constant thought when you approach low hanging branches or low building canopies. Allow 10-1/2 feet in most cases with a roof mounted air conditioner for proper clearance.

The experienced traveler learns to "walk his rig" at every stop. It takes but a minute to make a trip all the way around looking at the complete unit. Be sure that all caps are in place, access doors secure, and tires are well inflated. Be sure to check the rear inside duals either by kicking them or hit them with

a tire iron. An un-inflated tire will move on the rim causing heat build-up or possibly even a fire. "Once around before in" is a good practice.

The fuel efficiency of your Born Free depends on several factors: the load it's carrying, the size and weight of the body, driving habits and general condition and maintenance of the vehicle. Adding a trailer to your motorcoach will place an additional load on the engine and will reduce fuel economy. Here are some suggestions for increasing fuel economy:

1. Change oil and filter according to manufacturer's recommendations.
2. Manually shift the automatic transmission when appropriate.
3. Inspect air and fuel filters frequently when encountering excessive dust, bugs, and debris.
4. Keep cargo to a minimum.
5. Make sure tires and air bags are properly inflated.
6. Restrict dash air conditioner use when possible.

Ice, snow, and wet road surfaces present hazardous driving conditions. Stopping distance is unpredictable, and braking surfaces can cause skidding. Under such conditions, down-shifting the transmission helps reduce vehicle speed and provides more control. Pumping the brakes tends to prevent skidding. Lowering tire pressure helps considerably.

CAUTION: To avoid skidding in slippery situations do not down-shift to 1st gear at speeds above 10 mph.

Travel Tips

Here are some traveling tips to keep in mind when you're on the road with your new Born Free.

1. Remember to "think high and wide." Save the top and sides of your motorcoach.
2. Keep an eye on service station attendants. They may accidentally fill your water tanks with gas or vice-versa. They may also get the wrong type of fuel in your unit.
3. Use manned tollgates - usually you will be charged one class more than a car. Some states may or may not require you to stop at weight stations.
4. Check the oil every time you stop for fuel.
5. Check wheel lug nuts every day before you start.
6. Do not leave food or odor causing materials in your vehicle for extensive periods of time.
7. Inspect your fire extinguisher for proper charge once a month. It's also a good idea if everyone using the coach knows where the extinguisher is located and how to use it in case of an emer-

gency.

8. Conduct a tour of your vehicle before departure to be sure that all compartment doors are closed and locked, cabinet doors closed, and the refrigerator doors are secured.
9. First-time motorcoach owners may have a tendency to crowd the center line of the highway. Check your mirrors frequently to prevent crowding the center line.
10. When fogging appears on windows, there is an excessive amount of humidity inside the vehicle. In extreme cold conditions the humidity can turn to frost or ice. To alleviate the excess moisture problem, open a roof vent slightly or open a window. Operating power vents will also help.
11. Taste the water before filling your fresh water tank.
12. Conserve water when taking a shower by taking "sea showers." Wet down and soap from water saved in lavatory, then use the on-off button on the shower head. Turn the water on and rinse.
13. Dump sewage only at approved dumping stations.
14. During peak camping season, phone ahead for a camping spot.
15. You will find that sleeping bags save work. They take less space than blankets and are usually warmer.
16. Some states will not allow you to pass through highway tunnels with LP gas on board your vehicle. If your route includes a tunnel, check with authorities before venturing out.
17. Emergency items you should have along are:
 - a. Flashlight
 - b. First aid kit
 - c. Emergency flares
 - d. Tool box with tools
 - e. Plastic bucket
 - f. Tow chain or rope
 - g. Wheel blocks for leveling, or extra jacks
 - h. Water hose
 - i. 100-150 foot electrical cord with at least 50 amp rating
 - j. Fire extinguisher
 - k. Hydraulic jack and lug wrench

Check list for pre-departure inspection

As a safety precaution get in the habit of: ONCE AROUND BEFORE IN - walk completely around your coach before departure. It could save leaving with a power cord or hose still connected.

- Inspect springs, shocks, and steering mechanism.

- Test auxiliary battery for charge condition, clean battery posts if necessary.
- Check all running lights, turn signals, and panel lights.
- Test horn.
- Examine tires for wear and test for proper inflation.
- Check fluid levels: radiator, brake fluid, and washer fluid.
- Check windshield wiper condition.
- Doors and windows closed.
- Roof vents closed.
- Compartment doors closed and locked.
- All cords and hoses unhooked and stored away.
- ONCE AROUND BEFORE IN.

Trailer Towing

Whenever a motorcoach is used for towing, the following limitations must be followed:

1. The towing hitch on the Born Free is NOT class rated.
2. The Gross Combination Weight (GCW) must not exceed the Gross Vehicle Weight Rating (GVWR) unless the trailer vehicle is equipped with adequate brakes.
3. Trailers weighing in excess of 1000 pounds require trailer brakes. Trailer brakes are also required whenever Gross Combination Weight (GCW) exceeds the Gross Vehicle Weight (GVW) of the motorcoach.

Gross Combination Weight (GCW) equals the total weight of fully equipped motorcoach and trailer with cargo, driver, passengers, fluids, etc.

Do not restrict radiator air flow by mounting front-mount spare tire, trail bikes, etc. to the front of the motorcoach.

An auxiliary transmission cooler must be installed if you are going to tow any vehicle. The additional heat created by towing will cause fluids to overheat resulting in transmission failure.

CAUTION: Installation of a frame-type equalization hitch on a motorcoach is not recommended.

Additional Trailering Tips

1. Make extra wide turns to compensate the wider turning radius of the trailer.
2. When backing up, move trailer to the left by turning the front wheels of the motorcoach to the right. To turn the trailer to the right, do the opposite.
3. Place wheel blocks (chocks) under the trailer wheels before setting brakes and transmission of the tow vehicle. The blocks will absorb the stress and secure the trailer.

4. Frequently check operation of trailer brakes and trailer lights.
5. Decrease trailer load substantially for high-altitude driving.

Routine Operation

As a guide we would suggest that the following guidelines be followed when operating your new Born Free:

1. Change engine oil and filter at 3000 mile intervals. See the Ford owners manual for oil specifications.
2. Rotate tires at 5000-7500 miles and again at 10,000-15,000 miles. Change the direction of rotation when rotating.
3. Wash regularly with mild soap. Do not use abrasive cleaners.
4. Wax the motorcoach twice a year using a good carnauba-based paste wax.
5. Check caulking twice a year and replace if needed. A silicone caulking is recommended.
6. Align the front end at approximately 2500-4000 miles. Contact a truck alignment shop. If the motorcoach pulls to one side, immediate alignment is necessary. Failure to take immediate action can result in severe tire wear and create a very hazardous driving condition.
7. Service the auxiliary generator per manufacturer's guidelines.

Diesel Owners - Operating Tips

Some special precautions need to be taken when dealing with diesel engines. Because it is not uncommon for diesel fuel to become contaminated with water, a water drain separator is located along with a bleeder valve on the bottom of the fuel filter. A warning light on the dash will indicate that there is a problem with water in the fuel. If the warning light comes on, you should contact a Ford dealer to have the problem remedied.

When the outside temperature drops to 20-degrees an anti-gel additive can be added to the fuel to prevent gelling. If the temperature remains below 20-degrees #1 diesel fuel should be used. In cold climates the 110-volt engine block heater should be used to assist in starting the engine.

Remember to allow the "wait to start" light to go out before engaging the starter. Do not crank for more than 15 seconds at a time; wait 30 seconds before the second try.

I. SUSPENSION

A. Air Lifts

Some Born Free Motorcoaches are equipped with an "Air Lift" system. The system enables you to compensate for any additional loads you may be carrying in the coach, offset trailer towing tongue weight, or simply to aid you in making minor leveling adjustments to increase gas appliance efficiency.

Proper inflation of the air lifts can result in the smoothest ride possible by reducing the choppy ride sometimes caused by truck tires and springs.

The system is made up of two air bags mounted to the rear axle and inflated by separate fill valves located by the driver's side wheel well. To operate, simply add air to each of the fill valves to achieve the proper leveling of the coach. Minimum air pressure is 20 PSI and maximum is 100 PSI. A general rule is that the air springs will support approximately 40 lbs. of load for every pound of inflation. For example: 50 PSI of inflation will support a load of 2000 lbs. per set. For the best ride use only enough air pressure to level the vehicle when viewed from the side.

NOTE: Too much air pressure will cause a stiffer ride, while too little pressure will cause the vehicle to bottom out. Never inflate the bellows above 100 PSI.

For service and warranty information see your manual pertaining to Air Lift Company.

B. Hellwig Helper Springs

Hellwig Helper Springs are added to some Born Free Motorcoaches to help stabilize the unit for better handling. The Hellwig springs are simply a helper spring that is bolted to the factory rear leaf springs.

II. FIBERGLASS SKIN

A. Looking Like New

At Born Free Motorcoach, we constantly test and evaluate the latest in new fiberglass materials to offer you, the owner, the finest and the most long lasting products available. Even though we are constantly striving to use the best possible products in the construction of your unit, the fiberglass finish may become dull, faded, or chalk without proper care. The following is a brief explanation of what happens to dull or fade the fiberglass finish and what can be done to restore the finish.

Fiberglass consists of two basic polyester products: gel coat, which is the outer colored surface; and the structural reinforcement, which is a blend of polyester laminating resin mixed with strands of glass to create a structure that is strong, weather resistant, and long wearing.

Man-made and natural materials, when placed in the elements, slowly deteriorate. The material is exposed to the sun, water, wind, dust, and chemicals in the air. How much wear and tear depends on how you treat the product and maintain it. An automobile's exterior surface quickly deteriorates if you do not wash and wax the painted surface. Although the gel coated surface is approximately ten times thicker than the paint surface on your automobile, it reacts similarly when exposed to the elements.

B. General Maintenance

1. Wash monthly or more frequently, if needed. Wash with a mild soap, such as dishwashing soap; avoid using strong alkaline cleaners and abrasives.
2. Wax the unit once or twice a year using a paste wax containing a high percentage of carnauba. As a rule, only the hard paste waxes contain large amounts of carnauba. Liquid or soft waxes usually contain a large amount of silicone and solvents. The silicone is usually washed away after a few washings with a detergent.

C. Chalking

Chalk is the outer surface of the gel coat being broken down into an extremely fine powder. The chalk that develops is strictly on the surface. This problem is caused by overexposure to the sun's ultraviolet rays, chemicals in the air, or improper care of the gel coat surface. To alleviate the chalk, wash the unit and try a paste wax to restore the luster. If this is not effective, apply a fine rubbing compound, either hand applied, or applied with a power buffer. Follow this procedure with a good paste wax. If this method is still ineffective, a light sanding using 600 grit or finer grit wet or dry sandpaper can be used followed by fine rubbing compound and a coat of wax.

NOTE: If a power buffer is used, use low RPM with light pressure. Keep the buffer moving at all times to prevent heat build-up, which may result in a burn spot of softening of the gel coat surface.

D. Fading

Fading means that the color has changed. Fading is caused by (1) chalking, which makes the color lighter, (2) pigments in the gel coat have actually changed color due to a chemical reaction with chemicals or pollution in the air, or (3) the gel coat is bleached or stained by something. Stains may derive from dirt, dust, road tar, plant sap, rust, or materials from caulking or sealing compounds.

To determine how to remove a stain, pre-test the

stain in an inconspicuous area first, using mild detergent. A mild abrasive cleaner may be used if necessary. The abrasive cleaner may leave the finish dull and may need to be buffed to restore the luster. Always apply a coat of wax to the repair area when completed.

To remove a non-soluble stain, you may try removal using acetone, paint thinner, or alcohol. Prevent prolonged contact with the surface for fear of deterioration of the gel coat surface.

Scratches may be touched up using touch-up paint purchased from your Ford dealer. The fiberglass gel coat is the same color as the Ford chassis. For larger repairs you may contact Born Free Customer Service and we will send you the desired amount of gel coat material. We would be happy to assist you with any and all repairs you may require.

III. COACH

A. Interior

1. **Seat Belts** - For seat belt requirements refer to RVIA and FMVSS (Federal Motor Vehicle Safety Standards). Most states, by law, are requiring the use of seat belts. In addition Born Free recommends the use of seat belts on all passengers while the vehicle is in motion.

According to Federal Regulations on recreational vehicles, an automatic restraint diagonal shoulder belt on the right front passenger seat is not approved and therefore cannot be used to secure a child safety seat. The safety of young passengers is not only your responsibility, but also the law.

All seats must be locked in the forward position when the vehicle is in motion.

2. **Smoke Alarm** - A smoke alarm is provided as protection in case of a fire. The alarm operates on a 9-volt battery. We suggest that you change the battery once a year for your protection.

LIMITATION ON LIABILITY - Remedy under this warranty is limited to repair or replacement of the detector only. We will not be liable for loss or damage due directly or indirectly to occurrences which the detector is designed to detect.

Some states do not allow the exclusion or limitation of incidental or consequential damages; so the above limitations or exclusions may not apply to you. The warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

3. **Tables** - Some Born Free Motorcoaches are equipped with removable, pedestal-type tables and bases recessed into the floor.
4. **Cabinets and Doors** - Your Born Free is equipped with solid oak cabinet doors. It is not uncommon for the doors to become misaligned during travel. Because of normal movement of

the coach and cabinet loading, the doors on some cabinets may become misaligned. Normally, a simple adjustment of the door striker or hinge is all that is required.

5. **Beds** - Several types of beds are used in the Born Free Motorcoaches. They are designed for maximum comfort in seating and sleeping.
 - a. **42" x 76" Sofa Bed** - The sofa quickly converts from a sofa to a 42" x 76" bed by lifting up and pulling out of the seat cushion. The bed then can be made up for a comfortable night's sleep. To return it to a sofa simply lift the front and push in.
 - b. **Dinette/Sofa Bed** - The dinette sofa combines sleeping accommodations with dining-style seating. By removing the table and legs and removing the dinette front wood filler plates, the table can be inserted between the two dinette seat. Move the cushions into place using one of the back rest cushions to form a comfortable bed. Open storage is found under each seat base.
 - c. **Cabover Bed** - This uniquely shaped mattress fits the contour of our cabover bed area. By "flipping over" the center cushion you are ready to climb the bed ladder to the cabover bedroom. Privacy curtains separate this area from the rest of the coach and the outside. The mattress measures 66" x 82" x 4" thick.
6. **Interior Maintenance** - Curtains, shades, and upholstery ... vacuum the upholstery, curtains and shades as regularly as the carpet. Do not wash the curtains but rather have them dry cleaned. Carpet spot remover may be used to remove stains and soiled spots from furniture and carpet.
7. **Idler Control (Diesel Showmobiles)** - To get maximum efficiency from your auxiliary air conditioner and 12-volt lighting, a higher than normal idle speed is needed. The idler control, mounted at the bottom of dash, left of the steering column, will do this for you. Simply push the button on the control and the engine will accelerate to the required RPM. A light on the control will indicate that the device is engaged.

The idler control is engineered to work only when the transmission is in park or neutral. The device will automatically shut off when the transmission is shifted into gear, when the brake pedal is applied, or can be shut off manually by pushing the button on the control.
8. **Emergency Exits** - Three entry doors are designated as exits to your Born Free. The rear window on most recreational vehicles is also designated as an emergency exit. Familiarize all occupants with these exits in case of an emergency.
9. **Roof Vents** - To provide adequate ventilation

inside your coach, crank-out roof vents are installed in the ceiling. Some models are equipped with a "Fantastic Fan." This vent fan is a 3-speed exhaust fan that will do an excellent job of exhausting. The optional "Fantastic Fan" does not come equipped with a light.

We do not advise you to travel with the roof vents in the wide open position. Also, while using the roof-mounted air conditioner, be sure roof vents are closed to get maximum efficiency from the air conditioner.

10. **Roof Air Conditioner** - As an accessory, we install a 13,500 BTU Duo-Therm roof-mounted air conditioner.
 - a. **Operating Instructions** - The roof-mounted air conditioner operates on 110-volt power supplied either by shoreline or generator-produced 110-volt current..
 - b. **Controls** - The selector switch is the left-hand knob. It has eight positions and controls fan speeds, heating mode and cooling mode. The thermostat is located on the right side and controls the temperature range from 65° on the coldest side to 90° on the warmest side. The compressor ON/OFF is controlled by the thermostat setting in the cooling mode.
 - c. **Cooling Operation** -
 1. Select the fan speed that best satisfies your needs:

HI COOL: Selected when maximum cooling and dehumidification are required.

MED COOL: Selected when normal or average cooling is required.

LO COOL: Selected when room is at desired comfort level and needs to be maintained. Normally, this speed is used for night time operation.

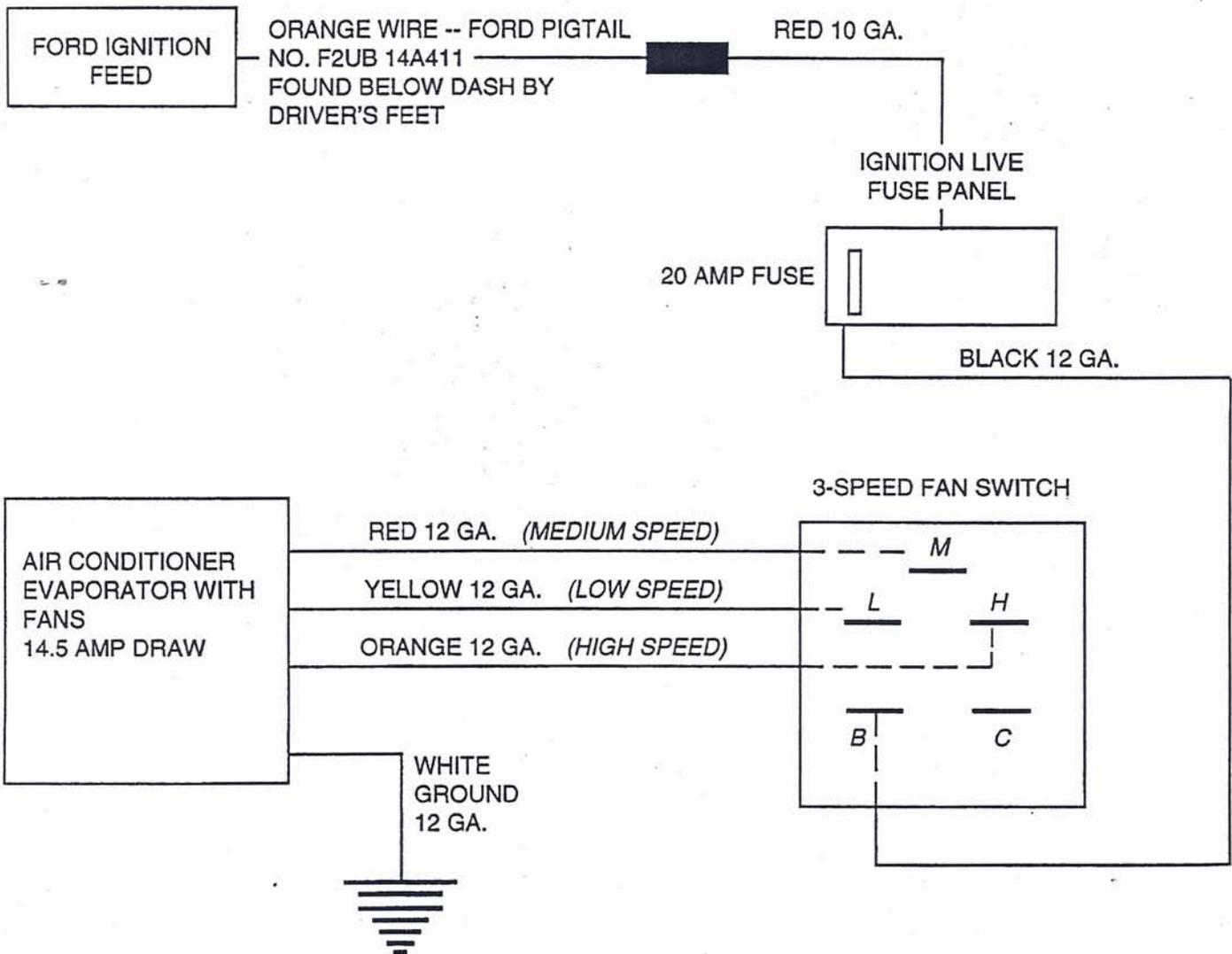
NOTE: The blower runs continuously to circulate air and maintain an even temperature. The compressor will cycle on as cooling is required to maintain the selected temperature level.
 2. Set the thermostat at the desired temperature.
 - d. **Heating Operation** - Turn the selector switch to OPT HEAT. The fan and heater will run continuously on low speed.

NOTE: The electric heater will not replace a furnace for heating your RV in cold weather. The intent is to remove the chill on cool days or mornings.
 - e. **Maintenance** - Periodically remove the filter/grille assemblies located in the air box and clean. Remove the assemblies by placing fingers on the long portion of latches and with an over-and-downward pressure, unlatch the catches. After assemblies are



Evaporator Wiring Diagram

Automotive Climate Control System on Born Free



removed, wash the filter/grille assemblies with soap and warm water. Let the assemblies dry and then reinstall.

- f. **Warranty Service** - In case of failure to operate, check power source first to make sure shore-line is carrying proper amount of current, check generator to see if it is producing power, or check the breaker at the power converter to see if it is tripped. Refer to the Duo-Therm Air Conditioner manual for warranty and service information.
11. **Auxiliary Air Conditioner/Heater** - Some Born Free Showmobiles are equipped with an auxiliary air conditioner/heater. The auxiliary unit runs independently from the chassis air. In other words, the dash air need not be running to run the auxiliary unit. The auxiliary air conditioner/heater is controlled with a switch mounted on the left side of the dash panel. The switch is a 3-position switch: "OFF" - "HEAT" - "A/C." The fan for the auxiliary unit is located on the cabinet next to the entry door. The switch controls the fan speed only.

Maintenance - As part of normal maintenance, the auxiliary air and heat unit should be run periodically, even in the winter, to lube fittings and seals. The compressor for this unit is a separate unit mounted on the engine. However, the drive belt or "serpentine belt" is incorporated into the Ford belt system to drive all of the accessories. This belt is available only through the manufacturer. For warranty service you may contact the manufacturer listed in the Auxiliary Air Conditioner/Heater manual or Born Free Customer Service.

12. **Range hood - Monitor Panel**
- a. **Range hood** - Your Born Free is equipped with a 12-volt range hood, vented to the outside. It also has a built-in monitor panel to accurately read the holding tanks, water tank, and battery level. The panel also has a water pump switch, hood light, and fan switch built-in.
- b. **Fan and light** - To operate the range hood fan you must first open the outside plastic vent by turning the two retaining turnbuckles on the vent. The door will now operate on its own, when the exhaust fan is in operation. A simple push of the fan button will now activate the exhaust fan. Also, a light can be activated by pushing the light switch. The third switch on the frontal panel is for the water pump. This switch may be left on while camping and the pump will automatically cycle when needed. We advise that you turn the water pump switch off and be sure to close the latch of the outside range vent when traveling.

c. **Monitor Panel** - By pushing the "monitor" switch, the panel will light up, indicating the fluid levels in the black water holding tank, the gray water holding tank, the fresh water holding tank, and the charge condition of the auxiliary battery.

d. **Maintenance** - The range vent may be cleaned with soap and water. Periodically, remove the aluminum filter and wash in soap and water. Allow to dry and reinstall. For warranty service, see your Jensen warranty manual.

13. **Microwave Oven** - Born Free offers an option on some vehicles - a microwave oven. Because we offer a variety of brands, we advise you to consult the manufacturer's owner's manual for proper operating instructions and warranty service.
14. **TV - VCR - VCP** - Again, Born Free offers as an option a variety of brands and we advise you to consult the manufacturer's owner's manual for proper operating instructions and warranty service.

B. Exterior

1. **Doors and Locks** - Most Born Free Motorcoaches are equipped with the following locks and keys.

Identification	Replacement
a. Chassis door and ignition	See chassis dealer
b. Coach entrance door lock	Send number of lock to Born Free
c. Coach entrance dead bolt lock	Send number of lock to Born Free
d. Compartment door locks	One key fits all - order from Born Free

2. **Rack and Ladder** - Exterior roof mount rack and ladder is offered as an option to provide access to the roof area for storage purposes. Care should be taken when using the ladder in icy or rainy conditions. Do not exceed 100 pounds per square foot, or 1,000 pounds total weight of storage on roof.
3. **Roof-mounted Storage Compartment** - This weatherproof storage pod is a very useful accessory for storing large items, like suitcases, sleeping bags, etc. Do not exceed 10 pounds per square foot, or 100 pounds total weight of storage in the compartment.
4. **Generator Storage Compartment** - The generator storage compartment is located under the floor on the driver's side of the vehicle. If an auxiliary generator is not installed in this area, it can be used as an outside storage compartment.
5. **Battery Storage Compartment** - The auxiliary battery storage compartment is located on the lower driver's side. The battery is mounted

on a sliding tray and can be slid out for servicing the auxiliary battery. This compartment is not weathertight to allow fumes and gasses to escape.

6. **Sewer Hose Compartment** - We have provided you with a storage compartment to house your sewer hose.
7. **Gas Fill Door** - Access to your fuel tank fill is obtained through this area. Pay particular attention to the warning labels affixed to the door. Diesel owners need to pay particular attention when filling the fuel tank that the service station attendant uses diesel fuel rather than gasoline.
8. **Power Cord Hatch** - Your 30-foot power cord is stored in this compartment. See section on "Power Cord" for proper use of the cord.
9. **Exterior Light** - We have installed a light in the area of the waste tank dump valve to aid you in evacuating the waste tanks at night.
10. **110-Volt Exterior Outlet** - A 110-volt weatherproof outlet is available on your coach to run any 110-volt accessories you may have. This outlet is controlled by a ground-fault 110-volt breaker to prevent electrical shock caused by wet conditions. Use only grounded plugs and do not exceed the amperage limit of the breaker.
11. **Potable and City Water Fills** - One door, located on the driver's side, access the potable water and city water fills.
12. **Furnace Outlet** - The exterior furnace outlet is a combination intake and exhaust system for the furnace. When furnace is operating, this vent may become hot and you should take precautions to not touch it or store flammables near it.
13. **Roof-mounted TV Antenna** - Models with TV's have an antenna mounted on the roof, with access to the inside of the coach for positioning the antenna. A simple turn of the inside knob will position the antenna to your desired location.
14. **Entry Door Light and Grab Handle** - The exterior porch light and the lighted grab handle are switched inside the entry door on the wall. On some models we also install a stepwell light, which is also switched on the wall.

IV. ELECTRICAL SYSTEMS

Your Born Free Motorcoach is equipped with one or more electrical sources for electrical power for your coach.

1. 12-volt automatic electrical system
2. 12-volt motorcoach auxiliary battery
3. 110-volt external power supply
4. 110-volt auxiliary generator (optional)

A. Automotive 12-volt System

The chassis battery is located under the chassis hood on the driver's side and operates the following:

1. Headlamps
2. Turn indicators
3. Console panel lamps
4. Windshield wipers
5. Speed control
6. Starter motor
7. Backup lights
8. Exterior clearance lights
9. Tail lights, indicator lights, and stop lights
10. Cigarette lighter (dash-mount)
11. Auto air conditioner
12. Radio and stereo

All of the above accessories are fused at the chassis fuse box. See your chassis owner's manual for proper replacement. NOTE - Never install a larger rated fuse as a replacement. Severe wire damage or possible fire may result.

B. Auxiliary Coach 12-volt System

The coach is equipped with an auxiliary battery mounted on a slide-out tray beneath the coach floor. It operates the following:

1. Interior lights
2. Interior roof fans
3. Recirculating toilet
4. Range exhaust fan
5. Furnace fan and ignitor
6. Water pump
7. Monitor panel
8. Auxiliary generator starter
9. Safety detector
10. LP leak detector
11. Igniters for refrigerator and water heater

The auxiliary battery is separated from the truck battery anytime the chassis ignition is switched off by a battery isolator mounted near the auxiliary battery. The isolator separates the two systems so that the chassis battery won't run down during auxiliary use. When the chassis engine is running, the isolator allows the auxiliary battery to be charged by the alternator. The auxiliary battery can also be charged through the power converter when the vehicle is plugged into 110-volt shoreline power, or when the auxiliary generator is running. However, the rate of charge is a great deal less and will take a longer time to recharge.

Vehicles with diesel engines have two chassis batteries mounted under the chassis hood. Diesel engines require more cranking amperage and thus the two batteries.

C. Care of Batteries

Check battery water level before every trip; and at least once a week during heavy use. The terminals on the battery must be kept clean and free from corrosion. If the motorcoach is stored for the

winter, remove the battery(ies) and store in a cool dry area, preferably off of a concrete floor. Even when idle, batteries will discharge due to chemical action, and should be charged periodically. Do not connect the battery to a charger and leave for the winter as the danger of overcharging is too great. Keeping the cells of the battery filled with water will keep the plates from buckling, causing an internal short.

D. Switches and 12-volt Fusing

All 12-volt powered equipment is fused inside the power-converter control center. Each fuse is labeled on the control center door. Do NOT install a larger replacement fuse, as each circuit is rated for the size of fuse installed.

A switch panel, mounted inside the door on some models, has control switches with a built-in circuit breaker to accommodate any overload situation. If a switch circuit becomes overloaded, the switch circuit breaker will trip and must be re-set. Re-setting the breaker involves switching the tripped switch from off to back on positions. Also located on the switch panel, in Showmobile models, is an hour meter hooked up to the diesel engine to record the running hours of the engine. Inside this compartment are two fuse bars with controlling fuses for other 12-volt accessories used in the motorcoach. Each fuse is identified, and again, a larger replacement fuse should never be installed to replace a blown fuse.

E. 110-volt System

The 110-volt system operates from a shore-line utility service, or an auxiliary generator source.

The following equipment operates entirely off of 110-volt power:

1. Roof air conditioner/heater
2. Refrigerator (except when operating on LP gas)
3. Electric appliances
4. Electrical outlets
5. Microwave
6. TV - VCR - etc.

1. **110-volt Utility Supply** - A 30-foot U.L. approved 30 amp heavy duty cable is provided for the connection to a utility supply. Also, a 15-amp adapter is provided to adapt to a standard three-prong outlet.

WARNING - Never use an un-grounded plug adapter, as an electrical short may occur and cause serious electrical damage or personal injury.

2. **Converter Control Center - Battery Charger** - When plugged into 110-volt shoreline, 110-volt current enters the motorcoach from the 30-amp cord directly into the converter control center. The converter converts the 110-volt power into 12-volt DC current, along with sup-

plying 110-volt power to wall outlets and all appliances requiring AC current. The converter also contains a battery charger that will charge the auxiliary battery at a rate of three amps per hour. The three amp charger is not intended to charge the auxiliary battery rapidly. The chassis alternator is intended to be the primary source of charge. When plugged into shoreline power, no DC power is removed from the auxiliary battery.

All cord electrical circuits are switched and fused inside the converter control center. Dropping the front panel of the converter will expose the circuit breakers that control the 110-volt power in the motorcoach and the automotive-type snap-in fuses that control the 12-volt circuits. The circuit breakers are a manual reset-type similar to those used in your home. If a short occurs, the breaker will trip and will have to be manually reset. The automotive fuses must be replaced using the same amperage-rated fuse replacements. We recommend that you carry a supply of spare replacement fuses, in the various sizes required, along with you. Inside the converter face panel you will find that we have identified each circuit for you.

In the event that a circuit breaker trips or a fuse blows, reset the breaker or replace the fuse. If this happens again, we suggest that you locate the circuit and unplug the offending appliance before resetting the breaker or replacing another fuse. The cause may be in the appliance itself. Again, never replace a blown fuse or circuit breaker with a larger rated fuse or breaker.

F. Ground Fault Circuit Breaker

For your protection and safety, we have installed a Ground Fault Circuit Breaker (GFCB) to protect the outlets in your Born Free that are located in areas that are possibly wet. Bathroom and outside outlets are protected with this device and will sense and trip the "GFCB." We advise you to test the "GFCB" once a month to be sure the breaker is functioning properly. To test the device, simply push the "TEST" button. An electrical test will thoroughly test all groundfault features. The breaker handle will audibly move to center trip position indicating ground fault protection. Reset the breaker by moving the handle to "OFF" and then "ON." If the test fails to trip the breaker, you should have the breaker replaced.

G. 110-volt Auxiliary Generator

The auxiliary generator in your motorcoach allows you to use 110-volt appliances when utility power is not available. The generator operates on unleaded gasoline from the fuel tank of your

motorcoach or from LP-gas from the LP storage tank. We advise you to maintain at least one-fourth of a tank of gasoline and at least 15% full for the propane version to adequately supply fuel for the generator.

The propane generator runs on liquid LP-gas drawn from the bottom of the LP supply tank. This is unlike your LP appliances, which operate on LP-gas vapor.

WARNING - The exhaust from the generator contains carbon monoxide (CO). This gas is colorless, odorless, tasteless, lighter than air, and poisonous. The exhaust system of your auxiliary generator has been installed with your safety in mind. However, certain precautions must be taken to protect you from conditions beyond the control of the manufacturer:

1. Do not simultaneously operate your generator and a ventilator that could draw air containing exhaust gases into the vehicle.
2. Do not open windows or non-powered vents in the vicinity of the generator location.
3. Position the vehicle, when parking, so that the wind will carry exhaust fumes away from you. Note the position of other vehicles parked near you.
4. Do not position the motorcoach so that the generator exhaust is deflected off vegetation, snow, buildings, vehicles, or any other object that can deflect the exhaust under or into the vehicle.

a. Generator Operation

Before starting the generator:

1. Open access panel on generator and visually inspect exhaust system; look for loose or damaged components and fasteners.
2. Check the engine oil level. (Do not overfill.)
3. Make sure that you have an adequate supply of fuel.
4. Switch off all electrical appliances.

Starting and stopping:

The generator has two start-stop switches: one mounted on the generator, and one located inside the coach, mounted to a cabinet face. The inside switch panel also has an indicator light that tells you when the generator is running and an hour-meter to tell you how many hours the generator has run.

1. Push the "start" switch to start generator. Release the switch when the generator starts. A light will come on at the switch when the generator is running.
2. Allow the generator to warm up before switching on any appliances.
3. Switch on electrical appliances.
4. To stop generator, switch off all electrical appliances and allow generator to cool for three to five minutes. Then push "off" switch.

b. Break-in Procedure

After initial start-up; plug in enough appliances to equal half the generator's capacity. (Check the model and capacity in your owner's manual.) Run the generator with this load for two hours. Operate the generator for another two hours with a three-quarter's load.

Change the crank case oil after 50 hours and every 150 hours after that.

c. Maintenance

1. Because the generator is air-cooled, it is essential that the cooling fins be kept clean and nothing is allowed to obstruct air flow to and from the generator.
2. Keep the governor linkage clean and well lubricated. (Refer to the owner's manual for proper procedure.)
3. It's a good practice to "exercise" the generator in times when there is infrequent use of the motorcoach. Running the generator at one-half capacity approximately every four weeks for about two hours will rid the generator of damaging moisture condensation. Failure to follow this procedure could result in generator engine damage.
4. The generator should be cleaned every six months or sooner if severe road contamination or dusty conditions are encountered.
 1. Do not steam clean or power spray while the generator is running.
 2. Provide cover or protection so that spray is not directed into the generator air cleaner, control box, fuel solenoid, or electrical connectors. Do not use solvents.

GENERATOR TROUBLESHOOTING GUIDE

The following is a simplified troubleshooting guide. If these recommendations fail to resolve the problem, contact your service organization generator set repair service.

Problem	Probable Cause	Solution
FAILS TO CRANK	<ol style="list-style-type: none"> 1. Low battery. 2. Bad battery connection. 3. Blown fuse. 	<ol style="list-style-type: none"> 1. Check battery electrolyte level. 2. Clean and tighten all battery and cable connections. 3. Replace fuse on control box. See specifications for proper fuse rating.
CRANKS SLOWLY	<ol style="list-style-type: none"> 1. Low battery. 2. Bad battery connection. 3. Oil is too heavy. 4. Load connected. 	<ol style="list-style-type: none"> 1. See "Fails to Crank", #1. 2. See "Fails to Crank", #2. 3. Replace with lighter oil. 4. Remove load.
CRANKS BUT WON'T START	<ol style="list-style-type: none"> 1. Fuel below genset pick-up level in tank. 2. Fuel supply shutoff valve closed. 3. Carbon deposits on spark plugs. 	<ol style="list-style-type: none"> 1. Add fuel. 2. Fully open fuel supply valve. 3. Remove spark plugs and clean.
EXHAUSTING BLACK SMOKE	<ol style="list-style-type: none"> 1. Rich fuel mixture. 2. Dirty air filter. 3. Excess oil. 	<ol style="list-style-type: none"> 1. Turn main fuel adjustment in 1/8 turn (location of adjustment is shown in Figure 3.) 2. Replace air filter. 3. Reduce engine oil level.
UNIT RUNS THEN STOPS	<ol style="list-style-type: none"> 1. Out of fuel. 2. Low oil level. 3. Excess oil. 	<ol style="list-style-type: none"> 1. Refill fuel tank. 2. Add oil if necessary. 3. Reduce engine oil level.
UNIT RUNS BUT SURGES	<ol style="list-style-type: none"> 1. Worn breaker points. 2. Loose or worn spark plug leads. 3. Ignition coil, wiring, or control components defective. 	<ol style="list-style-type: none"> 1. Adjust or replace breaker points. 2. Check security of spark plug leads at spark plugs and ignition coil. Replace leads if worn. 3. Contact a service representative

WARNING!!

**A HOT GENERATOR SET CAN CAUSE SEVERE BURNS.
ALWAYS ALLOW THE GENERATOR SET TO COOL BEFORE
PERFORMING ANY MAINTENANCE OR SERVICE.**

Maintenance Schedule

Establish and adhere to a definite schedule for maintenance and service. If the generator set is subjected to extreme operating conditions, you should reduce the intervals accordingly.

Consult your dealer if the generator set will be subjected to any extreme operating conditions and determine a suitable maintenance schedule. Keep an accurate log of all service and maintenance performed for warranty support.

Perform all the maintenance at the time period indicated or after the number of operating hours indicated, whichever comes first. Use the schedule to determine the maintenance required, and then

refer to the sections that follow for the correct procedures.

If you have the under-floor mount generator set and it must be lowered for any maintenance procedure (that is, you cannot service it in its normal position), see the procedures "Lowering the Under-Floor Mount Generator Set" in this section before beginning the maintenance procedure.

WARNING

Accidental starting of the generator set during maintenance procedures can cause severe personal injury or death. Disconnect both generator set starting battery cables before performing maintenance; disconnect negative (-) cable first.

PERIODIC MAINTENANCE SCHEDULE

Service these items	After each cycle of indicated hours				
	8	50	150	200	300
General inspection	x ¹				
Check oil level	x				
Check battery electrolyte level		x			
Clean out spark arrester		x			
Clean and lubricate governor linkage		x			
Change crankcase oil and oil filter			x ^{2,7}		
Change air filter			x ²		
Clean fuel filter			x ³		
Replace spark plugs			x ^{4,9}		
Check breaker points			x ⁵		
Replace breaker points				x ^{4,9}	
Clean cooling fins				x ⁶	
Clean carburetor and combustion chamber with Onan "4C" Cleaner			x		
Clean generator set			x		
Inspect and clean engine					x ⁶
Adjust carburetor	as required ⁶				
Check generator brushes	as required ⁶				
Exercise generator set	as required ⁸				

- 1 - With set running, visually and audibly check exhaust system for leaks.
- 2 - Every 150 operating hours or once a year, whichever is first. Perform more often in extremely dusty conditions (i.e., check monthly, and change if dirty).
- 3 - Equipped on BGEL and NHEL models. Customer option for BGE and NHE models.
- 4 - Or replace annually, or prior to storage, whichever is first.
- 5 - Replace if necessary.
- 6 - Have your Onan service center perform.
- 7 - First oil change during first year or 50 hours of operation, whichever is first.
- 8 - During periods of non-use, exercise for 2 hours every 4 weeks.
- 9 - Refer to Out-of-Service Protection if unit is to be stored.

BORN FREE

26' REAR SIDE BED



IS FLUORESCENT 12VDC LIGHTING FIXTURES



IS INCANDESCENT 12VDC LIGHTING FIXTURE

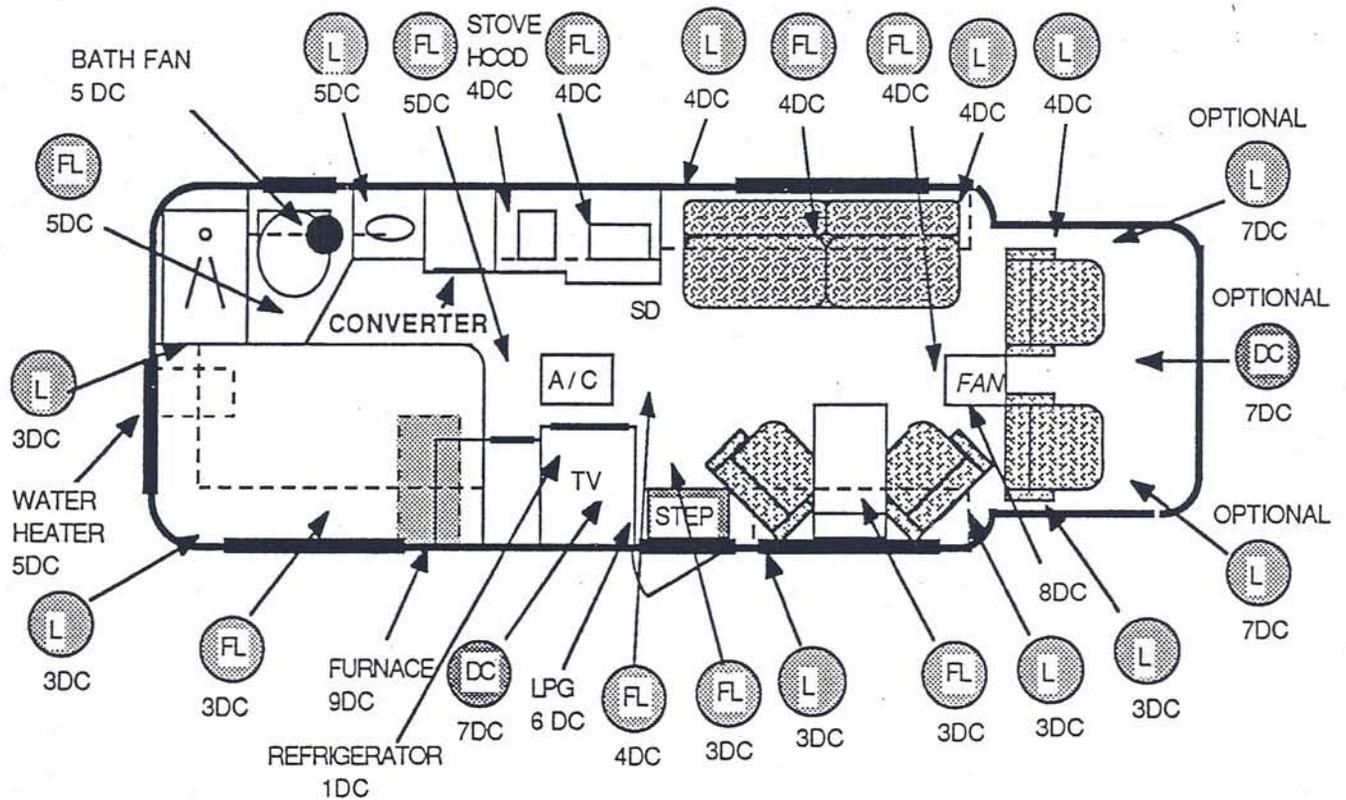


IS 12VDC OUTLET

SD IS SMOKE DETECTOR

LPG IS LP LEAK ALARM

THE NUMBER AND 2 LETTERS BELOW EACH SYMBOL REPRESENT THE CIRCUIT IN THE CONVERTER THAT THE ITEM IS ON.



BORN FREE

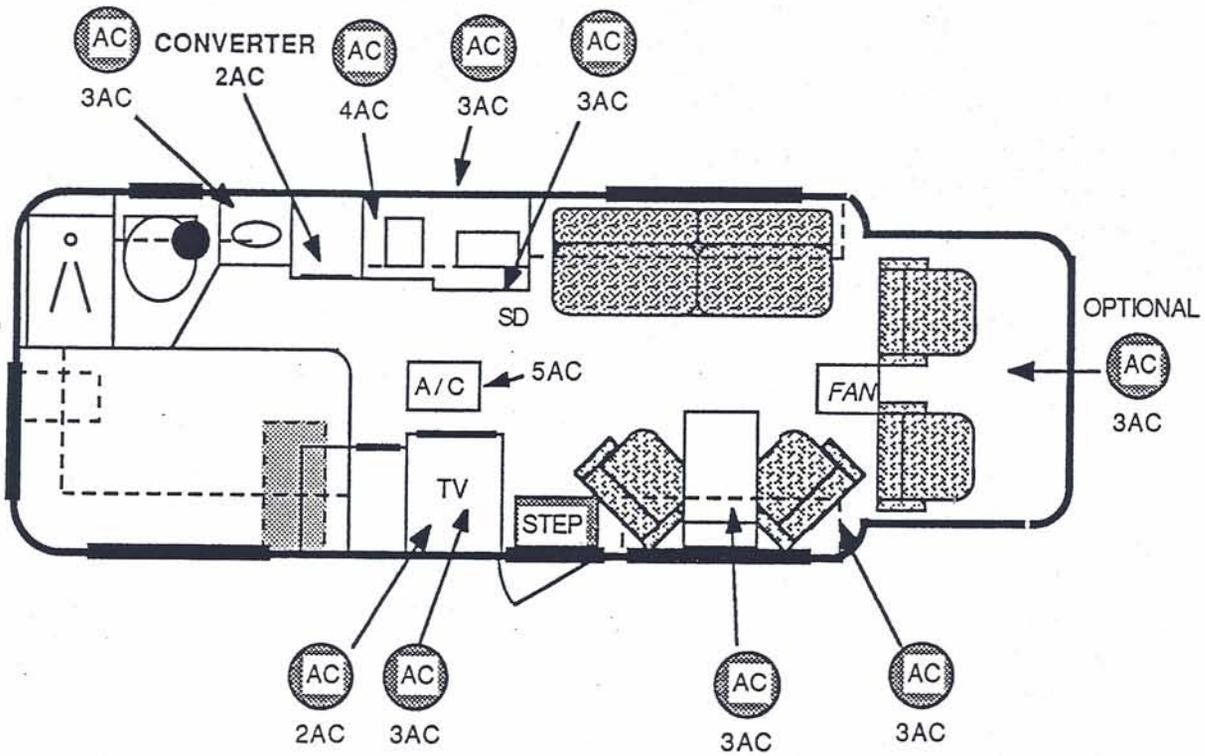
26' REAR SIDE BED



IS 120V / 60HZ OUTLET

SD IS SMOKE DETECTOR

THE NUMBER AND 2 LETTERS BELOW EACH SYMBOL REPRESENT THE CIRCUIT IN THE CONVERTER THAT THE ITEM IS ON.

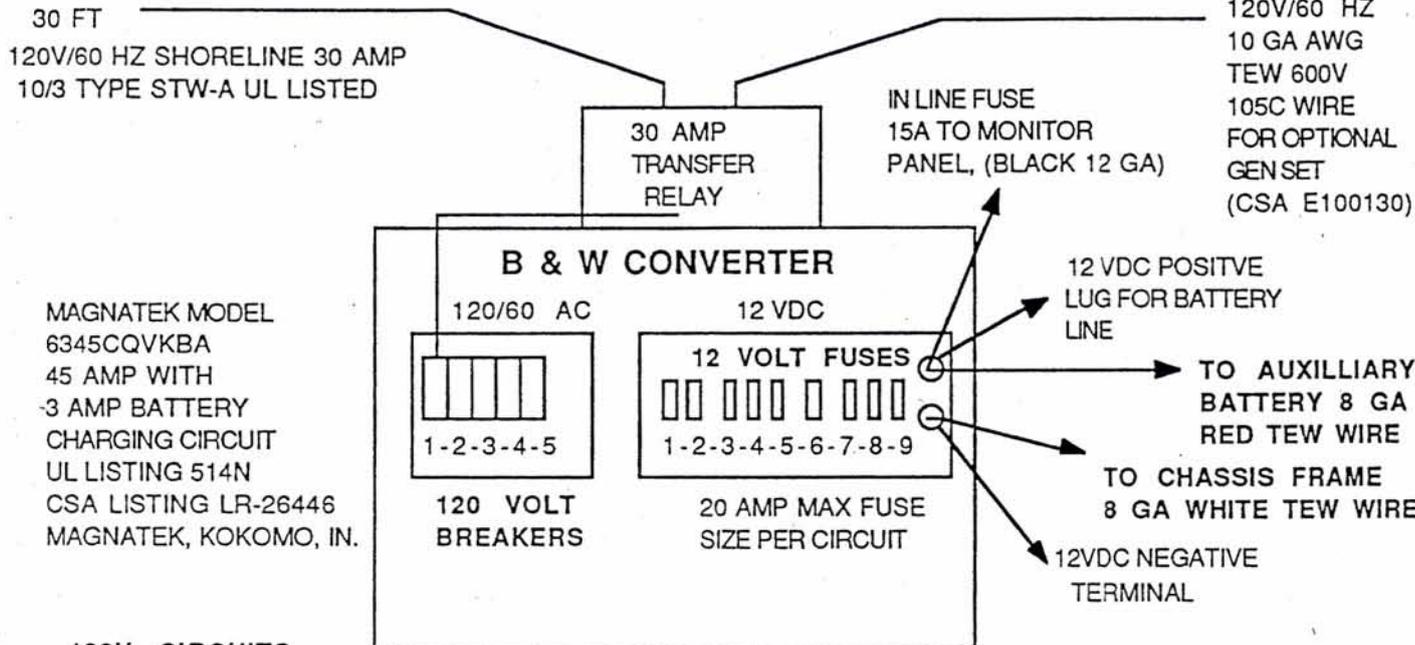


ELECTRICAL CIRCUITS

26' REAR SIDE BED

DODGEN INDUSTRIES INC

HIWAY 169N HUMBOLDT, IA 50548



MAGNATEK MODEL
6345CQVKBA
45 AMP WITH
3 AMP BATTERY
CHARGING CIRCUIT
UL LISTING 514N
CSA LISTING LR-26446
MAGNATEK, KOKOMO, IN.

120V CIRCUITS

1. 30 AMP MAIN BREAKER
2. 20 AMP BREAKER: REFRIGERATOR OUTLET AND 12VDC CONVERTER
3. 20 AMP GFI BREAKER: BATH OUTLET, OUTSIDE OUTLET, TV OUTLET, KITCHEN OUTLETS (2), BUNK BED OUTLET
OPTIONAL C/O OUTLET & TABLE OUTLET
4. 20 AMP BREAKER: MICROWAVE OUTLET
5. 20 AMP BREAKER: ROOF AIR CONDITIONER

ALL WIRE IS 12-2
TYPE NM-B WITH
GROUND 600 VOLT
UL-E18679

12 VDC CIRCUITS

- | | | |
|----|---|---------------------------|
| 1. | 15 AMP: REFRIGERATOR | WHITE/BLACK 12 GAUGE WIRE |
| 2. | 10 AMP: WATER PUMP CIRCUIT | RED 12 GAUGE WIRE |
| 3. | 15 AMP: PASSENGER SIDE LIGHTS
(3 FLUORESCENTS AND 5 READING LIGHTS) | BLACK 12 GAUGE WIRE |
| 4. | 15 AMP: DRIVER'S SIDE LIGHTS
(4 FLUORESCENTS AND | BLUE 12 GAUGE WIRE |
| 5. | 3 READING LIGHT STOVE HOOD) | |
| 6. | 15 AMP: WATER HEATER/VANITY LIGHT/BATH FAN/
BATHROOM FLUORESCENT LIGHT | ORANGE 12 GAUGE WIRE |

BORN FREE 26' REAR SIDE BED

TOTAL 12V ITEMS AVAILABLE ON CONVERTER CIRCUITS

2 PC OAK BED READING LIGHT	2.88
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC THINLITE FLUORESCENT LIGHT 30 WATT	2.5
1PC SHURFLO WATER PUMP	4.0
1PC B&W CONVERTER BATTERY CHARGE FUNCTION	3.0
1PC JENSEN 3 BULB DECORATIVE LIGHT	4.32
1PC BATHROOM BATH FAN	1.8
2PC OAK READING LIGHT (BEDROOM)	2.88
4PC OAK READING LIGHT (LOUNGE AREA)	5.76
1PC SUBURBAN FURNACE NT-30K	1.0
1PC ATWOOD WATER HEATER G6A-7E	1.0
1PC DOMETIC REFRIGERATOR LIGHT	1.25
1PC TEN TEK LPG ALARM	0.2
1PC 12 VOLT JACK FOR TV/VCP	3.33
1PC ANTENNA BOOSTER	0.1
1PC FLOOR ENTRY LIGHT	0.19
1PC JENSEN ENTRY LIGHT	1.04
1PC BORN FREE LIGHTED ENTRY HANDLE	0.58
1PC EXTERIOR LIGHT ON DRIVER'S SIDE	1.04
1PC FANTASTIK VENT MODEL 1000R3 3 SPEED	3.00

CALCULATION FORMULA:

FIRST 20 AMPS @ 100% = 20.0 AMPS

2nd 20 AMPS @ 50% = 10.0 AMPS

OVER 40 AMPS @ 25% = 5.69 AMPS

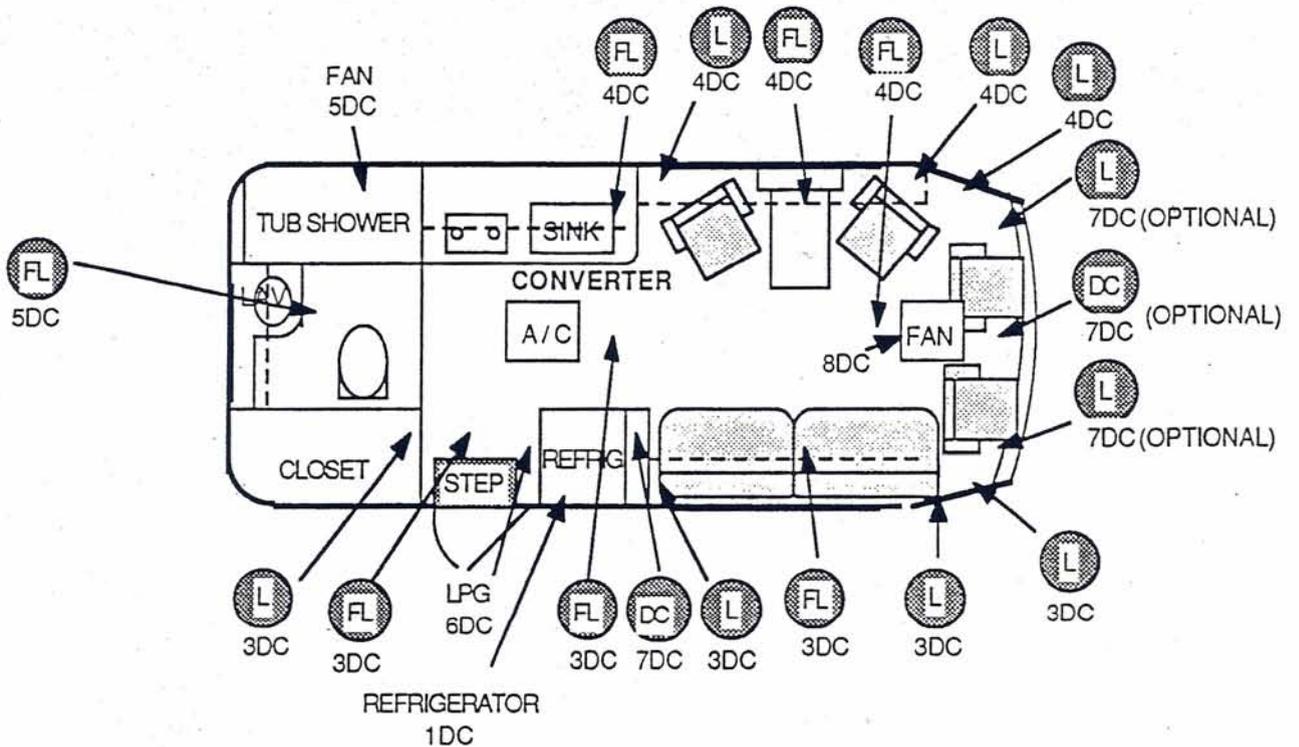
TOTAL = 35.69 AMPS

CONVERTER IS A 45 AMP
MAGNATEK MODEL 6345CQVVKBA

62.75 AMPS TOTAL

BORN FREE

24' REAR BATH



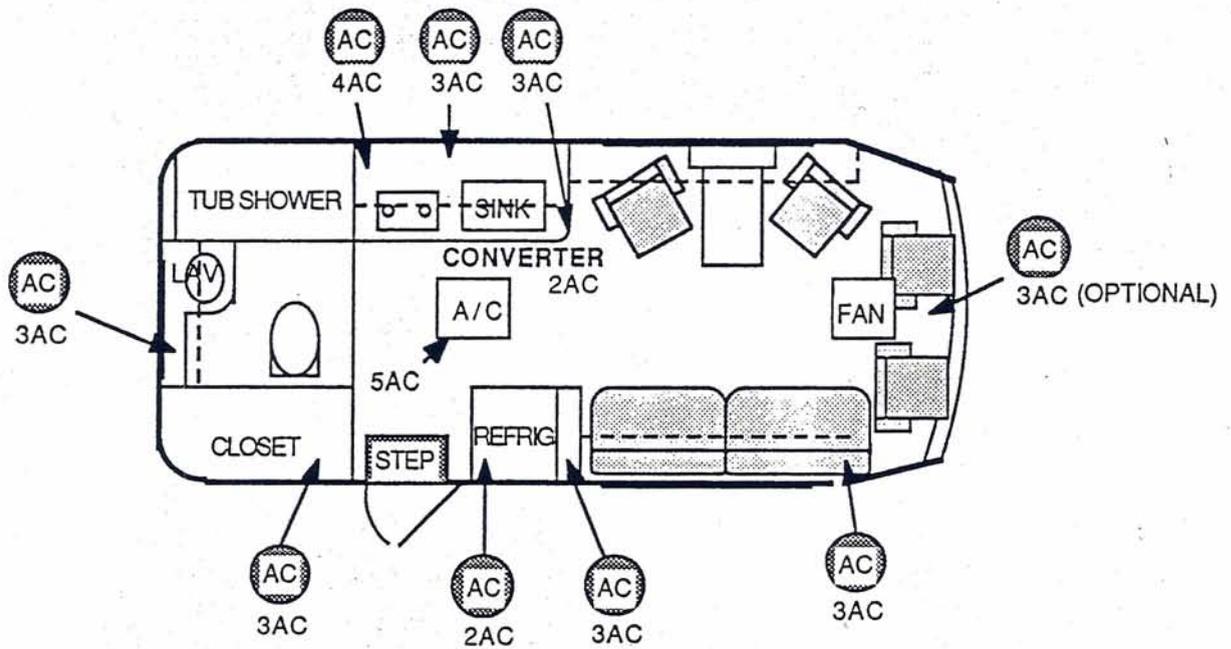
-  IS FLUORESCENT 12VDC LIGHTING
-  IS INCANDESCENT 12VDC LIGHTING
-  IS 12VDC OUTLETS

LPG IS LPG LEAK DETECTOR

THE NUMBER AND THE TWO LETTERS BELOW EACH SYMBOL REPRESENT THE CIRCUIT IN THE CONVERTER THAT THE ITEM IS ON.

BORN FREE

24' REAR BATH



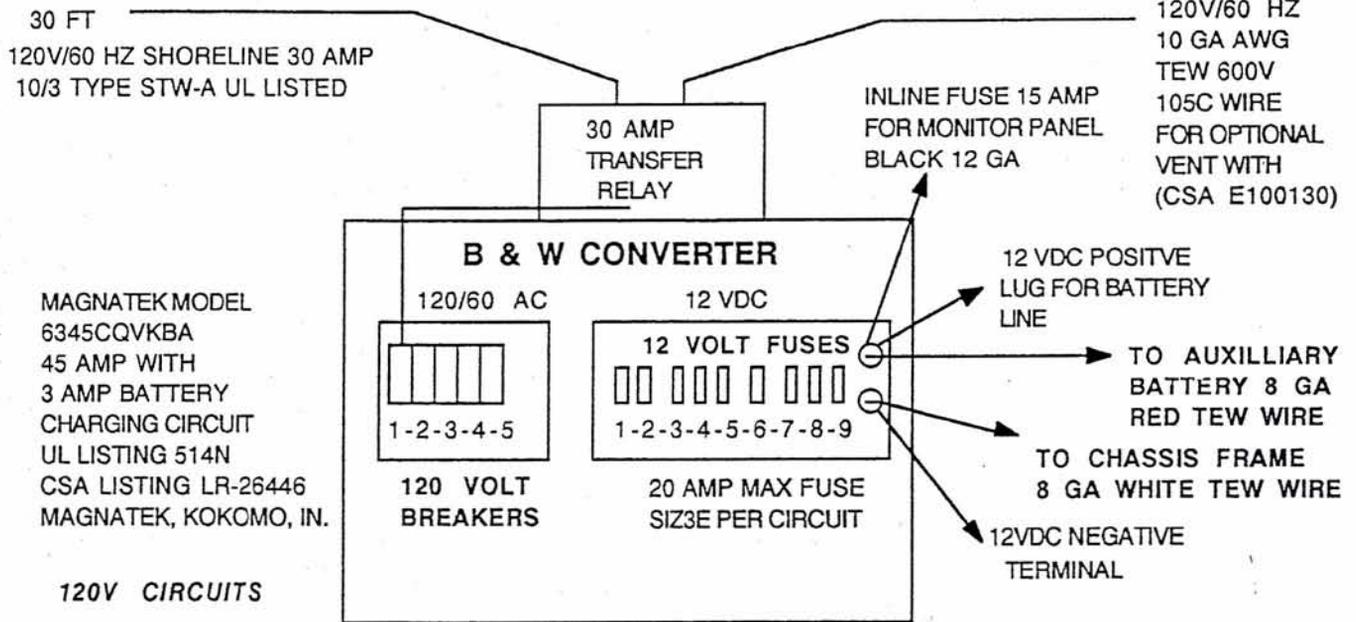
 IS 120/60HZ OUTLETS

THE NUMBER AND THE TWO LETTERS BELOW EACH SYMBOL REPRESENT THE CIRCUIT IN THE CONVERTER THAT THE ITEM IS ON.

ELECTRICAL CIRCUITS

24' REAR BATH

DODGEN INDUSTRIES INC
HIWAY 169N HUMBOLDT, IA 50548



MAGNATEK MODEL
6345CQVKBA
45 AMP WITH
3 AMP BATTERY
CHARGING CIRCUIT
UL LISTING 514N
CSA LISTING LR-26446
MAGNATEK, KOKOMO, IN.

120V CIRCUITS

1. 30 AMP MAIN BREAKER
2. 20 AMP BREAKER: REFRIGERATOR OUTLET AND 12VDC CONVERTER
3. 20 AMP GFI BREAKER: BATH OUTLET, OUTSIDE OUTLET, TV OUTLET, KITCHEN OUTLETS (2), CABOVER OUTLET, (OPTIONAL OUTLET MAYBE ADDED TO THIS CIRCUIT WITH ENTERTAINMENT CENTER OPTION)
4. 20 AMP BREAKER: MICROWAVE OUTLET
5. 20 AMP BREAKER: ROOF AIR CONDITIONER

ALL WIRE IS 12-2
TYPE NM-B WITH
GROUND 600 VOLT
UL-E18679

12 VDC CIRCUITS

- | | |
|---|----------------------------|
| 1. 15 AMP: REFRIGERATOR | WHITE/BLACK 12 GAUGE WIRE |
| 2. 10 AMP: WATER PUMP CIRCUIT | RED 12 GAUGE WIRE |
| 3. 15 AMP: PASSENGER SIDE LIGHTS
(3 FLUORESCENTS, 3 READING, & 1 CLOSET LIGHT) | BROWN 12 GAUGE WIRE |
| 4. 15 AMP: DRIVER'S SIDE LIGHTS
(3 FLUORESCENTS AND 3 READING LIGHTS) | BLUE 12 GAUGE WIRE |
| 5. 15 AMP: WATER HEATER/BATHROOM LIGHT/BATH FAN | ORANGE 12 GAUGE WIRE |
| 6. 3 AMP: LPG ALARM | ORANGE/BLACK 12 GAUGE WIRE |
| 7. 15 AMP: TV BOOSTER CIRCUIT (OPTIONAL 2 LIGHTS
DC OUTLET WITH ENT.CENTER OPTION) | YELLOW 12 GAUGE WIRE |
| 8. 15 AMP: FANTASTIK 3 SPEED ROOF FAN | PURPLE 12 GAUGE WIRE |
| 9. 15 AMP: FURNACE | YELLOW/BLACK 12 GAUGE WIRE |

ALL WIRE IS 12 AWG 600 VOLT
105 DEGREE C TEW CSA E100130

CONVERTER CALCULATIONS

BORN FREE 24' REAR BATH

TOTAL 12V ITEMS AVAILABLE ON CONVERTER CIRCUITS

2 PC OAK BED READING LIGHT

2.88

1PC THINLITE FLUORESCENT LIGHT 30 WATT

2.5

4 PC READING LIGHTS

5.76

1PC SINGLE BULB CLOSET LIGHT

1.44

1PC SHURFLO WATER PUMP

4.0

1PC B&W CONVERTER BATTERY CHARGE FUNCTION

3.0

1PC BATHROOM BATH FAN

1.8

1PC ATWOOD WATER HEATER G6A-7E

1.0

1PC SUBURBAN FURNACE SF-30F

6.5

1PC DOMETIC REFRIGERATOR & LIGHT MODEL RM2607

1.2

1PC TEN TEK LPG ALARM

0.2

1PC 12 VOLT JACK FOR TV/VCP

3.33

(TV/VCP OPTIONAL)

1PC ANTENNA BOOSTER

0.1

(ANTENNA OTIONAL)

1PC FLOOR ENTRY LIGHT

0.19

1PC JENSEN ENTRY LIGHT

1.04

1PC BORN FREE LIGHTED ENTRY HANDLE

0.58

1PC EXTERIOR LIGHT ON DRIVER'S SIDE

1.04

1PC FANTASTIK VENT MODEL 1000R3 3 SPEED

3.00

1PC DC OUTLET

3.33

(OPTIONAL)

2PC READING LIGHTS

2.88

(OPTIONAL)

60.77 AMPS TOTAL

CALCULATION FORMULA:

FIRST 20 AMPS @ 100% = 20.0 AMPS

2nd 20 AMPS @ 50% = 10.0 AMPS

OVER 40 AMPS @ 25% = 5.19 AMPS

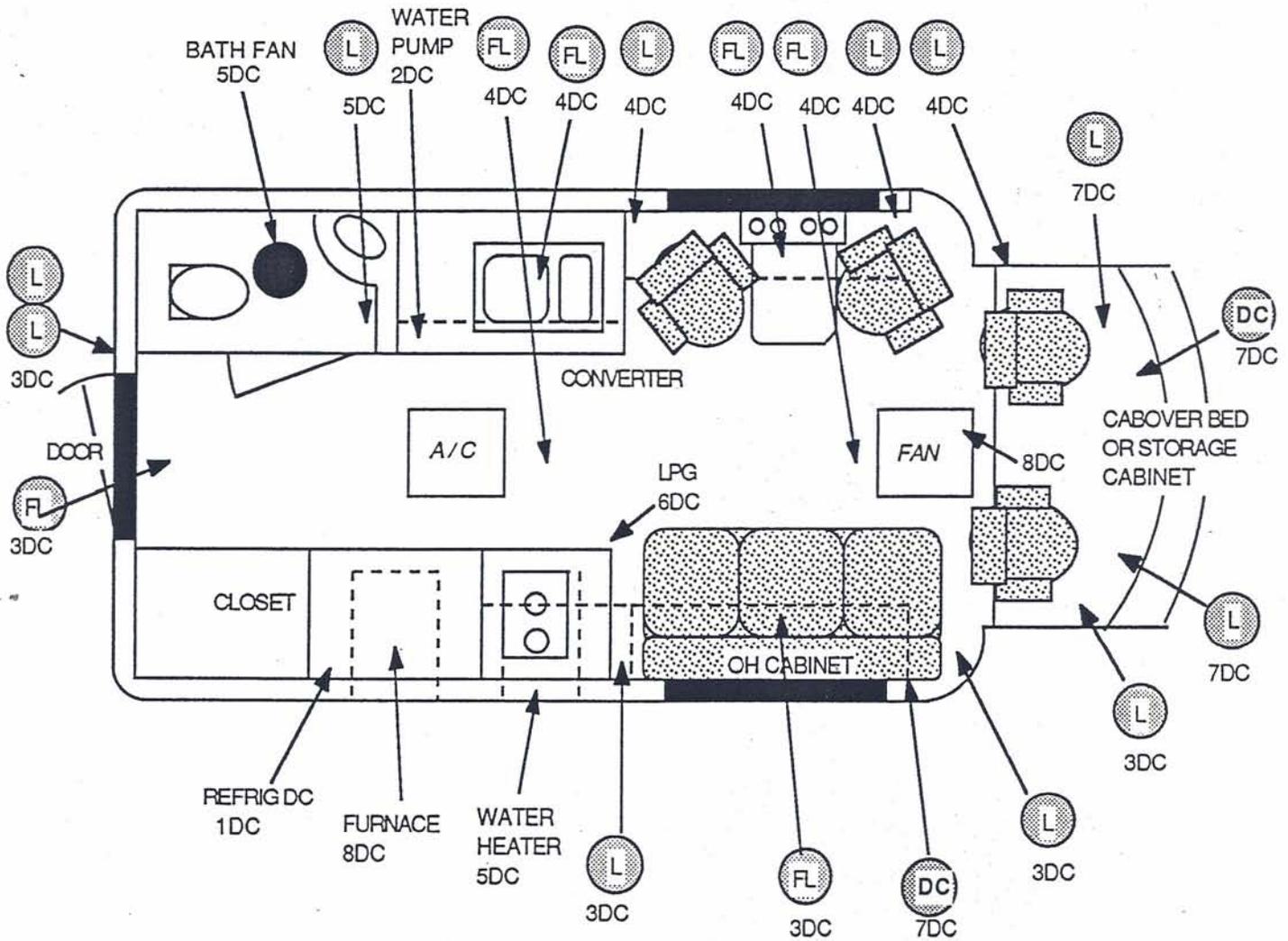
TOTAL = 35.19 AMPS

CONVERTER IS A 45 AMP
MAGNATEK MODEL 6345CQVVKBA

BORN FREE

21' REAR DOOR WET BATH LIGHTING AND OUTLETS

- FL IS 12VDC FLUORESCENT LIGHTING DC IS 12VDC OUTLET.
L IS 12VDC INCANDESCENT LIGHTING. LPG IS LPG LEAK DETECTOR



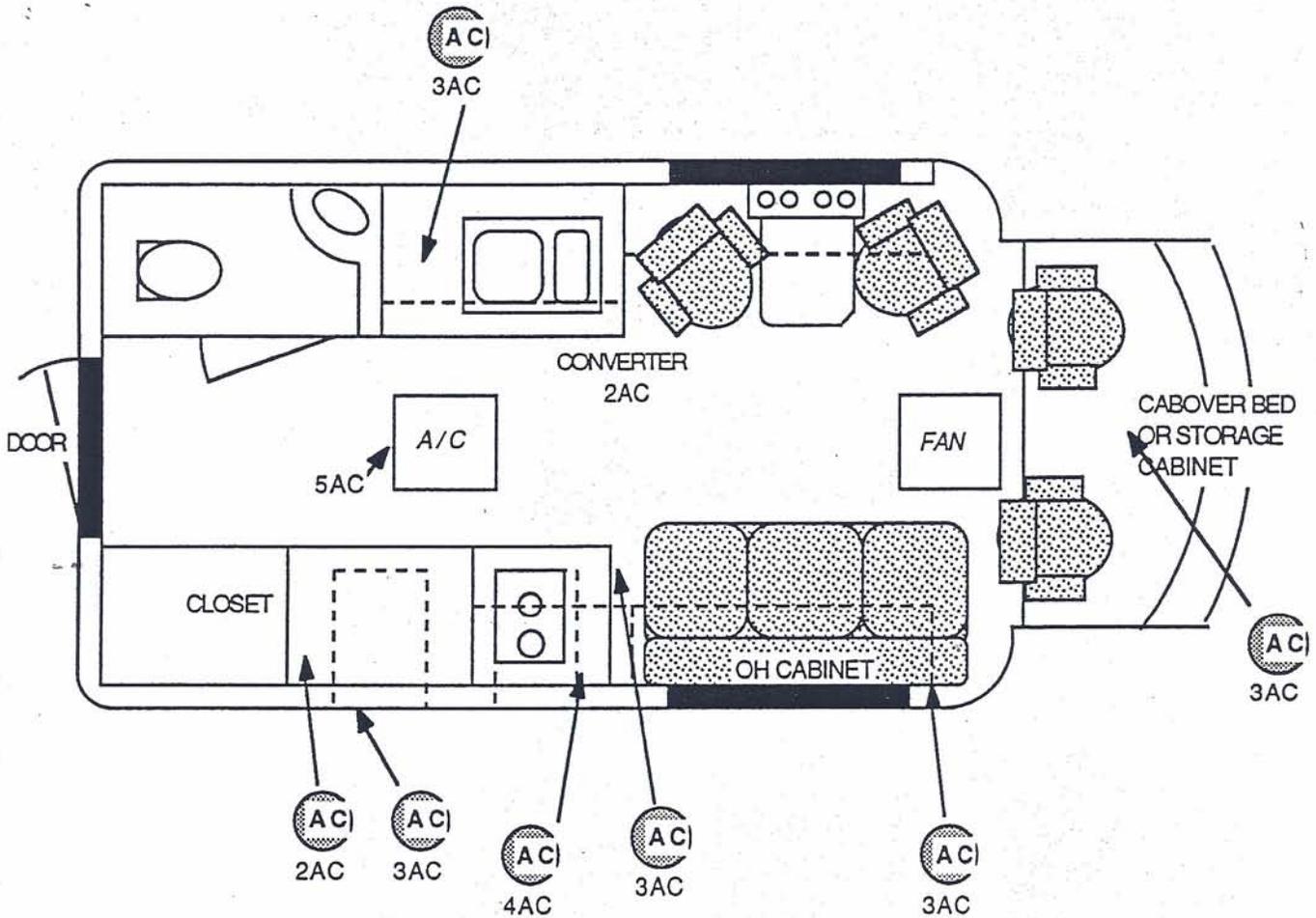
THE LETTER AND NUMBER BELOW EACH SYMBOL INDICATE WHICH CIRCUIT THE ITEM IS ON IN THE CONVERTER.

BORN FREE

21' REAR DOOR WET BATH

LIGHTING AND OUTLETS

 IS 120V AC OUTLET/RECEPTACLE.



THE LETTER AND NUMBER BELOW EACH SYMBOL INDICATE WHICH CIRCUIT THE ITEM IS ON IN THE CONVERTER.

CONVERTER CALCULATIONS

BORN FREE 21' REAR DOOR WET BATH

TOTAL 12V ITEMS AVAILABLE ON CONVERTER CIRCUITS

2 PC OAK BED READING LIGHT

2.88

1PC THINLITE FLUORESCENT LIGHT 30 WATT

2.5

1PC SHURFLO WATER PUMP

4.0

1PC B&W CONVERTER BATTERY CHARGE FUNCTION

3.0

1PC BATHROOM BATH FAN

1.8

1PC BATHROOM LIGHT

1 .04

1PC ATWOOD WATER HEATER G6A-7E

1.0

1PC SUBURBAN FURNACE SF-30F

6.5

1PC DOMETIC REFRIGERATOR & LIGHT MODEL RM2607

1.2

1PC TEN TEK LPG ALARM

0.2

1PC 12 VOLT JACK FOR TV/VCP

3.33

(TV/VCP OPTIONAL)

1PC ANTENNA BOOSTER

0.1

(ANTENNA OTIONAL)

1PC JENSEN ENTRY LIGHT

1.04

1PC BORN FREE LIGHTED ENTRY HANDLE

0.58

1PC EXTERIOR LIGHT ON DRIVER'S SIDE

1.04

1PC FANTASTIK VENT MODEL 1000R3 SPEED

3.00

1PC DC OUTLET

3.33

(OPTIONAL)

2PC READING LIGHTS

2.88

(OPTIONAL)

4PC READING LIGHT

5.76

57.68 AMPS TOTAL

CALCULATION FORMULA:

1ST 20 AMPS @ 100% = 20.0 AMPS

2nd 20 AMPS @ 50% = 10.0 AMPS

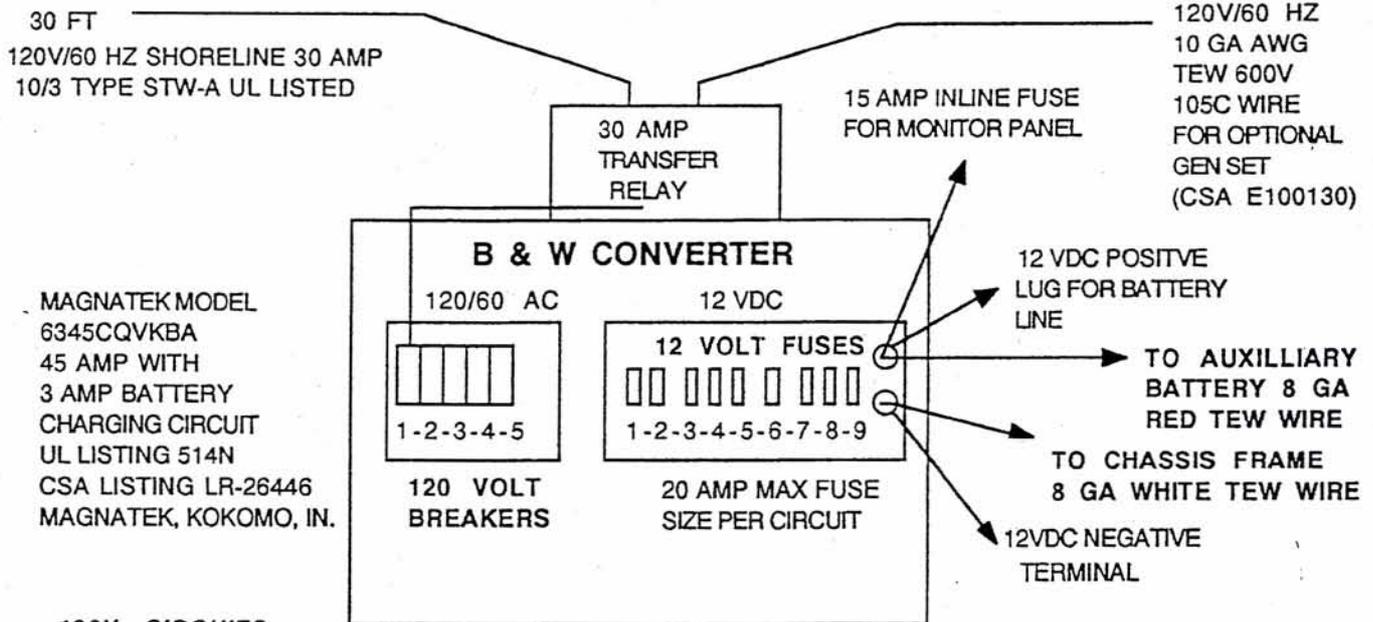
OVER 40 AMPS @ 25% = 4.42 AMPS

TOTAL = 34.42 AMPS

CONVERTER IS A 45 AMP
MAGNATEK MODEL 6345CQVVKBA

ELECTRICAL CIRCUIT 21' REAR DOOR WET BATH

DODGEN INDUSTRIES INC
HIWAY 169N HUMBOLDT, IA 50548



MAGNATEK MODEL
6345CQVKBA
45 AMP WITH
3 AMP BATTERY
CHARGING CIRCUIT
UL LISTING 514N
CSA LISTING LR-26446
MAGNATEK, KOKOMO, IN.

120V CIRCUITS

1. 30 AMP MAIN BREAKER
2. 20 AMP BREAKER: 12VDC CONVERTER & REFRIGERATOR OUTLET
3. 20 AMP GFI BREAKER: OUTSIDE OUTLET, CABOVER OUTLET, SINK SIDE OUTLET, STOVE SIDE OUTLET
(OPTIONAL ENTERTAINMENT CENTER OUTLET)
4. 20 AMP BREAKER: MICROWAVE OUTLET
5. 20 AMP BREAKER: ROOF AIR CONDITIONER

ALL WIRE IS 12-2
TYPE NM-B WITH
GROUND 600 VOLT
UL-E18679

12 VDC CIRCUITS

- | | |
|--|----------------------------|
| 1. 15 AMP: REFRIGERATOR | WHITE/BLACK 12 GAUGE WIRE |
| 2. 10 AMP: WATER PUMP CIRCUIT | RED 12 GAUGE WIRE |
| 3. 15 AMP: PASSENGER SIDE LIGHTS (2 FLUORESCENTS AND
OUTSIDE ENTRY LIGHT, HANDLE LIGHT, 3 READING LIGHTS) | BROWN 12 GAUGE WIRE |
| 4. 15 AMP: DRIVER'S SIDE LIGHTS (4 FLUORESCENTS AND
3 READING LIGHTS) | BLUE 12 GAUGE WIRE |
| 5. 15 AMP: WATER HEATER, BATH LIGHT, BATH FAN | ORANGE 12 GAUGE WIRE |
| 6. 3 AMP: LPG ALARM | ORANGE/BLACK 12 GAUGE WIRE |
| 7. 15 AMP: TV BOOSTER CIRCUIT (PLUS OPTIONAL DC OUTLET
& 2 LIGHTS WITH ENTERTAINMENT CENTER PACKAGE) | YELLOW 12 GAUGE WIRE |
| 8. 15 AMP: FANTASTIK 3 SPEED ROOF FAN | PURPLE 12 GAUGE WIRE |
| 9. 15 AMP: FURNACE | YELLOW/BLACK 12 GAUGE WIRE |

ALL WIRE IS 12 AWG 600 VOLT
105 DEGREE C TEW CSA E100130

V. LP GAS SYSTEMS

LP Gas Systems - Your coach uses liquid-petroleum (LP) gas as a fuel for all the appliances which require heat, such as the water heater, furnace, range, oven, and absorption-type refrigerator. LP gas is economical and effective for these purposes; when proper precautions are taken, it is a safe form of energy. There are two types of LP gas in common usage, propane and butane. If the temperature is below 32 degrees F., butane will not vaporize. It can be used only in warm climates. Propane, on the other hand, will vaporize at any temperature above 40 degrees F. Most LP gas used in motorhomes is propane.

A. LP Tank

LP gas is stored in a cylindrical-shaped welded steel tank mounted to the underside of the floor of your Born Free Coach and vented freely to the atmosphere so that in case of a leak the gas will not be discharged into the interior of the coach where it might be ignited by a pilot flare and cause an explosion.

All LP-gas systems have a pressure regulator mounted in the vicinity of the tank outlet.

When any appliance is not being used, the gas shut-off valve controlling that appliance should be placed in the "off" position. When the motorhome is to be stored for any period of time, the main shut-off valve at the tank should be closed.

LP GAS DETECTOR - A standard feature in all Born Free Motorcoaches is the LP-gas detector. It is designed to quickly detect leakage in any LP-gas piping and appliance system. The device does not prevent leaks. A beeper will sound if there is a leak. We encourage you to test the device before and after a trip is undertaken.

Checking for Leaks - The LP-gas system should be checked for leaks at frequent intervals. An oily substance having a pungent odor is mixed with LP-gas so that if there is a leak, you will be able to smell it.

The best method of finding a leak is to use a soap solution made from ordinary dishwashing detergent and water. This solution can be applied with a small paint brush to gas lines and connections. Bubbles will appear at any place where gas is leaking out of the system. Most leaks occur at fittings and can be corrected usually by tightening the fitting. Where tightening fails to stop the leak, the fitting must be replaced.

WARNING - No flammable material should ever be used to check for leaks in an LP-gas system.

Occasionally water may find its way into an LP-gas system and if this water freezes, the operation of the system may fail. The addition of anhydrous methanol to the LP-gas system, using approximately one ounce for each 20 lbs. of fuel, will usually eliminate this problem. The anhydrous methanol absorbs

the water and it then passes out of the system as the gas is used.

Most of the gas appliances in your Born Free Motorcoach have electronic pilot lights which will engage to light the fuel upon demand. These appliances all have a device built-in that will shut the flow of gas off to the burner if the burner is not ignited.

B. Maintenance of LP-Gas Systems

LP-gas systems normally operate for periods of time with a minimum of maintenance. However, a few tips on maintenance will be useful. One of the worst enemies of LP-gas systems is the spider. Spiders are attracted to tunnels and holes. They frequently spin webs across and through the orifices of gas-fired appliances. These webs restrict the air flow and produce a weak yellow flame which typically deposits carbon. If a yellow flame is detected, all parts of the burner should be wiped clean and orifices should be blown clear with compressed air.

If spider webs are not present and the flame is still too yellow and filled with carbon, the air adjustment of the burner should be adjusted until a blue flame is maximized.

C. Furnace

The furnace in your Born Free is an LP-gas burning model which will distribute heat throughout the coach. It is controlled by a wall thermostat. The furnace is equipped with electronic ignition. To start the furnace simply position the thermostat to the desired temperature, making sure the LP-gas valve is open at the tank. When not in use remember to position the wall thermostat to the "off" position.

Furnace Main Burner Cleaning - We recommend that you inspect the main burner periodically to assure that the furnace burner is functioning at maximum efficiency. If the flame has become yellow, you should remove the burner and clean it with a wire brush and blow it clean with compressed air. Reinstall the burner and ensure that the burner is burning with a hard blue flame, with well defined burner ports. Refer to the furnace manual for proper removal of the burner assembly.

D. Water Heater

Before you can light the water heater, it must be filled with water. With the water pump switch on, open a hot water faucet to fill. The water pump will push water into the waterheater tank, and the air displaced will escape from the open hot water faucet. A steady flow of water from the open hot water faucet will indicate the tank is full and the faucet may be shut off. The best time to fill the water heater is when you are filling the fresh water tank. You will take six gallons of water from your supply tank and your supply tank will not be full.

On the back of the water heater we have installed

a bypass system. This system consists of three valves and is used to winterize the coach's water system for cold weather. Using the bypass system cuts down on the amount of antifreeze needed and also keeps antifreeze out of the water heater. This bypass system can also be used during cold weather when you want to use the toilet by placing biodegradable antifreeze in the fresh water tank for a toilet flushing water source.

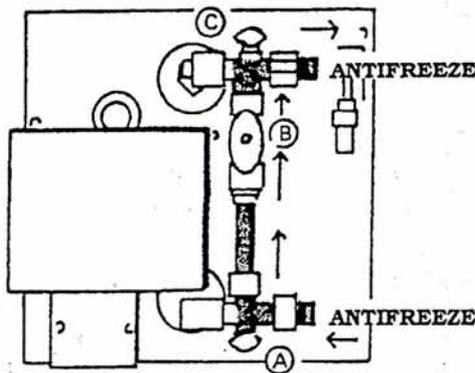
Lighting the Water Heater -

1. Turn on the gas supply at the LP-gas tank.
2. Push the water heater ignition switch in the coach to the "on" position. Listen for a clicking sound. This indicates that the heater is trying to light. You will hear the burner when it lights. If it fails to light, a light will come on at the switch. Shut the switch off and repeat the procedure until it lights. Water tempera-

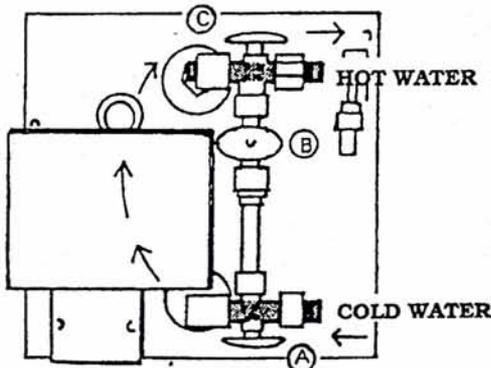
ture is factory adjusted and cannot be changed. The water heater will cycle on and off to maintain the proper temperature.

Maintenance - Turn the LP-gas valve "off" before draining. Open the drain valve and open the lever on the pressure relief valve on the outside of the heater. The pilot height can be increased or decreased by removing the protective shield around the pilot light and adjusting the small screw controlling the gas to the pilot light. Air adjustment for the burner can be adjusted by moving the air sleeve to increase or decrease air. Yellowish, smoky flame will indicate that the burner needs more air. If adjustment does not reduce yellow flame, the problem is likely due to an obstruction in the pipe. This is a favorite place for spiders to spin a web, impeding air to the burner. Simply clear the obstruction from the tube and repeat the lighting procedure.

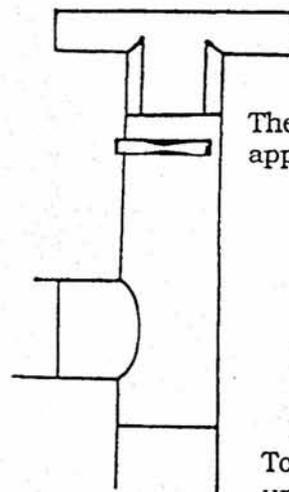
Water Heater Bypass and Draining Illustrations



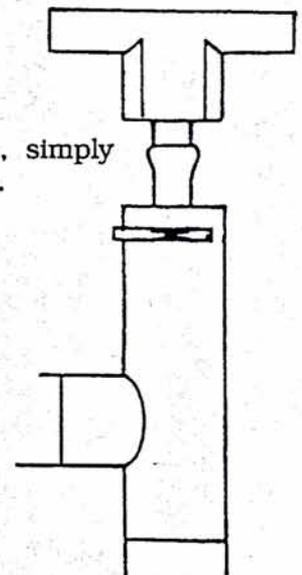
The positioning of the valves (A,B,C) when winterizing with antifreeze. This allows antifreeze to go through cold water pipe, through bypass and out through hot water pipe. (See shaded area.) Antifreeze will not go through heater if in this position. You should not run antifreeze through your heater as the tank will "trap" the taste of the antifreeze for summer use.



The positioning of valves (A,B,C) for use of water heater. This allows cold water to go through heater and come out as hot water. (See shaded area.)



The three drain valves should appear like this when closed.



To open, simply unscrew.

E. Refrigerator

Your Born Free Motorcoach is equipped with an LP-gas and 110-volt AC refrigerator. The refrigerator should be started a few hours before leaving on any trip or outing. Pre-chill all food and beverages in your house refrigerator before placing in the coach refrigerator. This will hasten the time that it takes to get the refrigerator cool, and will not raise the temperature by placing too great a load on it suddenly. An inexpensive refrigerator thermometer can be purchased at most hardware stores and will prove very valuable in monitoring the temperature of the refrigerator.

The refrigerator must be level to operate efficiently as the gases and fluids within the cooling unit depend on gravity for circulation. While traveling down the highway, regular movement of the coach allows the gases and fluids to circulate properly. We advise you to carry a few short pieces of 2x4 or 2x6 lumber to elevate the coach to attain proper leveling.

A. Electric operation

1. Turn Gas/Electric Selector Switch to "off" position, then press the knob inward and turn clockwise to the "ELEC" position.
2. Set the electric thermostat, turn knob 1/4 turn.
3. After refrigerator has had time to cool, adjust electric thermostat to the desired setting to maintain the desired temperature.

B. LP-Gas Operation

1. Turn LP-gas on at supply tank.
2. Turn Gas/Electric Selector Switch counterclockwise to the "GAS" position.
3. Set gas thermostat by turning knob 1/4 turn.
4. Press starter button to stop and keep it depressed when flashing light goes out. Wait 15 seconds and release button.

Travel Latch - A travel latch has been built into the front of the refrigerator to prevent the doors from opening during travel. To operate the latch slide the latch towards you until the latch engages the door.

Defrosting - The freezer compartment may be defrosted in the following manner:

1. Turn the cooking unit "off."
2. Allow the frost to melt. Inserting the ice trays filled with hot water will hasten this process.
3. Do not attempt to chip the frost away from any part of the cooling unit. Damage to the cooling unit may result.
4. Clean the entire refrigerator with a mild detergent and water, dry with a soft towel, and allow the unit to air dry before re-starting the refrigerator.
5. We advise you to follow this cleaning procedure following any trip.

Refrigerator Troubleshooting

Pilot flame blow-out is not unusual when subjected to strong gusty winds from other vehicles.

Do not obstruct the outside vent by covering it or placing any kind of material inside the vent door. For proper operation, air must be drawn in through the side vent, allowed to pass over the cooling unit, and then drawn upward through the roof vent. Any blockage of this "chimney action" will impair the operation of the refrigerator.

For maintenance and warranty work, refer to the manufacturer's manual.

F. Range and Oven

The range in your Born Free Motorcoach is either a two-burner or four-burner model. To operate simply turn on the LP-gas at the tank. Turn on the gas control to the desired burner and light the burner with a match or igniter.

The oven is equipped with a safety pilot which must be ignited before the oven burner will operate. Move the oven control knob by pushing inward, then turning to "OVEN OFF" position. Light the oven pilot with a match and allow it to warm a few minutes before advancing the oven control. The pilot is located inside the oven, under the burner shelf, approximately midway on the burner. Set the oven heat control to the desired temperature, and it will come on under the control of the pilot and thermostat. Restoring the oven control to "OVEN OFF" will turn off the oven burner, but allow the pilot to remain lit. It may be left in this position until next time the oven is used. When returning from a trip, restore the oven thermostat to "PILOT OFF" position. When in transit it is important that the control be in the "PILOT OFF" position.

WARNING - The oven and range are not a substitute for your furnace and should never be used to heat the coach.

Maintenance and Adjustments

If you are using an LP-gas range for the first time, you will notice flame height is appreciably lower than the natural gas range in your home. LP-gas contains more BTU per unit than natural gas and a lower flame will cook as quickly and contain as much heat as the larger natural gas flame.

The flame should always be a blue color without any yellow tips. If yellow starts to form on the tips, it will smoke or soot the bottoms of your cookware. This condition can be remedied by adjusting the sleeve shutter to each individual burner to allow for the proper air mixture.

Refer to your range-oven manual for warranty service and any other adjustments required.

26' REAR SIDE BED

LP GAS SYSTEM

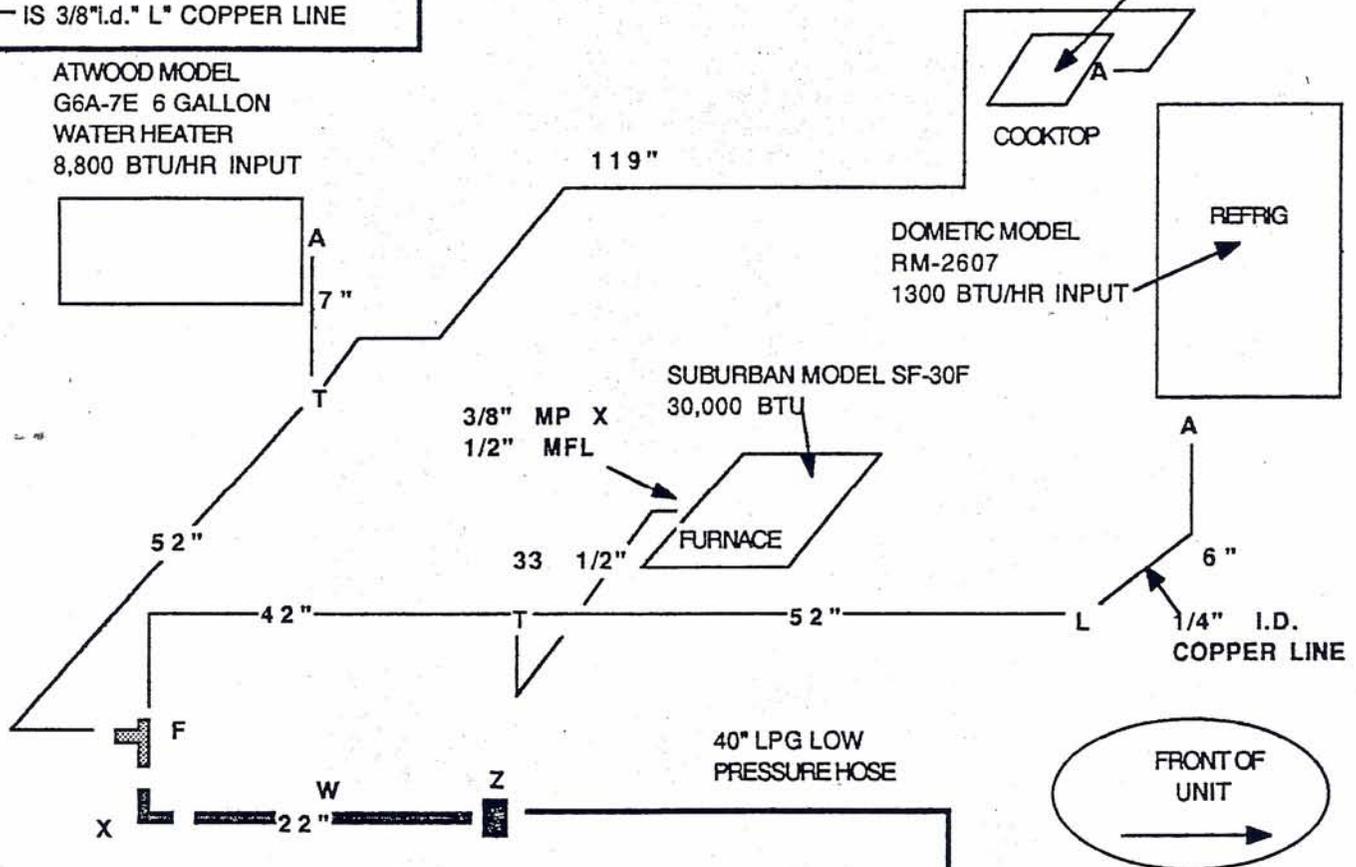
- W IS 1/2" BLACK PIPE SCHEDULE 40
- X IS 1/2" MALLABLE BLACK ELBOW 90 DEGREES
- Z IS 1/2" BLACK PIPE COUPLING
- T IS 1/2" BRASS FLARE TEE
- L IS 1/2" BRASS ELBOW
- F IS 1/2" MPT x 1/2" MFL x 1/2" MFL BRASS TEE
- A IS BRASS COUPLER 3/8" FMFL X 1/2" MFL (ADAPTER)
- IS 3/8" I.D. L" COPPER LINE

ATWOOD MODEL G6A-7E 6 GALLON WATER HEATER
8,800 BTU/HR INPUT

WEDGEWOOD MODEL D-20 2 BURNER
10,400 TOTAL BTU

DOMETIC MODEL RM-2607
1300 BTU/HR INPUT

SUBURBAN MODEL SF-30F
30,000 BTU



LIQUID PROPANE GENERATOR USING 1.3 GALLONS / HR (91500 BTU/GAL TOTAL BTU / HR 118,950)

PARKER 5525UL-6
5/16" I.D.
223" LONG

DODGEN INDUSTRIES INC
HIWAY 169N HUMBOLDT, IA 50548

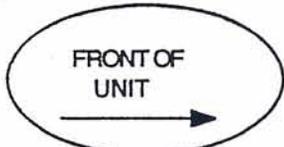
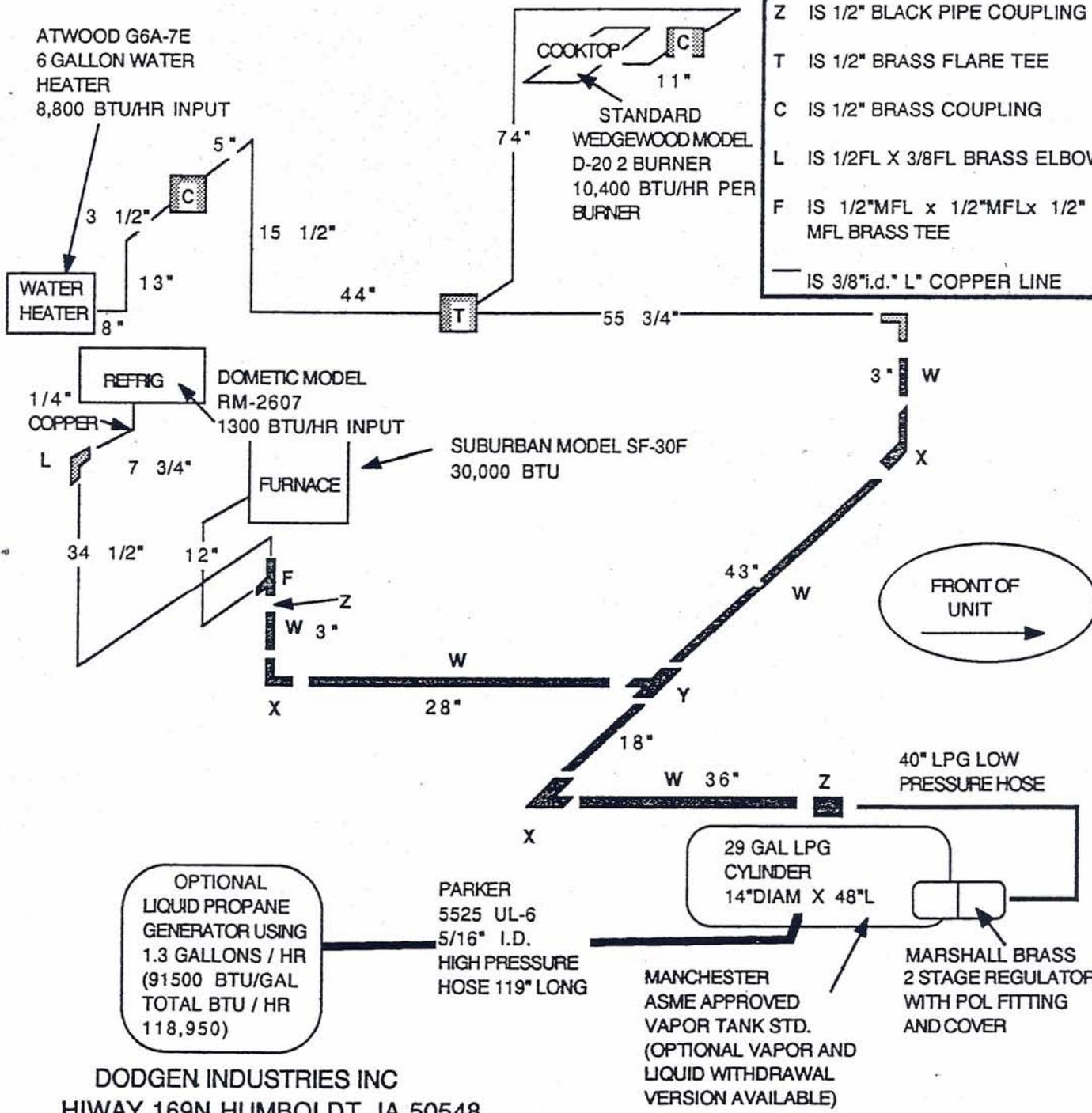
MANCHESTER ASME APPROVED VAPOR TANK STD. (OPTIONAL VAPOR AND LIQUID WITHDRAWAL VERSION AVAILABLE)

MARSHALL BRASS 2 STAGE REGULATOR WITH POL FITTING AND COVER

24' REAR BATH

LP GAS SYSTEM

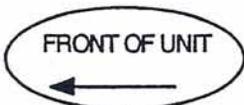
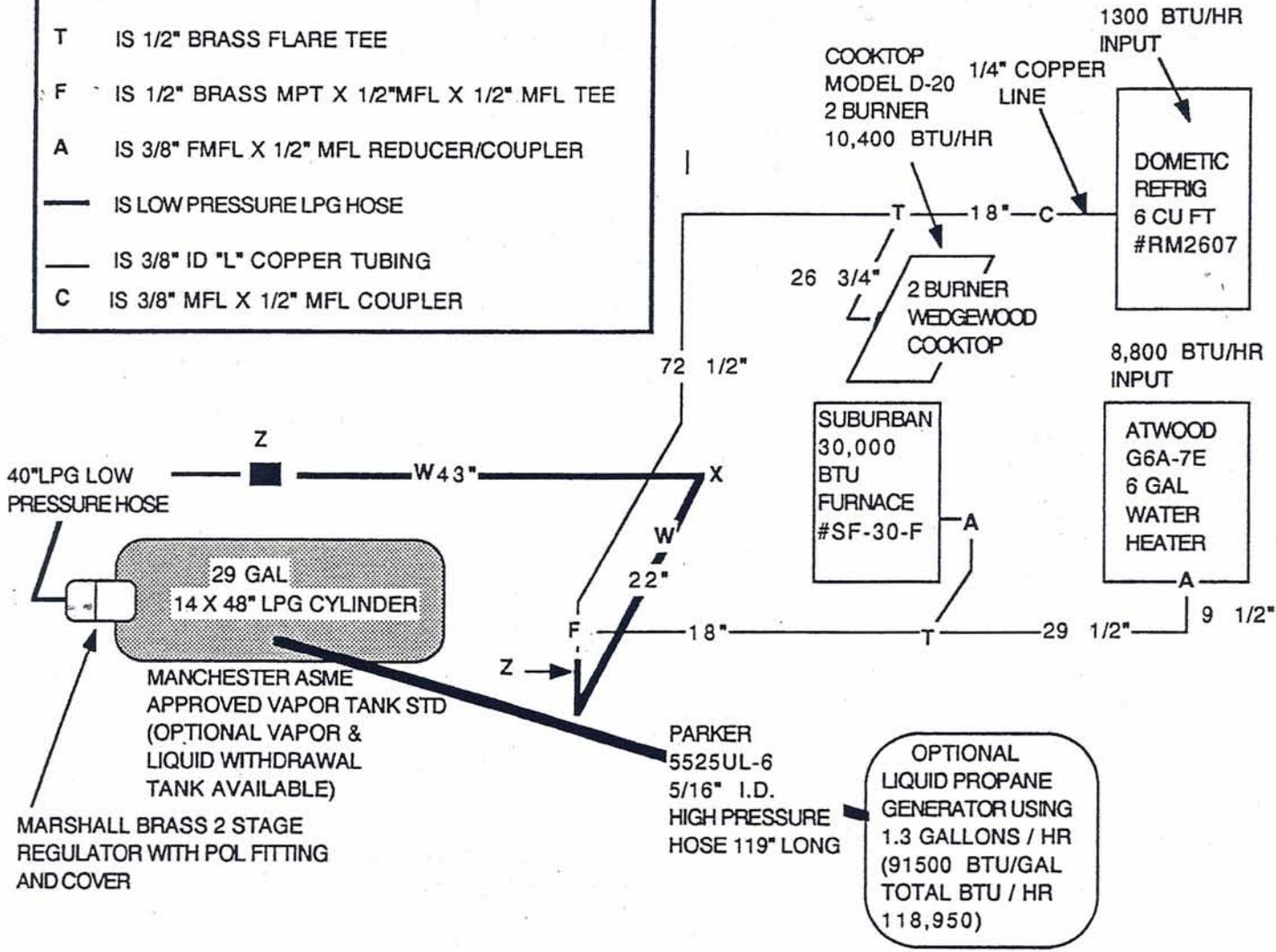
- W IS 1/2" BLACK PIPE SCHEDULE 40
- X IS 1/2" MALLABLE BLACK ELBOW 90 DEGREES
- Y IS 1/2" MALLABLE BLACK TEE
- Z IS 1/2" BLACK PIPE COUPLING
- T IS 1/2" BRASS FLARE TEE
- C IS 1/2" BRASS COUPLING
- L IS 1/2FL X 3/8FL BRASS ELBOW
- F IS 1/2"MFL x 1/2"MFLx 1/2" MFL BRASS TEE
- IS 3/8"i.d." L" COPPER LINE



21' REAR DOOR WET BATH

LPG SYSTEM

W	IS 1/2" SCHEDULE 40 BLACK PIPE.
X	IS 1/2" BLACK PIPE ELBOW
Z	IS 1/2" BLACK PIPE COUPLING
T	IS 1/2" BRASS FLARE TEE
F	IS 1/2" BRASS MPT X 1/2" MFL X 1/2" MFL TEE
A	IS 3/8" FMFL X 1/2" MFL REDUCER/COUPLER
—	IS LOW PRESSURE LPG HOSE
—	IS 3/8" ID "L" COPPER TUBING
C	IS 3/8" MFL X 1/2" MFL COUPLER



VI. PLUMBING

A. Fresh Water System

Fresh water can be supplied from two sources: a water tank located inside the motorcoach, or from a campground water source connected to the water intake through a garden hose.

The fresh water tank system is equipped with a demand pump that controls water pressure by use of a switch built into the pump. When a faucet is opened, pressure in the line drops, causing the pump to start. When the faucet is closed, pressure builds up quickly and the pressure switch shuts off the pump. The manual switch, located on the range vent, is used to cut off the electrical power to the demand pump. The pump operates on 12-volt power.

NOTE - It is good practice to turn off the pump switch when leaving the coach for a period of time and when retiring for the night. If the pump cycles on and off occasionally, shut the pump off and check the system for leaks.

B. Fresh Water Tank

The fresh water tank filler is located outside the coach on the driver's side. Using a garden hose, allow the water to run into the tank at a moderately slow speed. This will allow the air to escape and the tank will fill much easier. After the tank is full, allow the air to purge for about 3-4 minutes. You may be able to get several more gallons in the tank. Reminder - Remember to fill the water heater when filling the fresh water tank. See the instructions for doing so listed under "Water Heater."

C. City Water Connection

When parked in a campground which has hookup facilities for "city water," a connection has been provided on the outside of the coach. To use, connect a water hose to this fitting and turn off the demand pump. The city water pressure will provide adequate movement. The city water connection will by-pass the fresh water system and will not fill the fresh water tank.

NOTE - Some water systems have very high water pressure, so to guard against damage to pressure-limiting components, do not run faucets wide open.

D. Toilet

We currently use two kinds of toilets: Flush-type and recirculating-type.

1. Flush-type - To operate step on the small (right) pedal and hold until a desired amount of water, above the normal refill level, enters the bowl. Step on the large pedal to flush. Release both pedals slowly. On some models an optional hand sprayer is included. To use simply depress the thumb lever while stepping on the

flush pedal.

2. Recirculating-type - A recirculating toilet uses a self-contained compartment to hold water, a pump (electric), and a drain valve. To fill storage compartment, pour 3 gallons of water directly into the bowl. Press the electric switch several times to prime the pump and to start recirculating cycle. Add liquid holding tank deodorant to the water.
3. Maintenance - To clean the toilet use a non-abrasive cleaner. Do not use highly concentrated or acid content cleaners, or abrasive powders. These may damage the seals or plastic parts of the toilet.

NOTE - We highly recommend that you use an RV-type toilet paper. These types of paper breakdown and are easily discharged.

E. Drain Systems

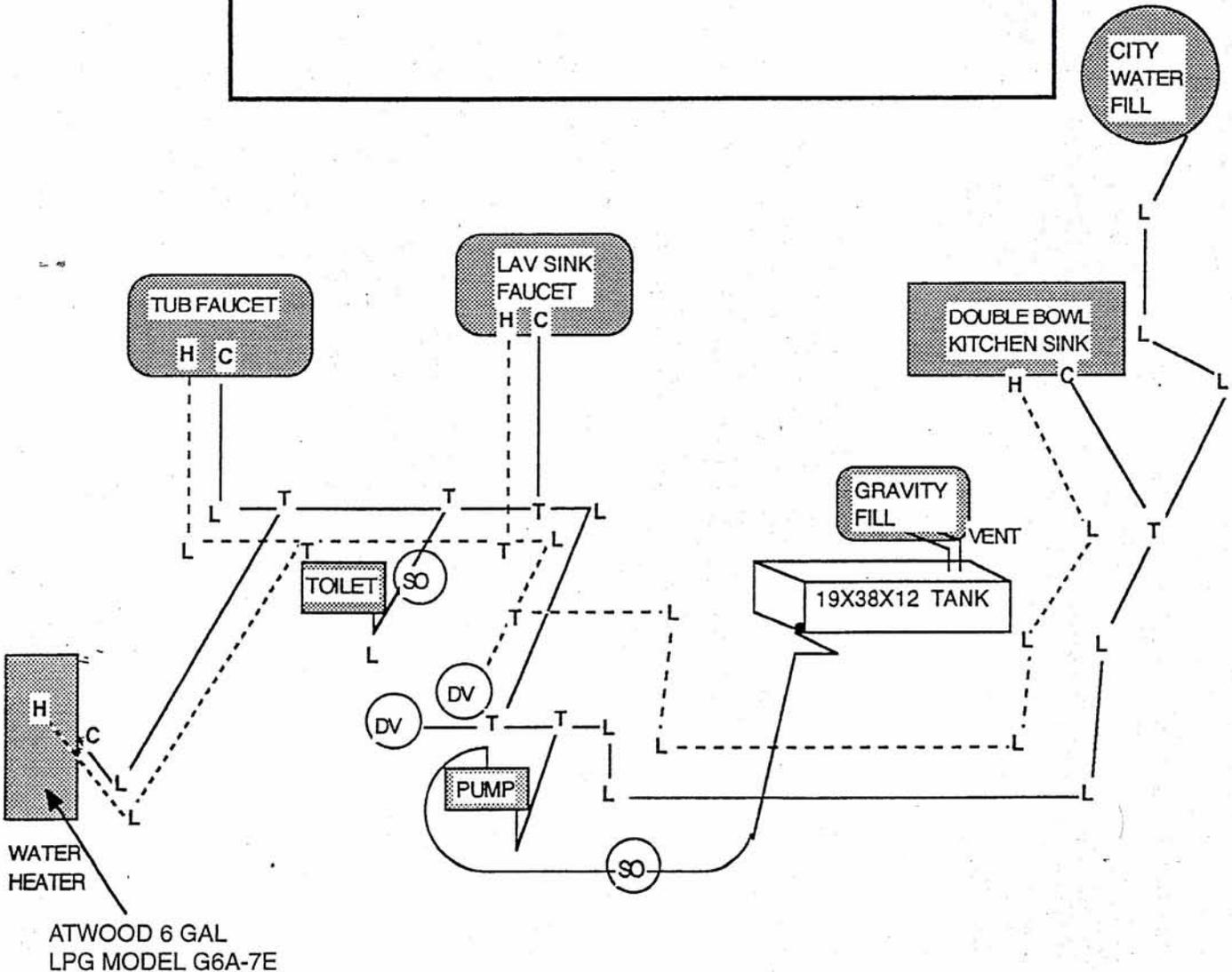
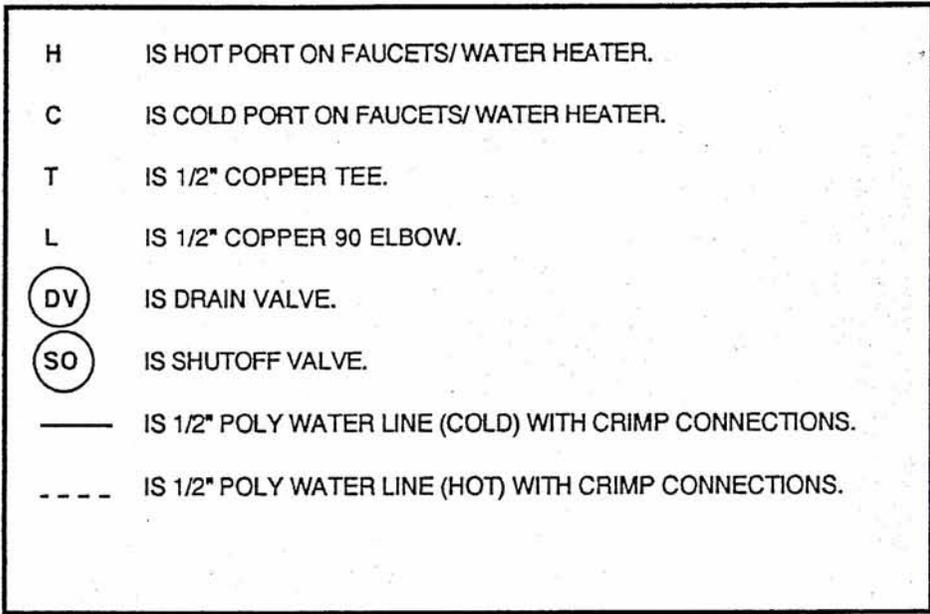
To provide complete self-containment and to comply with requirements of good sanitation practices, your Born Free is equipped with a dual tank drain system. The sanitary holding tank (black water tank) receives waste from the toilet. The second tank (gray water tank) collects waste water from the sinks and shower.

The two tanks share a common outlet for connecting the regular three-inch sewer hose for emptying, but each has its own slide valve so they can be evacuated separately. This connection, along with two slide valves, is located on the driver's side, near the center or at the rear of the coach.

F. Holding Tank Evacuation

The holding tank should be evacuated only at an authorized sanitary disposal station or sewer hookup at a campground. Position your Born Free at the sanitation station so the sewer connection is located near the drain opening. Remove the cap on the drain opening and install the sewer hose to the connection. Place the open end of the sewer hose in the disposal drain, and hold it in position during the entire evacuation process. Each tank should be drained separately, dumping the black water waste tank first. Avoid opening both valves at one time, avoiding the contents of either tank running into the other. Pull the slide valve handle all the way out so the contents will run out in a quick flushing manner. When the tank is empty, close the valve and run clear water through the toilet into the tank for rinsing. The best method of rinsing either tank is to close the slide valve and fill either tank through the toilet or one of the sinks with fresh water. Again, open the slide valve to allow the rinse water to evacuate. Close slide valve and re-engage retaining clips. Evacuate the gray water waste tank in the same manner. Disconnect the sewer hose, rinse, and replace the sewer hose in its carrier.

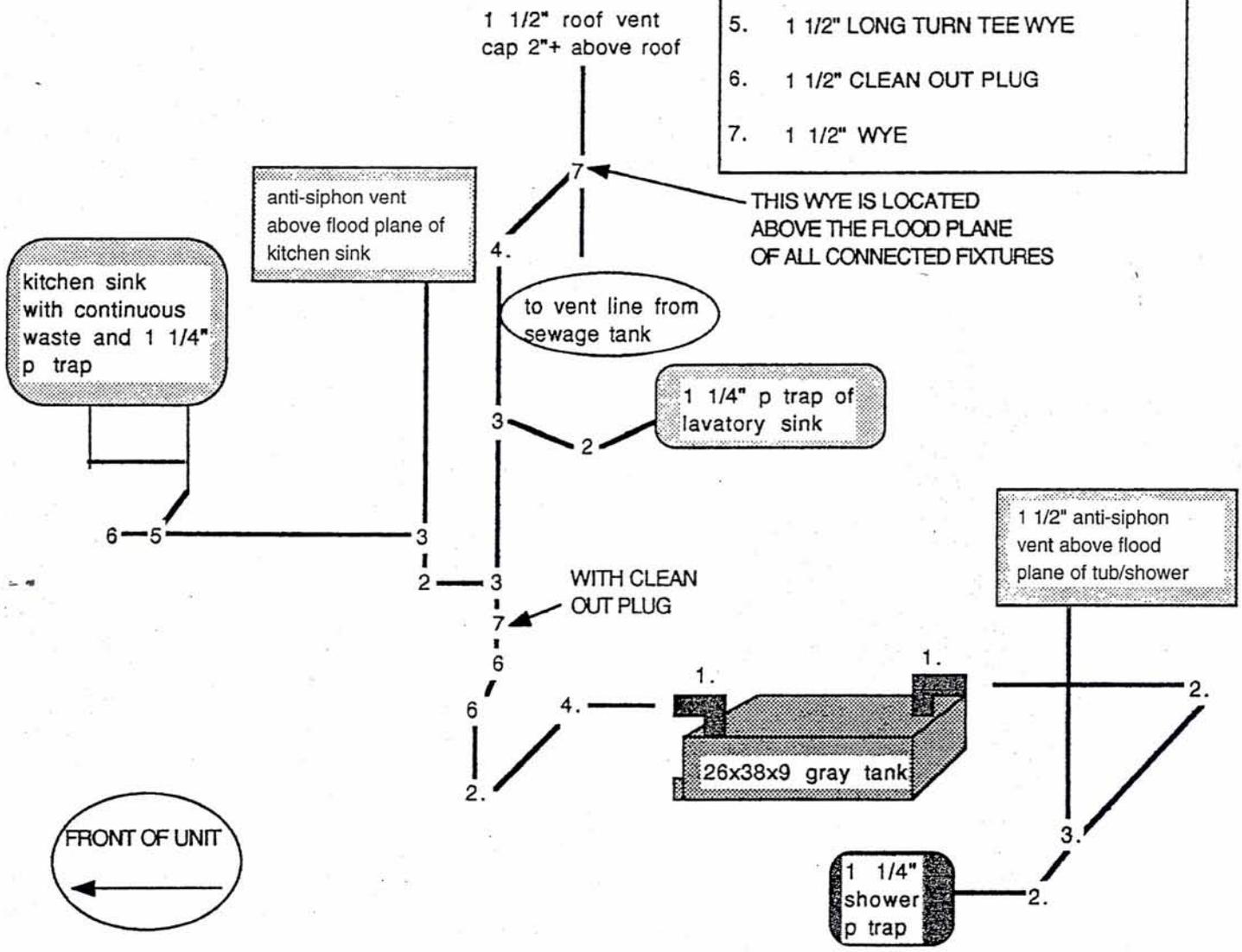
FRESH WATER SYSTEM 26' REAR SIDE BED



GRAY WATER SYSTEM

26' REAR SIDE BED

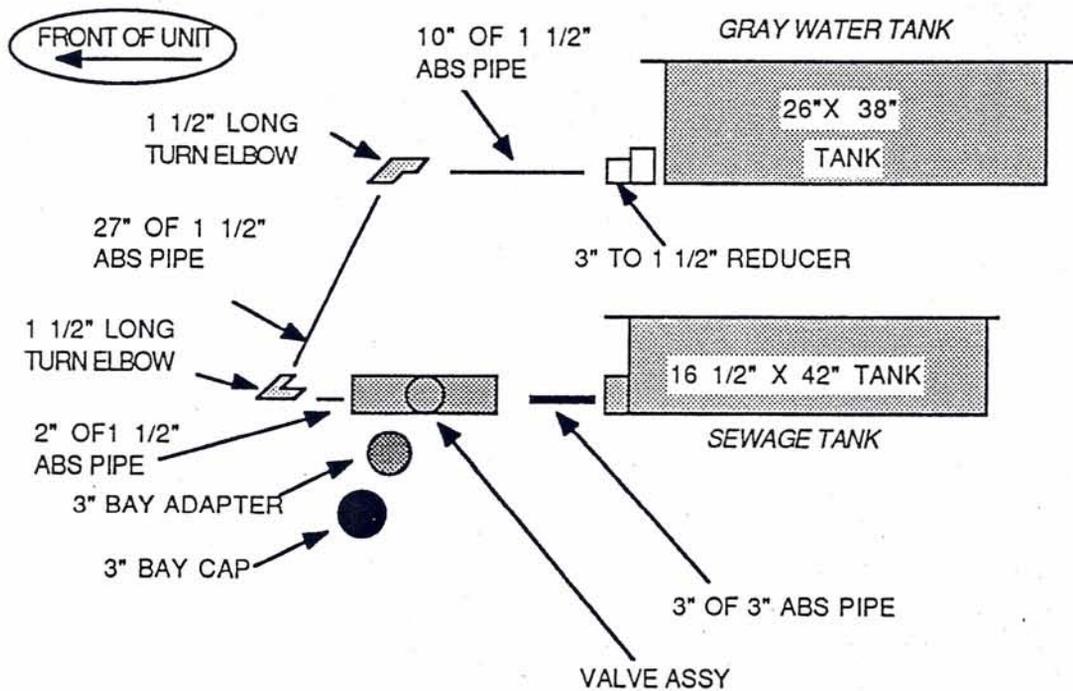
- | | |
|----|-------------------------------|
| 1. | 1 1/2" STD LONG TURN 90 ELBOW |
| 2. | 1 1/2" LONG SWEEP 90 ELBOW |
| 3. | 1 1/2" x 1 1/2" x 1 1/2" TEE |
| 4. | 1 1/2" 45 ELBOW |
| 5. | 1 1/2" LONG TURN TEE WYE |
| 6. | 1 1/2" CLEAN OUT PLUG |
| 7. | 1 1/2" WYE |



26' REAR SIDE BED

DUMP ASSEMBLY

(INTERCONNECTION BETWEEN THE GRAY AND SEWAGE TANKS AT OUTLETS OF TANKS)

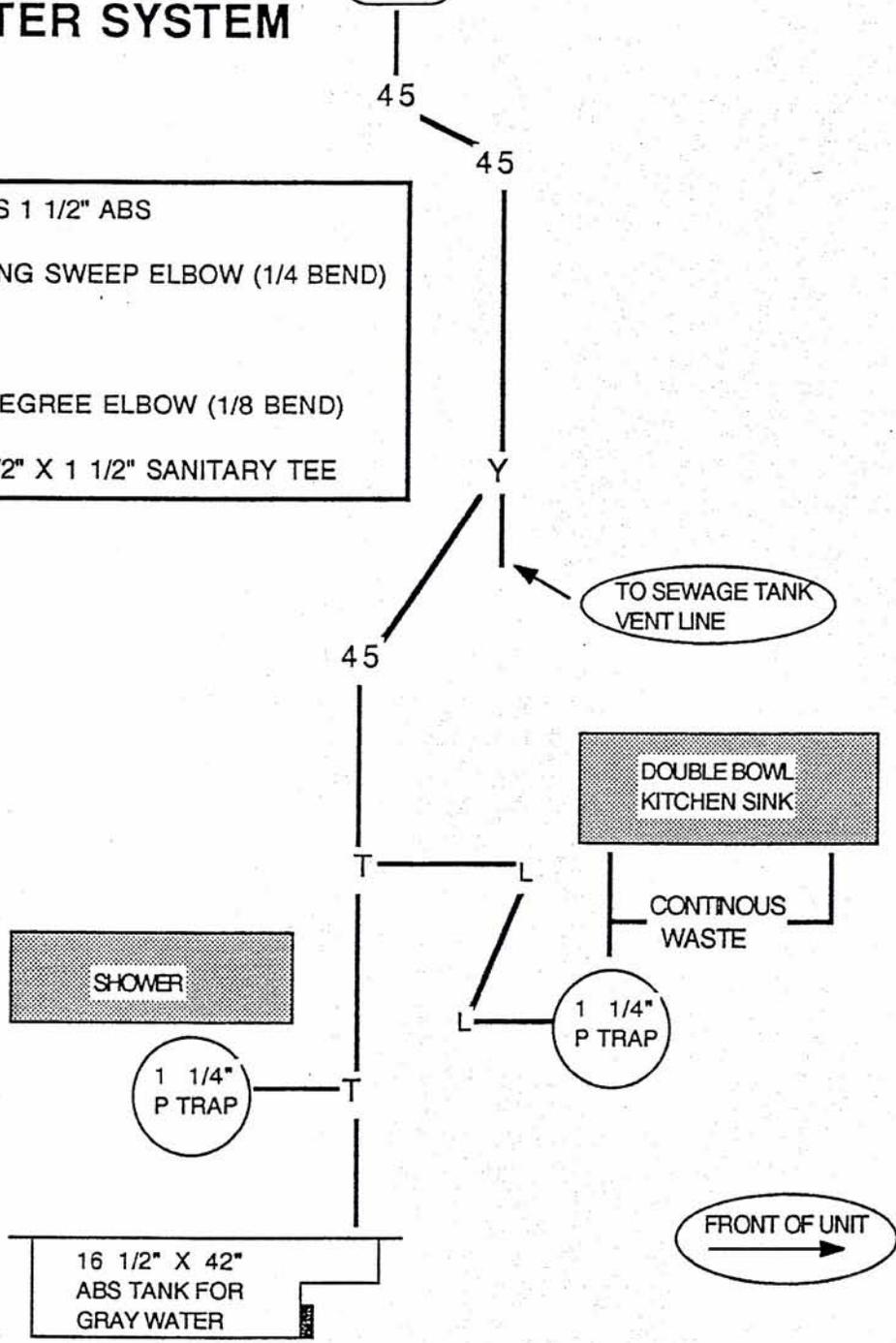


ONE PIECE UNIT WITH 1 1/2" VALVE ON THE LEFT, 3" VALVE ON THE RIGHT, AND ELBOWS BONDED TOGETHER TERMINATING 3" SIZE (VALTERRA PRODUCTS)

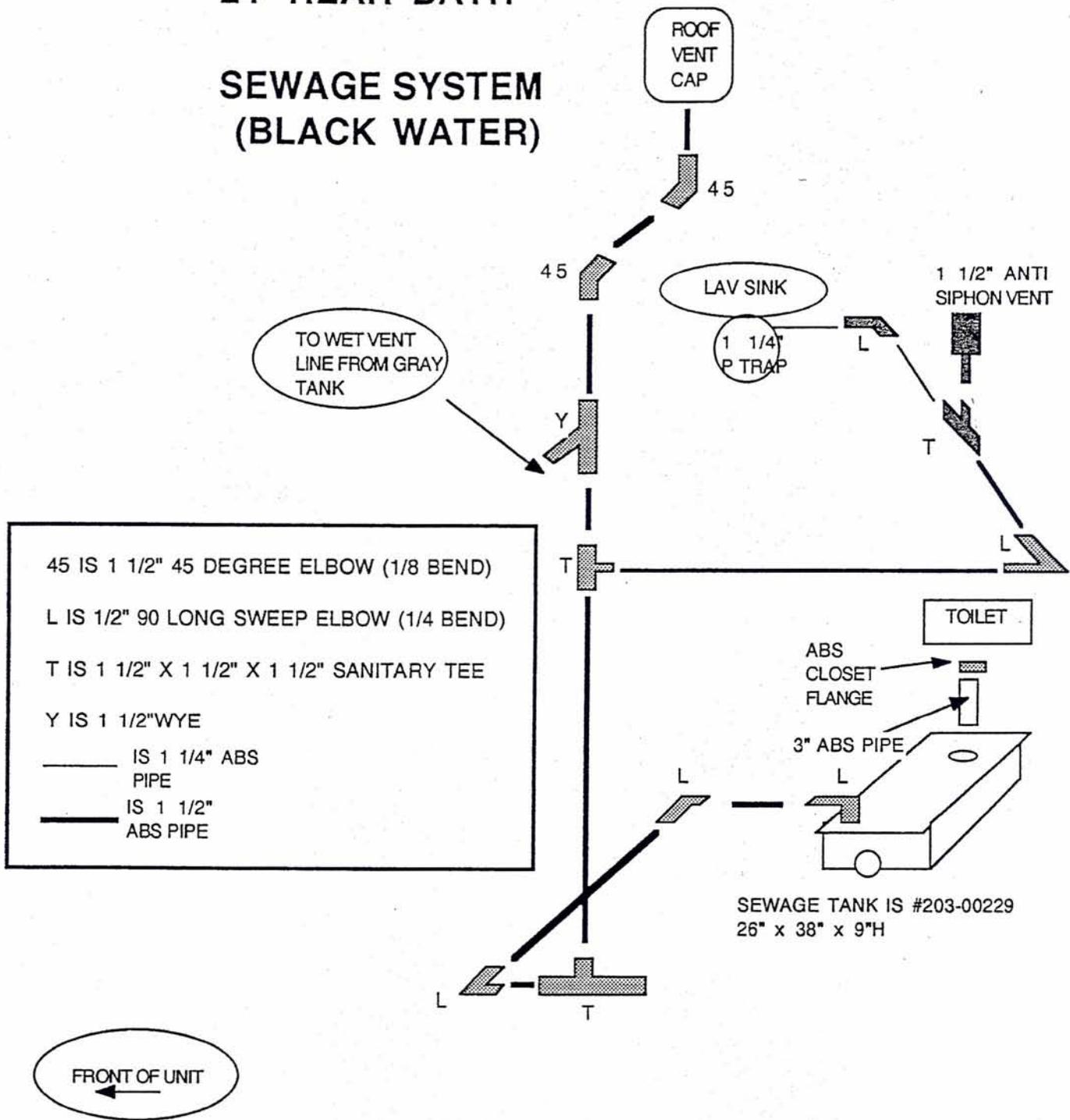
24' REAR BATH GRAY WATER SYSTEM

ROOF VENT CAP
1 1/2" ROOF VENT CAP WITH PIPE TERMINATING 2" ABOVE THE ROOF

ALL PLUMBING IS 1 1/2" ABS
L IS 1 1/2" 90 LONG SWEEP ELBOW (1/4 BEND)
Y IS 1 1/2" WYE
45 IS 1 1/2" 45 DEGREE ELBOW (1/8 BEND)
T IS 1 1/2" X 1 1/2" X 1 1/2" SANITARY TEE

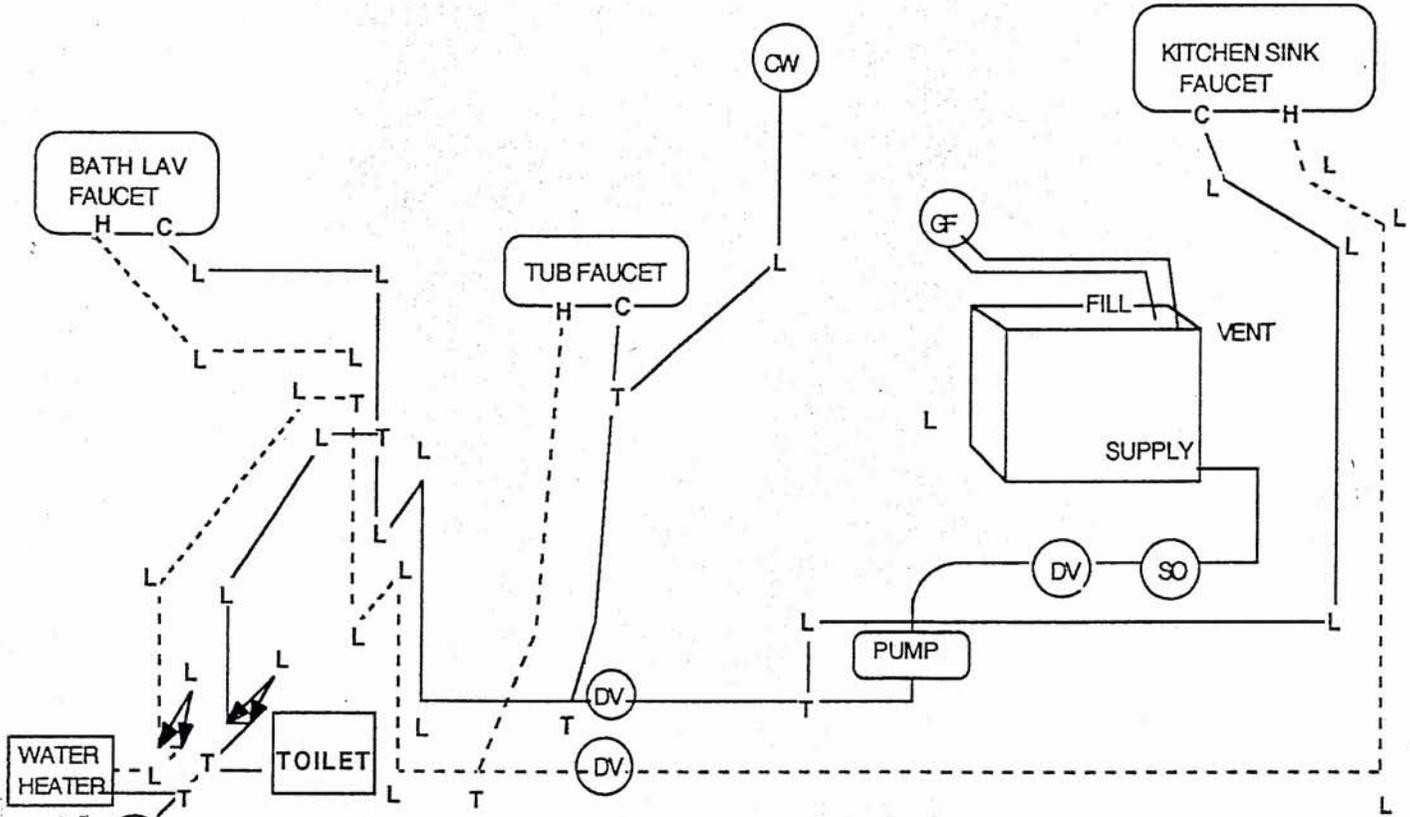


24' REAR BATH SEWAGE SYSTEM (BLACK WATER)



24' REAR BATH

FRESH WATER SUPPLY SYSTEM



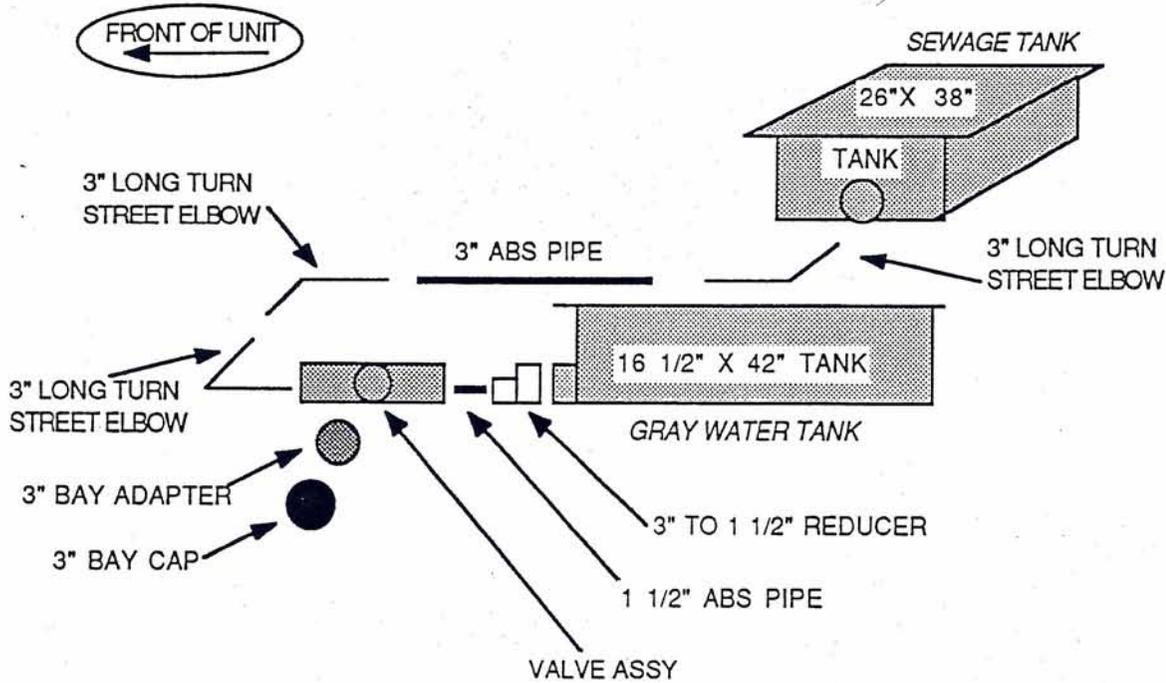
- IS COLD WATER POLY LINE
- - - IS HOT WATER POLY LINE
- (DV) IS DRAIN VALVE
- (SO) IS SHUTOFF VALVE
- (CW) IS CITY WATER FILL
- (GF) IS GRAVITY WATER FILL
- H IS HOT PORT ON FAUCET
- C IS COLD PORT ON FAUCET
- L IS COPPER ELBOW/90 DEGREE TURN
- T IS COPPER TEE

THE TANK IS A POLY 14"Wx26"Lx22"H TANK
 #203-00242
 THE PUMP IS A SHURFLO MODEL 2088-403-144
 2.8 GPM 12VDC
 THE WATER HEATER IS AN ATWOOD MODEL #G6A-7E
 6 GALLON

24' REAR BATH

DUMP ASSEMBLY

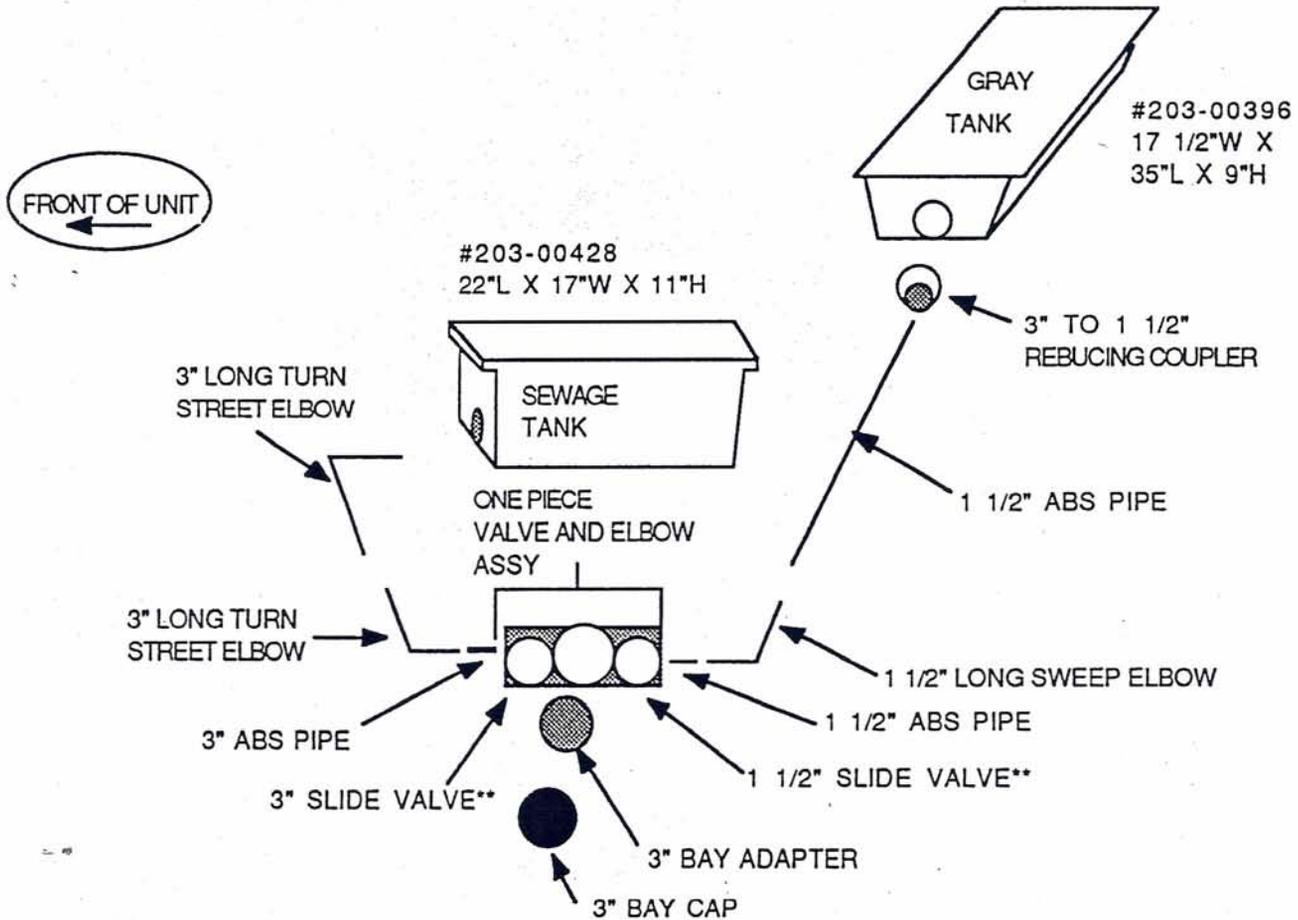
(INTERCONNECTION BETWEEN THE GRAY AND SEWAGE TANKS AT OUTLETS)



ONE PIECE UNIT WITH 3" VALVE ON THE LEFT, 1 1/2" VALVE ON THE RIGHT, AND ELBOWS BONDED TOGETHER TERMINATING 3" SIZE (VALTERRA PRODUCTS)

DUMP VALVE INTERCONNECTION BETWEEN GRAY AND SEWAGE TANKS

21' REAR DOOR WET BATH

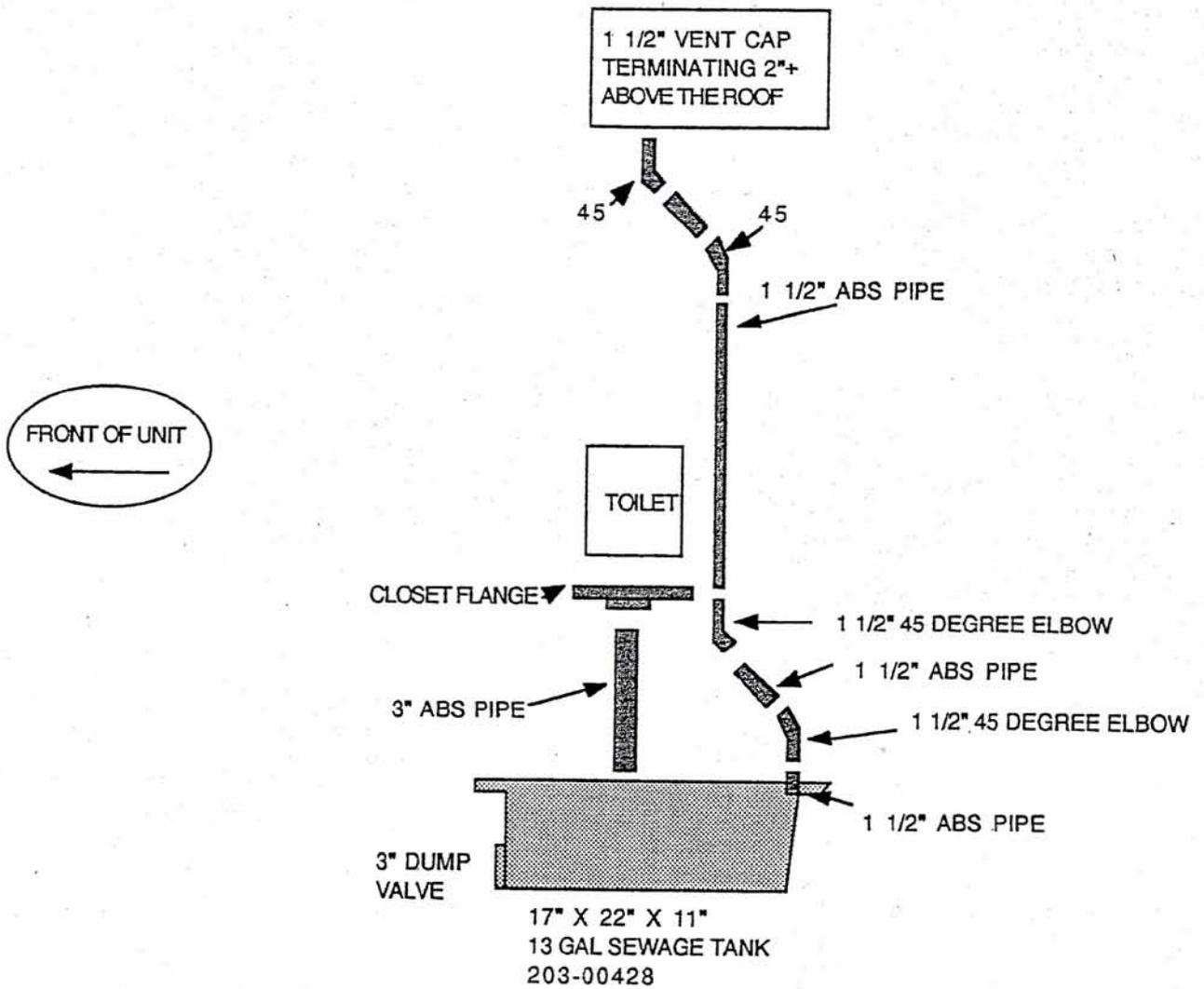


ALL OF THE ABOVE PIECES ARE ABS MATERIAL, AND JOINTS ARE BONDED WITH ABS CEMENT.
TANK # 203-00428 IS A POLY MATERIAL RATHER THAN ABS.

** The slide valves are a part of a one piece valve and elbow assy which incorporates a 3" long turn elbow with the 3" slide valve to the left of the elbow. The 1 1/2" slide valve is to the far right and comes into a 1 1/2" long turn elbow which is a side outlet of the 3" elbow. This is an approved part manufactured by Valterra Products.

SEWAGE SYSTEM (BLACK WATER)

21' REAR DOOR WET BATH

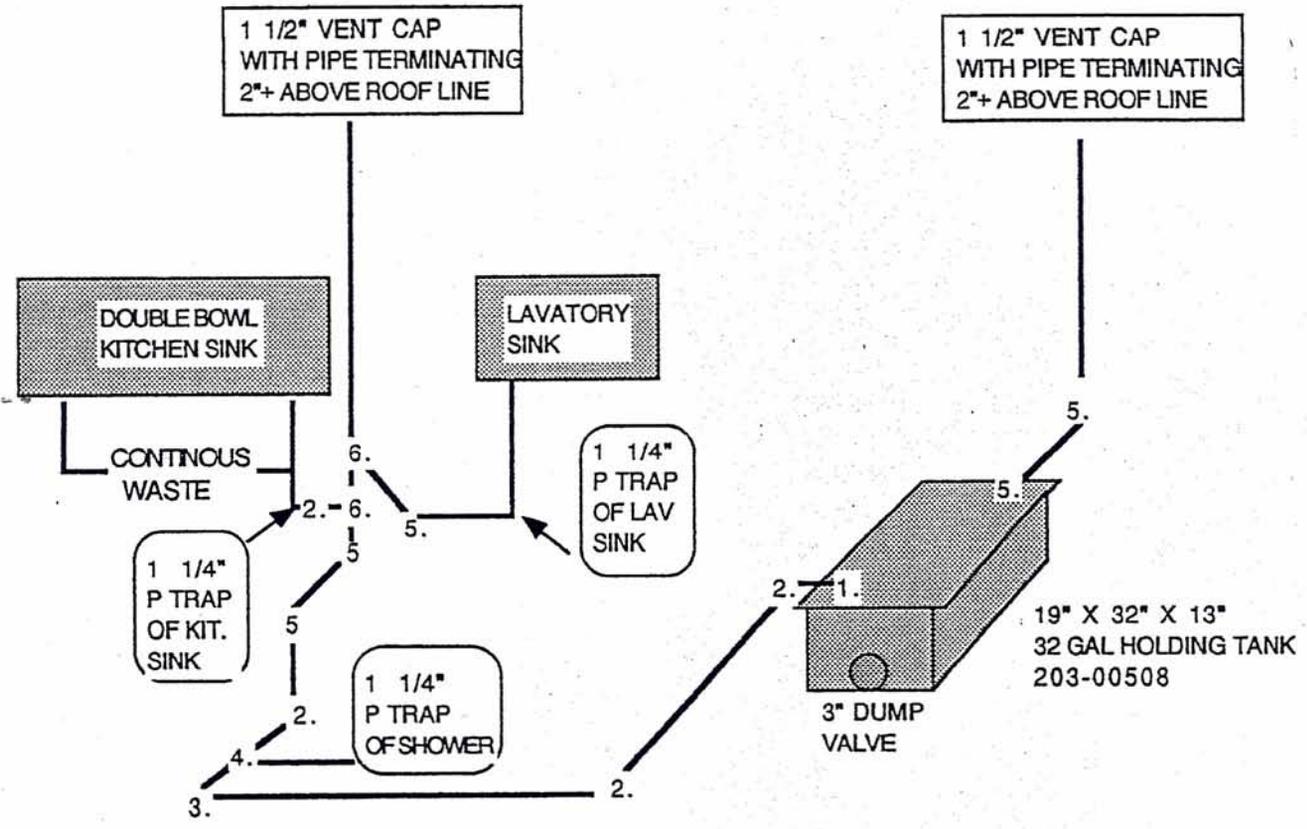


GRAY WATER SYSTEM

21' REAR DOOR WET BATH

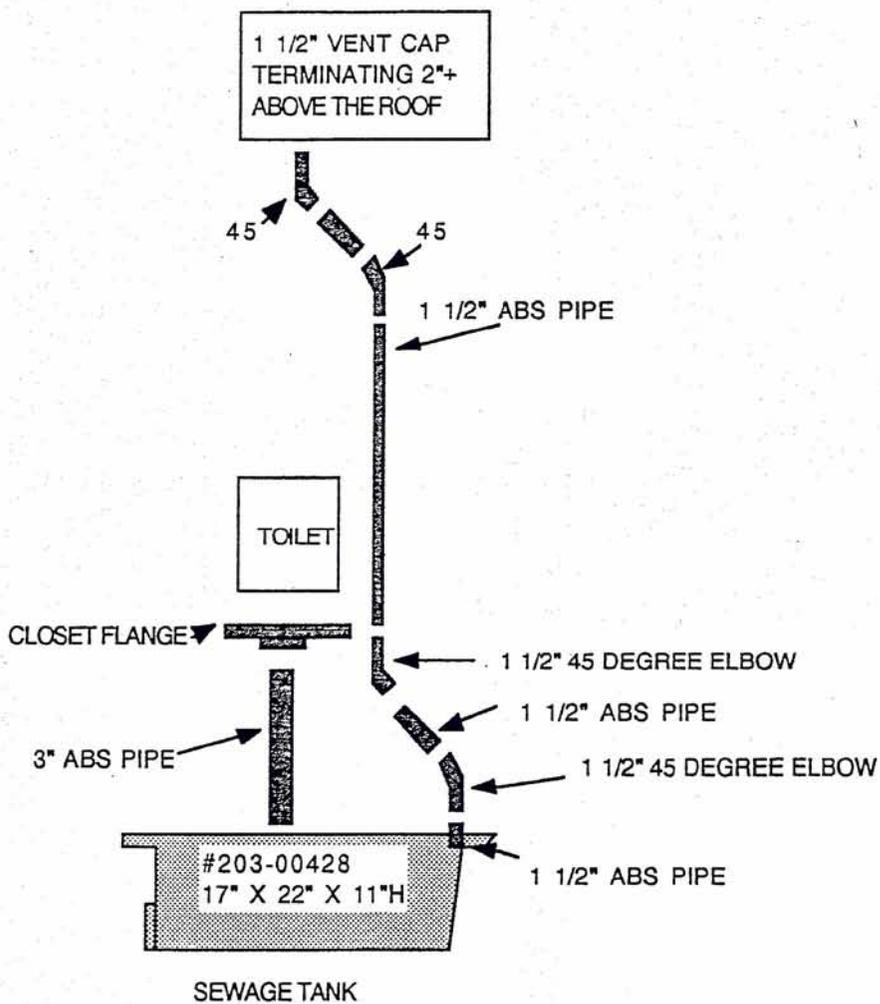


- 1. 1 1/2" LONG TURN 90 ELBOW (1/4 BEND)
- 2. 1 1/2" LONG SWEEP 90 ELBOW (1/4 BEND)
- 3. 1 1/2" LTTY WITH ADAPTER & PLUG
- 4. 1 1/2" WYE
- 5. 1 1/2" 45 ELBOW (1/8 BEND)
- 6. 1 1/2" X 1 1/2" X 1 1/2" SANITARY TEE
- 1 1/2" ABS PIPE



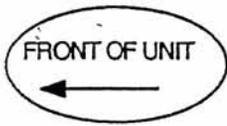
SEWAGE SYSTEM (BLACK WATER)

21' REAR DOOR WET BATH

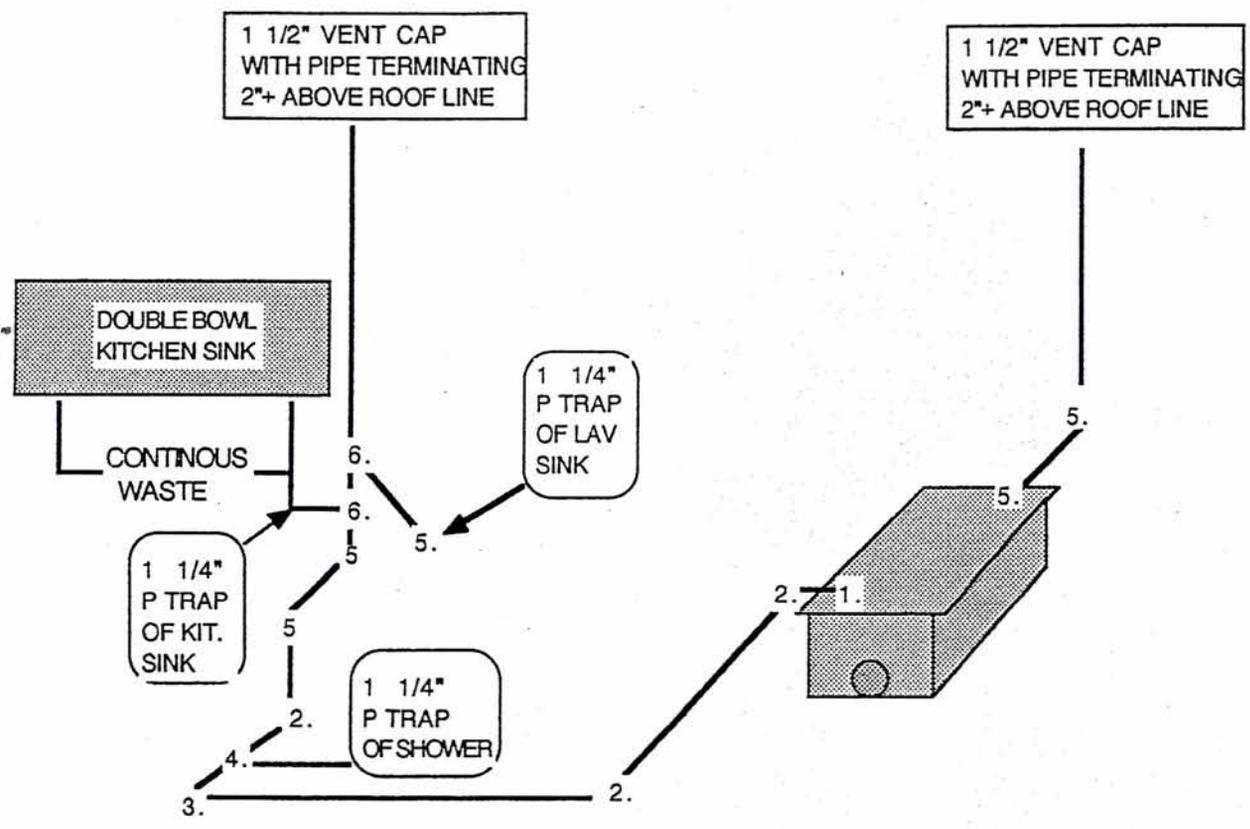


GRAY WATER SYSTEM

21' REAR DOOR WET BATH

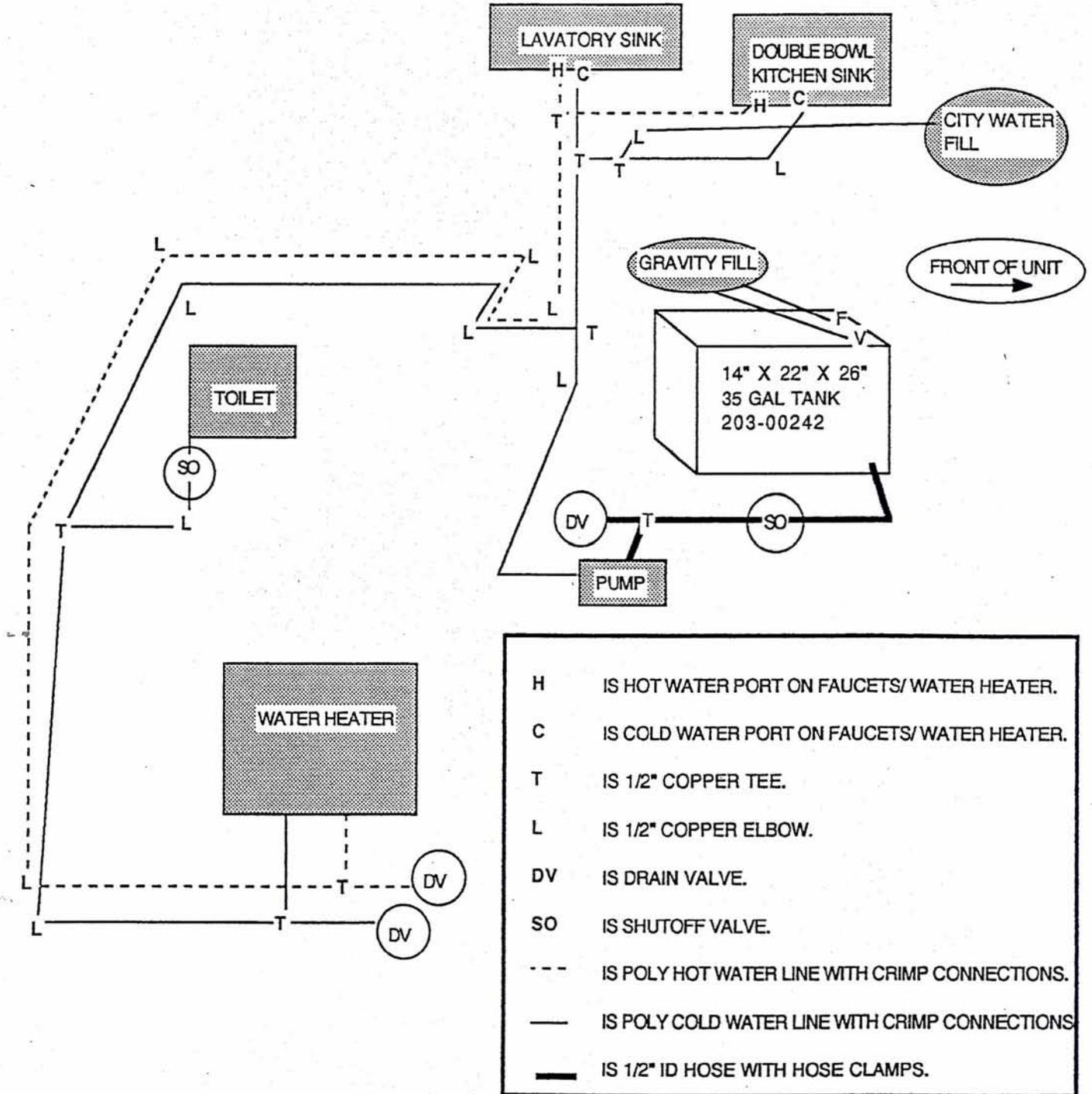


- | | |
|-------------------|---------------------------------------|
| 1. | 1 1/2" LONG TURN 90 ELBOW (1/4 BEND) |
| 2. | 1 1/2" LONG SWEEP 90 ELBOW (1/4 BEND) |
| 3. | 1 1/2" LTTY WITH ADAPTER & PLUG |
| 4. | 1 1/2" WYE |
| 5. | 1 1/2" 45 ELBOW (1/8 BEND) |
| 6. | 1 1/2" X 1 1/2" X 1 1/2" SANITARY TEE |
| — 1 1/2" ABS PIPE | |



FRESH WATER SYSTEM

21' REAR DOOR WET BATH



G. Parking In a Campground With Hookups

When parked in a campsite with sewer hookup facilities, connect the drain hose and open the gray holding tank drain valve. This will allow complete water drainage during your stay and your holding tank will remain empty. The drain valve should remain closed during your stay. If you leave the valve open, liquids will run out and leave solids behind. The proper method is to leave the slide valve closed allowing wastes to accumulate. If this is done, the evacuation procedure will allow the quick-flush principle to carry all wastes out the drain at the same time.

VII. SEASONAL PROTECTION

Each year more travelers discover winter camping. With your new Born Free Motorcoach, you don't have to wait, you are ready now. The coach is built with adequate insulation, ventilation, and construction principles that can keep you warm all winter long. If the unit is being heated with the furnace, the only precautions necessary to prevent freezing are to add RV antifreeze to the holding tanks and sink drains.

NOTE - Do not use automotive-type antifreeze. This ethylene glycol-type antifreeze is poisonous and not approved for potable water systems.

A. Winterizing

If you choose to store your motorcoach during the winter months, protection has to be provided for the water and drain systems. The procedure is as follows:

1. Allow as much water to evacuate from the system through a faucet as possible.
2. Turn water pump switch "OFF."
3. Drain water tank and lines through three drain valves located inside the lower cupboards. Also drain holding tanks.
4. Open water heater drain and drain water from tank.
5. ~~Turn valves "A" and "C" crossways to water line on water heater (see the diagram).~~
6. Turn valve "B" parallel to bypass water line.
7. When system is drained, shut drain valves and install 1-2 gallons of "non-toxic RV" antifreeze into the fresh water tank.
8. Turn the water pump switch "ON" and open faucets until antifreeze flows through each of them. Also flush toilet until antifreeze appears.
9. Shut water pump "OFF."
10. Pour 1/2 gallon of antifreeze down the shower drain, kitchen sink, and bath sink.
11. Your motorcoach is now "winterized."

Along with protecting the water and drain systems, we advise you to follow these simple suggestions for proper winter storage:

1. Remove all bedding and clothing to prevent mildewing.
2. Remove all food stuffs and clean cupboards.
3. Affix newspapers to inside windows with masking tape. This protects carpets, curtains, and cushions from ultraviolet damage.
4. Clean the refrigerator thoroughly and place an open package of baking soda inside, leaving the door open.
5. Clean all appliances and stove vents.
6. Shut LP tank valve "OFF."
7. Remove the auxiliary battery and store up off any concrete floor. It is advisable to charge the battery once or twice during storage.

B. Summer De-Winterizing Of Unit

Follow the following procedure to de-winterize your coach:

1. Fill fresh water tank with 5-10 gallons of clean water.
2. Turn water pump switch "ON."
3. Open faucets and allow water to run until coloration and foam is gone.
4. Allow water to flow in toilet until water is clear.
5. Drain remainder of fresh water tank.
6. Refill fresh water tank.
7. Turn valves "A" and "C" on water heater parallel with water lines. Turn valve "B" crossways to by-pass water line.
8. Drain holding tanks.
9. Your system is now ready for normal summer use. Antifreeze has been kept out of your water heater to prevent lingering tastes and smells.

See diagram on opposite page

RIGHT HAND SIDE WATER HEATER BYPASS

CK 6/26/95

