TABLE OF CONTENTS

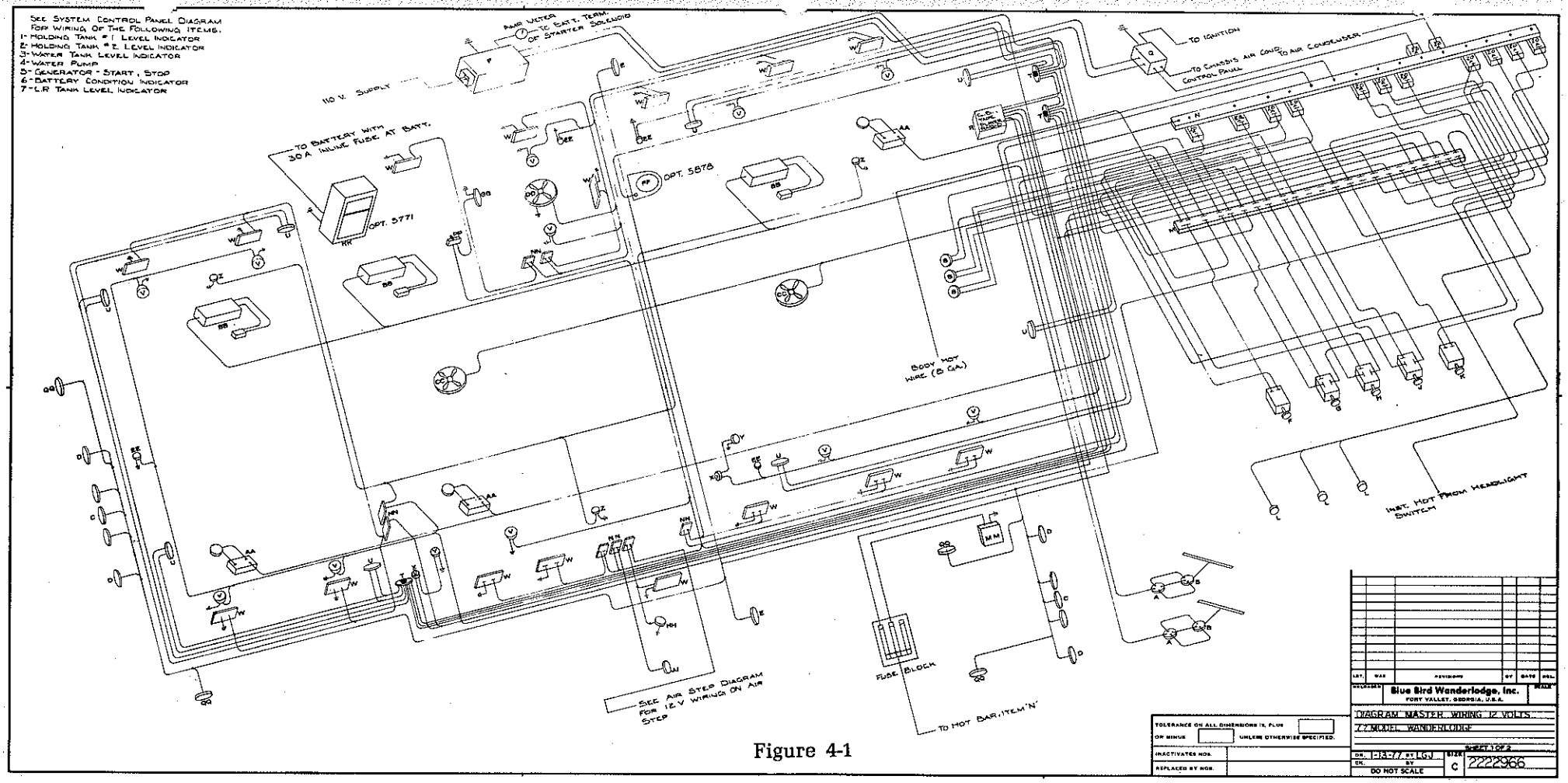


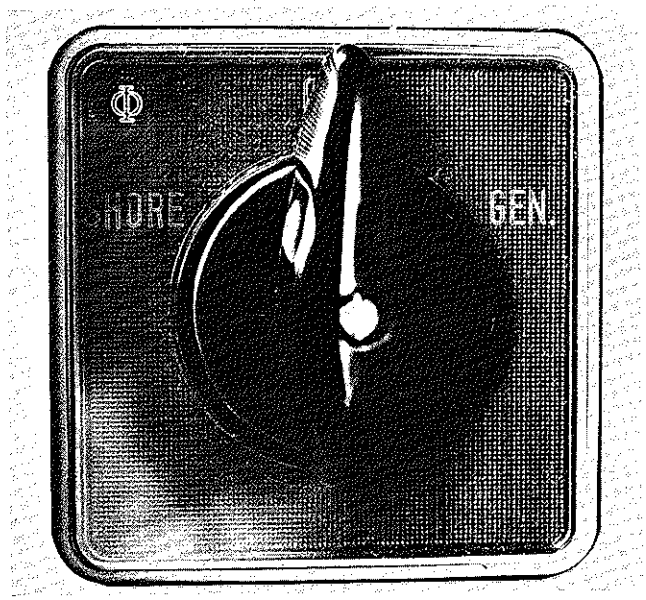
Figure 4-1

A	Wiper Switch	P	Battery Charger	CC	Vent Fan
B	Wiper Motor	Q	REM 70-922 Solenoid	DD	Exhaust Fan
C	Cluster	R	C.B., Tape Player & Radio	EE	12 V Receptacle
D	Clearance	S	Front Heater Motors	FF	12 V Electro Magic Toilet, Option 5878
E	Intermediate Side Marker Light	T	Volume Control	GG	Shower Light
F	Rear Heater Master	U	Radio Speakers	HH	Step Well Light
G	Front Heater	V	Reading Lights	JJ	Entrance Light
H	Defroster	W	Florescent Lights	KK	12 V Electric Refrigerator, Option 5771
J	Foot Warmer	X	Closet Switch	LL	20 A Circuit Breaker
K	Marker	Y	Closet Light	MM	Smoke Detector
L	Instrument Light	Z	Aisle Lights	NN	Light Wall Switch
M	Terminal Board	AA	Heater Motor & Switch	PP	Switch, Toggle, ON-Off
N	Hot Bar	BB	Furnace and Thermostat	QQ	Side Marker, Front & Rear

AC SUPPLY SYSTEMS [120-volts]

The motorhome ac-operated appliances are supplied from either an external ac shore line hookup; or from the internal generator plant. Selection of which power source is to be used is determined by a selector switch located in the rear closet, Figure 4-4. Set this switch to either GENERATOR, shore, or OFF position, depending on the source of available power. Leave the switch OFF to completely disconnect the motorhome 120-volt circuits.

Figure 4-4. Location of Power Selector Switch



GENERATOR OPERATION

The generator plant has its own 12-volt starting battery so that it can operate independently of the coach 12-volt system and can be started even if the motorhome batteries are discharged.

The generator can be started from either of two locations within the coach; at the driver's instrument panel, or at the galley wall switch panel; or, from outside the coach, at the generator compartment. To start the generator from the driver's position, operate the GENERATOR switch upward to the ON position and hold until the generator starts, as indicated by the generator ON indicator lighting. DO NOT HOLD THIS SWITCH ON FOR LONGER THAN 15 SECONDS AT A TIME. If the generator does not start the first time, wait a minute and try again. Release the switch when the ON light glows. A duplicate switch is located on the galley wall and is operated in the same manner.

To start the generator directly outside the unit, Figure 4-5, use the START-STOP switch located on the generator instrument panel. The generator may be stopped at any time, from either of the three locations, by holding the switch at STOP position until the generator shuts off. It is not advisable to start the generator "under load", especially with the heavy current drain provided by the roof air conditioner(s). This may cause hard generator starting and possible damage to the generator electrical system. It is a good practice to remember to set the main SELECTOR switch to OFF before turning off the generator so there will be no electrical load on the line. Also, remember to set the selector switch in the cabinet under the front dinette seat to GENERATOR position when the generator is being used; and to reset the switch to either OFF or SHORE position, as appropriate.

AC SHORELINE OPERATION [COMMERCIAL POWER]

Set the selector switch (in the cabinet under the front dinette set) to SHORE position before connecting the motorhome electrical system to the external ac supply. Further, for purposes of safety, observe all precautions when connecting the shoreline. Poor grounding or incorrectly wired receptacles can cause personal harm as well as equipment damage and create a fire hazard.

NOTE

Your motorhome has been wired in accordance with the National Electrical Code. All 120-volt wiring is a two-wire service with ground; all 220-volt wiring is a three-wire service with ground. If the motorhome is connected to an external system which has only a two-wire circuit, ground the third wire on the adapter to the external supply metal junction box or conduit. Commercial "ground detectors" are available which will help you to be sure that your lines are correctly connected and the proper wire is grounded.

SECTION VI

LPG SYSTEM

INTRODUCTION

Your coach is equipped with a permanently-mounted Liquified Petroleum Gas (LPG) tank which is the energy source for operation of the refrigerator, range/oven and three gas furnaces. A piping diagram of the complete LPG system is shown in Figure 6-1.

LPG TANK

The LPG supply is stored in a 180 pound tank located in the compartment forward of the entry door. Controls on the tank, shown in Figure 6-2, include the main gas valve, filler connection and a 20% relief valve. The tank regulator is located in the refrigerator compartment and connects with the tank via a flexible high-pressure hose.

CAUTION

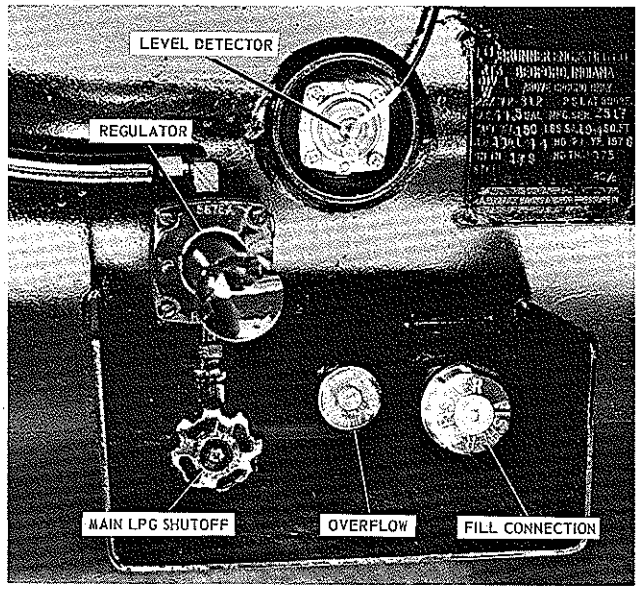
Be sure to shut off all gas appliances filling the LPG tank. Periodically check gas lines and fittings for tightness.

FUEL REQUIREMENTS

Liquified petroleum gas is a material composed of various hydrocarbons such as propane, propylene, butanes, butylenes, or a mixture thereof. In its gaseous form (vaporized) it is colorless and has a garlic-scented additive for detection. In addition to being inflammable, it is dangerous to inhale. For ease of transportation and storage, LPG is compressed into a liquid state, and stored in this form within the LPG tank. As fuel is used, vapor passes from the top of the tank through the regulator, which reduces the LPG pressure to about 6½ PSI. Low-pressure vapor is then supplied through LPG piping to the various appliances.

Moisture condensation within the tank and line, with possible cold-weather freeze-ups, can be prevented when filling the tank by requesting the dealer to add a small amount of Methy Alcohol to the fill-up. (Approximately 1 ounce of Methyl Alcohol to each 20 pounds of LPG is a common mixture.) Note that the dealer must use a P.O.L. adapter when filling the tank. A filled tank is indicated when liquid appears at the 20% valve.

Figure 6-2. Location of LPG Tank and Controls, Fittings.



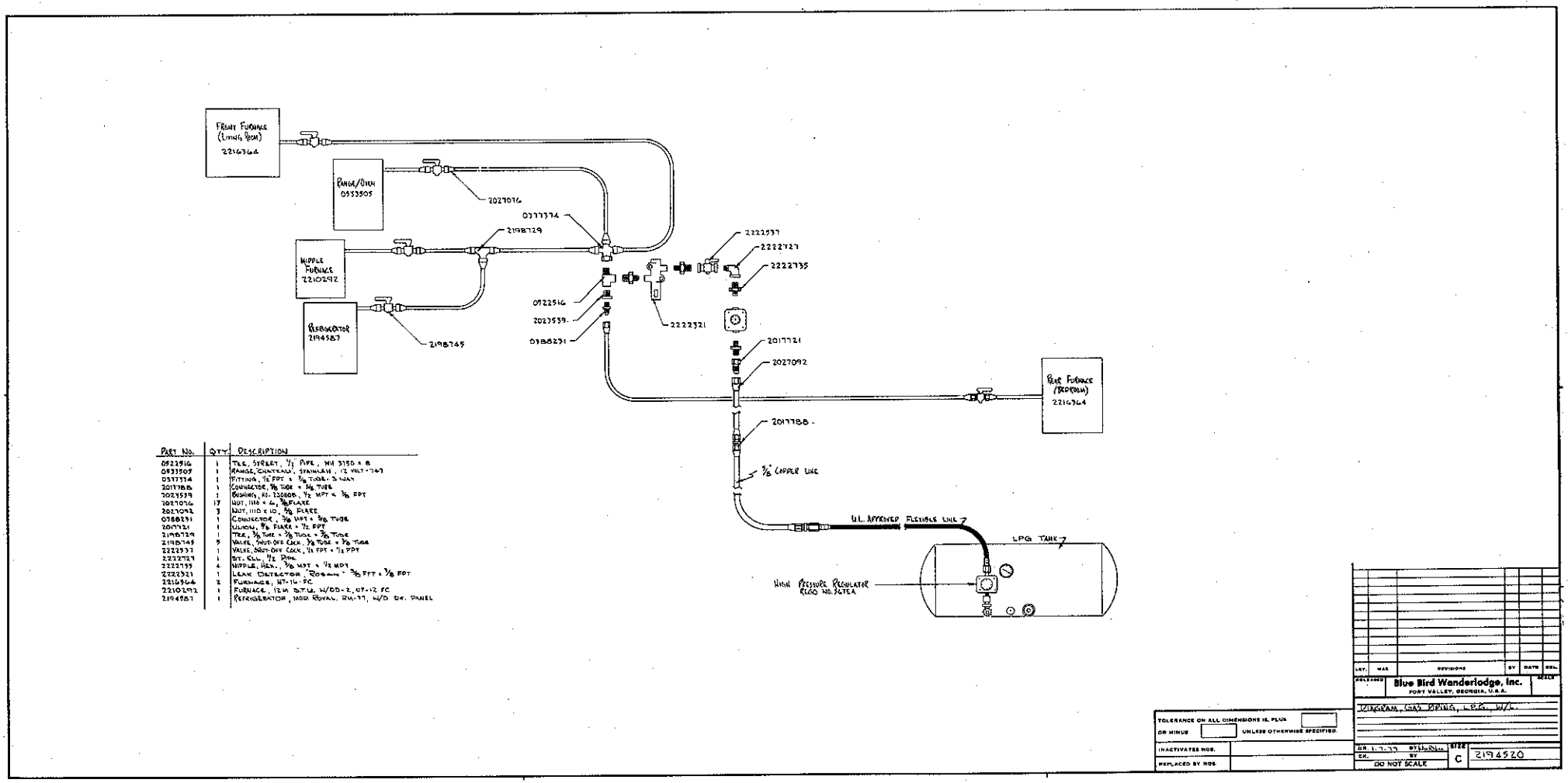
LPG REGULATOR

The LPG regulator, located in the refrigerator compartment, regulates the pressure of the LPG supplied to the appliances. The regulator functions automatically and is factory preset to provide the correct line pressure. DO NOT attempt to tamper with or reset the regulator; even a small variation above the normal line pressure can be sufficient to create a danger situation and cause possible damage to individual appliance regulators. The high-pressure regulator is located on the LPG tank.

OPERATION

Before the main valve on the LPG tank is opened, check that all inside local shutoff valves are closed. The locations of these valves, one at the inlet to each of the four appliances, is shown in Figure 6-1.

Figure 6-1. LPG System



PART NO.	QTY.	DESCRIPTION
0922516	1	TEE, SWEAT, ½" PIPE, MM 3150 x B
0531307	1	RANGE, CONTROL, STAINLESS, 12 VOLT-1367
0377374	1	FITTING, ½ FPT x ⅜ TUBE, 3 WAY
2017788	1	CONNECTOR, ⅜ TUBE x ⅜ TUBE
2023539	1	BUSHING, #2-120000, ½ MPT x ⅜ FPT
2027076	17	NUT, 1110 x 4, ⅜ FLARE
2027092	3	NUT, 1110 x 10, ⅜ FLARE
0388231	1	CONNECTOR, ⅜ MPT x ⅜ TUBE
2017721	1	UNION, ⅜ FLARE x ½ FPT
2198729	1	TEE, ⅜ TUBE x ⅜ TUBE x ⅜ TUBE
2198749	9	VALVE, SHUT-OFF COCK, ⅜ TUBE x ⅜ TUBE
2222537	1	VALVE, SHUT-OFF COCK, ½ FPT x ½ FPT
2222727	1	STR. CLN. ½ PIPE
2222735	4	NIPPLE, HEX., ⅜ MPT x ½ MPT
2222321	1	LEAK DETECTOR, Rosaire, ⅜ FPT x ⅜ FPT
2216764	2	FURNACE, 45-14-FC
2210292	1	FURNACE, 12M B.T.U. W/DD-2, 07-12 FC
2194587	1	REFRIGERATOR, MOD. ROYAL, RM-77, W/D DR. PANEL

REV.	WAS	REVISIONS	BY	DATE	APP.
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Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM, GAS PIPING, L.P.G., W/L

TOLERANCE ON ALL DIMENSIONS IS PLUS OR MINUS UNLESS OTHERWISE SPECIFIED.

INACTIVATES NOS.

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DR. 1-7-77 BY

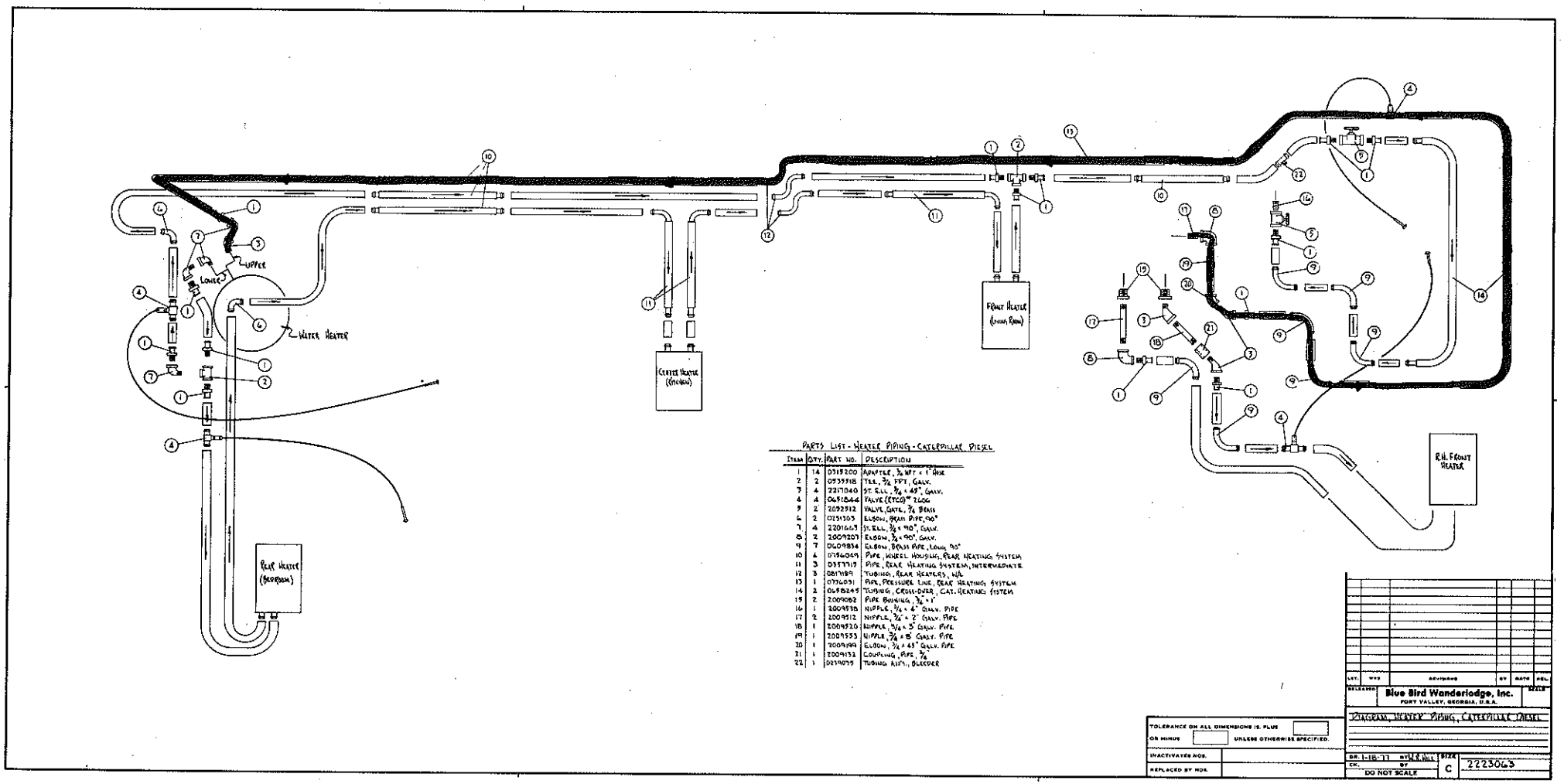
CK. BY

DO NOT SCALE

SIZE C

2194520

Figure 5-3B



PARTS LIST - HEATER PIPING - CATERPILLAR DIESEL

ITEM	QTY.	PART NO.	DESCRIPTION
1	14	0318200	ADAPTER, ⅜ MPT x 1" HOSE
2	2	0253918	TEE, ¾ FPT, GALV.
3	4	2217040	ST. ELL, ¾ x 45°, GALV.
4	4	0691844	VALVE (ETCO)™ 2600
5	2	2092512	VALVE, GATE, ¾ BRASS
6	2	0251303	ELBOW, BRASS PIPE, 90°
7	4	2201669	ST. ELL, ¾ x 90°, GALV.
8	2	2009207	ELBOW, ¾ x 90°, GALV.
9	7	0609814	ELBOW, BRASS PIPE, LONG 90°
10	4	0350449	PIPE, WHEEL HOUSING, REAR HEATING SYSTEM
11	3	0357719	PIPE, REAR HEATING SYSTEM, INTERMEDIATE
12	3	0611189	TUBING, REAR HEATERS, W/L
13	1	0734031	PIPE, PRESSURE LINE, REAR HEATING SYSTEM
14	2	0648249	TUBING, CROSS-OVER, CAT. HEATING SYSTEM
15	2	2009082	PIPE BUSHING, ¾ x 1"
16	1	2009336	NIPPLE, ¾ x 4" GALV. PIPE
17	2	2009512	NIPPLE, ¾ x 2" GALV. PIPE
18	1	2009520	NIPPLE, ¾ x 3" GALV. PIPE
19	1	2009533	NIPPLE, ¾ x 8" GALV. PIPE
20	1	2009199	ELBOW, ¾ x 45° GALV. PIPE
21	1	2009132	COUPLING, PIPE, ¾"
22	1	0234075	TUBING ASSY., BLEEDER

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Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM, HEATER PIPING, CATERPILLAR DIESEL

TOLERANCE ON ALL DIMENSIONS IS PLUS ☐ OR MINUS ☐ UNLESS OTHERWISE SPECIFIED

INACTIVATES NOS.

REPLACED BY NOS.

DR. 1-18-77 BY E. Hill

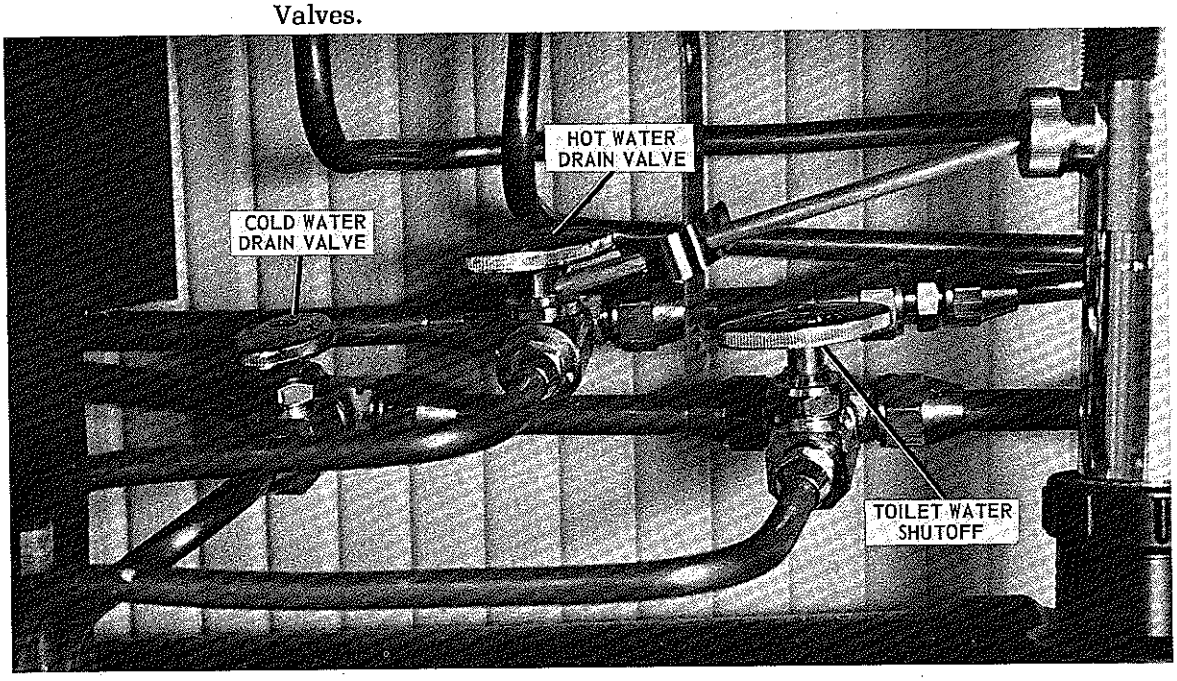
CK. BY

DO NOT SCALE

SIZE C

2223063

Figure 5-4. Location of Toilet Water Supply Shut-off Valve, Main Hot and Cold Water Drain Valves.



PLUMBING AND DRAINAGE SYSTEM

A diagram of the plumbing and drainage system is shown in Figure 5-5. Two separate holding tanks: Waste (42 gallons) and sewage (60 gallons) are located beneath the coach mid-section. The waste holding tank is closer to the **rear** of the unit and is the receiver for the waste water from the kitchen sinks, and the shower. The sewage holding tank, located toward the **front** of the unit, stores toilet wastes, and waste water from the bathroom sink. A common vent system connects both holding tanks to the vent stack located on the roof of the coach.

DRAINING THE HOLDING TANKS

The location of the holding tanks drain valves is shown in Figure 5-6. Each drain valve operates in the same manner; drain the tanks as follows:

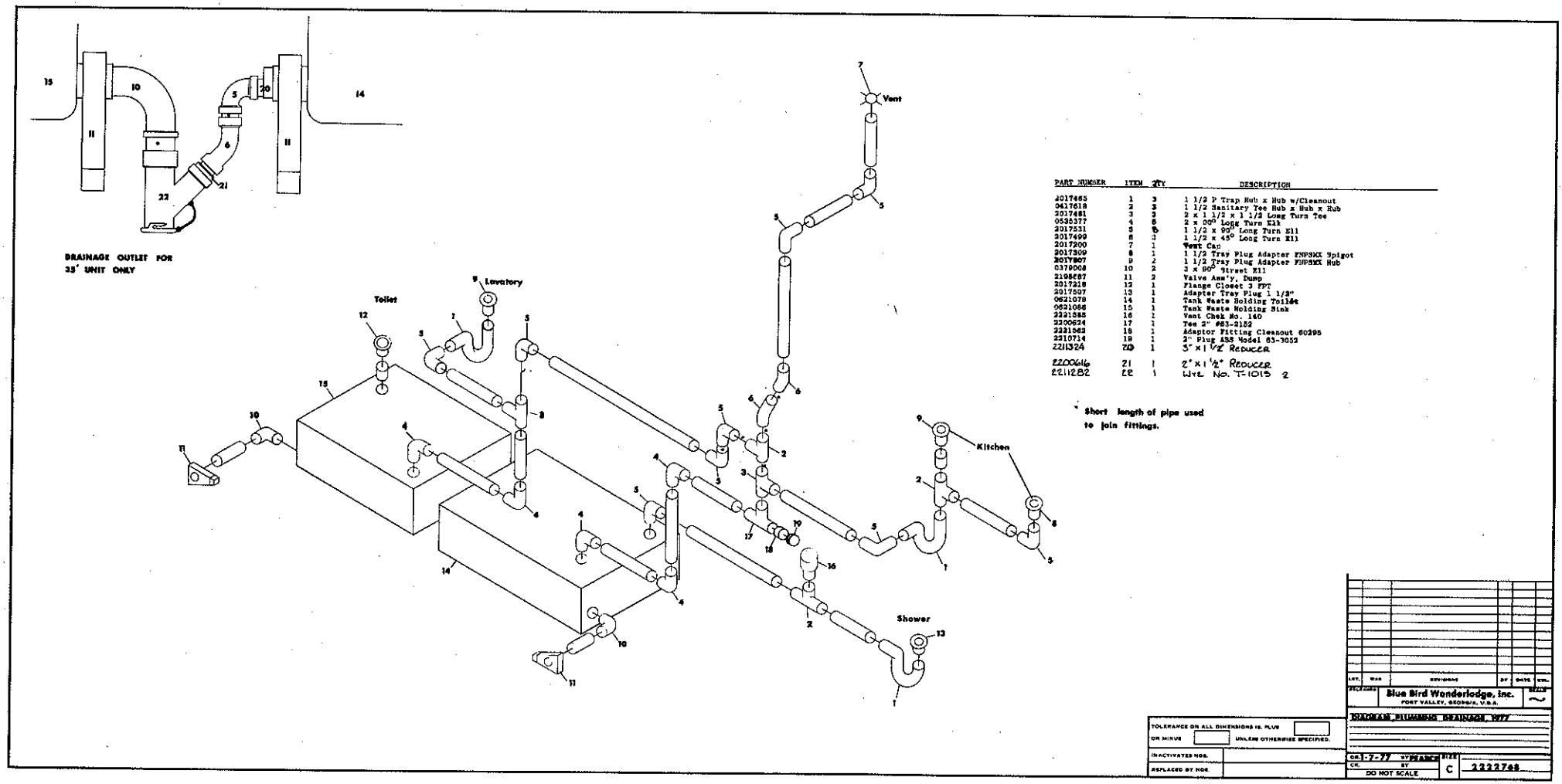
1. Check that both drain valves are in the closed position before proceeding any further, (valve handles will be turned clockwise to the closed/locked position).
2. Drain the sewage holding tank first. Remove safety cap from the end of the drain valve by turning the locking ring in a counter-clockwise direction.
3. Connect the 3-inch sewer hose coupling (stored in a pipe in the left storage compartment) to the end of the valve and tighten locking ring securely, in a clockwise direction. Place discharge end of the hose into sewer connection and check that all connections are secure to prevent accidental spillage.
4. Open the drain valve by turning the handle to the left (counter-clockwise), then pull the valve stem straight outward. This will discharge the holding tank contents into the sewer connection.
5. Occasionally, after contents are emptied, flush out holding tank to dislodge remaining solids.

NOTE

To clean the holding tank, add a cup of detergent into the tank after it is emptied. The agitating action of vehicle movement will clean the tank.

6. Close drain valve by pushing valve inward and turning handle to the right (clockwise) position.
7. Disconnect and wash out drain hose and replace safety cap.
8. Drain the wastes holding tank in the same manner, following steps 2 through 7 as applicable.

Figure 5-5. Plumbing and Drainage System Piping Diagram.



PART NUMBER	ITEM	QTY	DESCRIPTION
2017485	1	3	1 1/2 P Trap Hub x Hub w/Cleanout
0417618	2	3	1 1/2 Sanitary Tee Hub x Hub x Hub
2017481	3	3	2 x 1 1/2 x 1 1/2 Long Turn Tee
0535377	4	6	2 x 90° Long Turn Ell
2017531	5	6	1 1/2 x 90° Long Turn Ell
2017499	6	3	1 1/2 x 45° Long Turn Ell
2017200	7	1	Vent Cap
2017309	8	1	1 1/2 Tray Plug Adapter FNPSMX Spigot
2017307	9	2	1 1/2 Tray Plug Adapter FNPSMX Hub
0379008	10	2	3 x 90° Street Ell
2198587	11	2	Valve Ass'y, Dump
2017216	12	1	Flange Closet 3 FPT
2017507	13	1	Adapter Tray Plug 1 1/2"
0621078	14	1	Tank Waste Holding Toilet
0621086	15	1	Tank Waste Holding Sink
2221582	16	1	Vent Chek No. 140
2200624	17	1	Tee 2" #83-3122
2221562	18	1	Adaptor Fitting Cleanout 80295
2210714	19	1	2" Plug ABS Model 83-3052
2211324	ZD	1	3" x 1 1/2" Reducer
2200616	Z1	1	2" x 1 1/2" Reducer
2211282	Z2	1	Wye No. T-1015 2

* Short length of pipe used to join fittings.

Blue Bird Wonderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM, PLUMBING DRAINAGE, 1977

DR. J-7-77 BY FRANCE
CK. BY
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SIZE C 2222768

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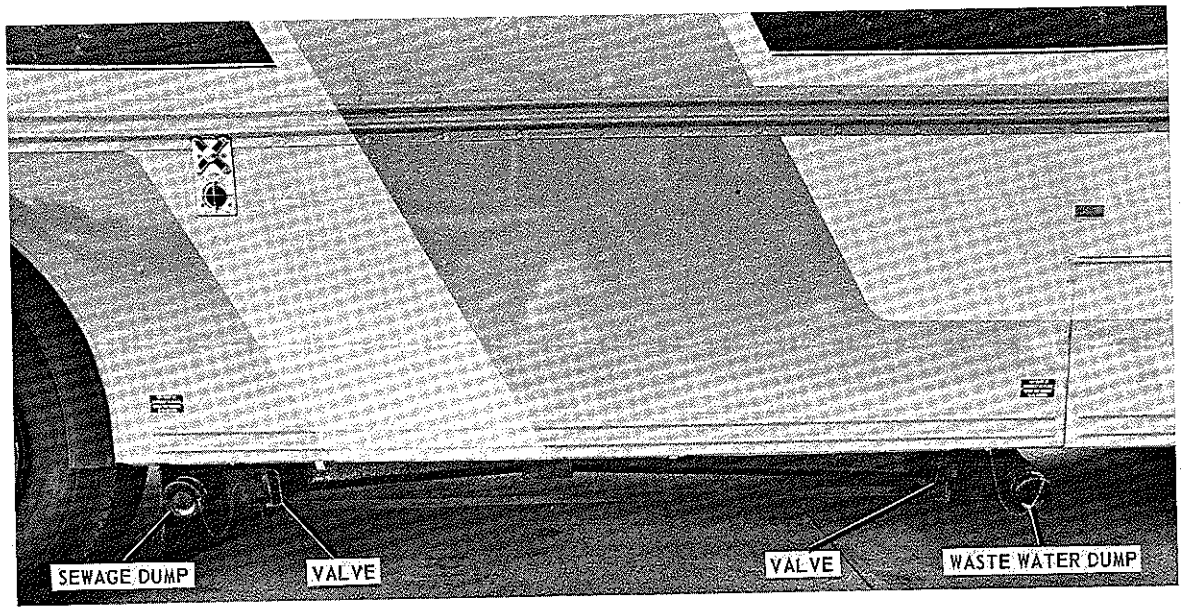
INACTIVATED NOS.
REPLACED BY NOS.

Figure 5-6. Location of Holding Tank Drain Valves.



WATER PURIFIER

An optional water purifier is attached to the cold water line to the galley sink. This filter will remove foreign matter from the drinking water supply and eliminate objectionable water tastes and odors. After a few months of use, the fine-screen filter in the purifier may become clogged as a result of the acumulated particles; this is an indication that the filter is due for replacement. Change filter every 6 months, regardless of amount of coach usage.

TANK LEVEL DETECTORS

Each of the holding tanks, and the potable water supply tank, is equipped with an electrical level detector. The amount of liquid remaining in the tank is indicated on the System Monitoring Panel. To read the level of the material in the tank, press the rocker switch associated with the tank and read the level in terms of 1/4, 1/2, or 3/4 full.

WINTERIZING

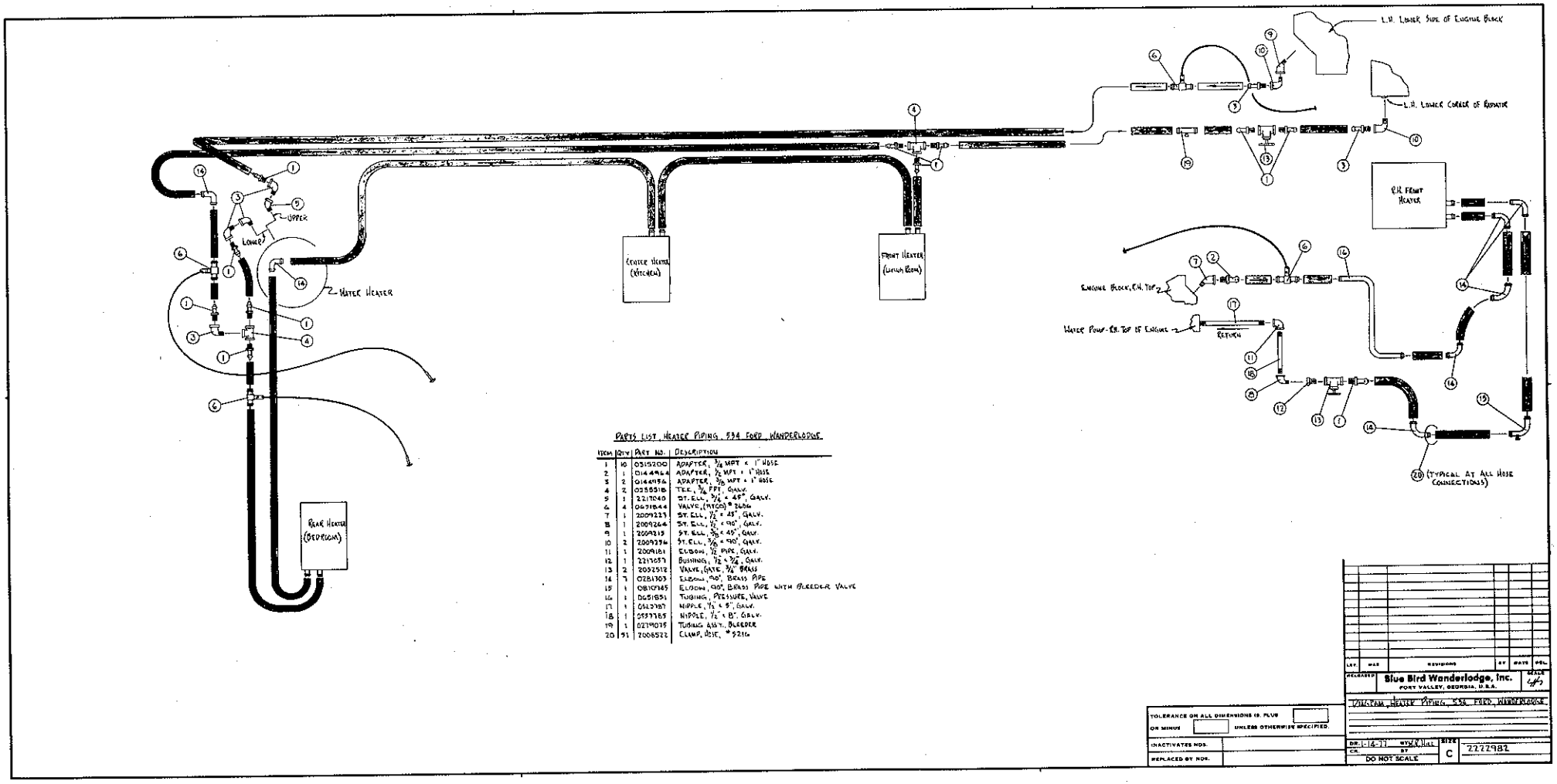
If the motorhome is to be stored outside during cold weather, it will be necessary to winterize the water systems to prevent damage from freezing conditions. To prevent freezing of water pipe supply line, pipes are wrapped with heat-tapes that operate automatically as long as the coach is connected to an ac supply. Check that tapes are plugged in (observe receptacle located in rear of refrigerator compartment). The following paragraphs describe the necessary steps to be taken to ensure that your coach can withstand sub-freezing temperatures without harm.

DRAINING THE FRESH WATER SYSTEM

Tilt the coach rearward and drain the fresh water system completely by opening all faucets and drain valves, including those on the water heater and water storage tank. (This is the same procedure as that previously described for sanitizing the water supply system. To summarize:

1. Open all faucets, valves and drains.
2. Leave drains open.
3. Block toilet valve open (if of the mechanical-seal type). This may be done by blocking the seal in the bottom of the bowl open with some objects of proper size, being careful it does not fall through the holding tank.
4. If a water filter is installed, remove filter cartridge and drain lower portion of housing.
5. Turn water pump switch on. Allow pump to run dry for a few minutes and then turn switch off.
6. As an added precaution, after water has stopped draining, and with valves and faucets still open, air pressure can be applied to the commercial water connection to blow out any remaining water that may be trapped.

Figure 5-3. Heat Exchanger Loop with Hot Water Heater, Interior Heaters.



PARTS LIST, HEATER PIPING, 534 FORD, WANDERLODGE

ITEM	QTY	PART NO.	DESCRIPTION
1	10	0315200	ADAPTER, 3/8 MPT x 1" HOSE
2	1	0144964	ADAPTER, 1/2 MPT x 1" HOSE
3	2	0144956	ADAPTER, 3/8 MPT x 1" HOSE
4	2	0355516	TEE, 3/4 FPT, GALV.
5	1	2217040	ST. ELL, 3/4 x 45°, GALV.
6	4	0631844	VALVE, (MICO) # 2604
7	1	2009223	ST. ELL, 1/2 x 45°, GALV.
8	1	2009264	ST. ELL, 1/2 x 90°, GALV.
9	1	2009219	ST. ELL, 3/4 x 45°, GALV.
10	2	2009234	ST. ELL, 3/4 x 90°, GALV.
11	1	2009181	ELBOW, 1/2 PIPE, GALV.
12	1	2217057	BUSHING, 1/2 x 3/4, GALV.
13	2	2032512	VALVE, GATE, 3/4 BRASS
14	7	0281303	ELBOW, 90°, BRASS PIPE
15	1	0810385	ELBOW, 90°, BRASS PIPE WITH BLEEDER VALVE
16	1	0651851	TUBING, PRESSURE, VALVE
17	1	0523187	NIPPLE, 1/2 x 5", GALV.
18	1	0597385	NIPPLE, 1/2 x 8", GALV.
19	1	0219019	TUBING ASS'Y., BLEEDER
20	51	7006522	CLAMP, HOSE, # 5216

LET.	MAS	REVISIONS	BY	DATE	APP.

RELEASED — Blue Bird Wanderlodge, Inc. — FORT VALLEY, GEORGIA, U.S.A. — SCALE: NONE

HEATER PIPING, 534 FORD, WANDERLODGE

TOLERANCE ON ALL DIMENSIONS ± PLUS OR MINUS ____ UNLESS OTHERWISE SPECIFIED.

INACTIVATES NOS.

REPLACED BY NOS.

DR. 1-16-77 BY W.V. HALL

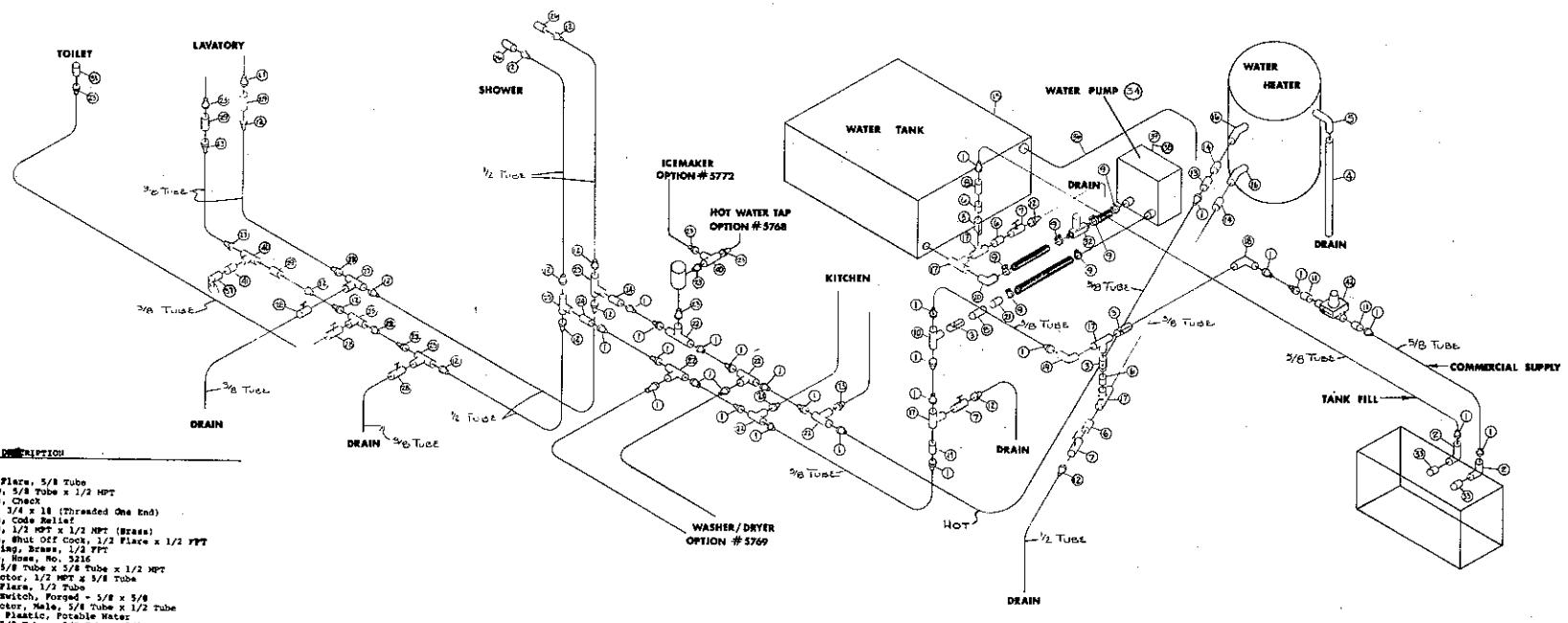
CK. BY

DO NOT SCALE

SIZE C

2222982

Figure 5-2. Major Components of Potable Water Distribution System.



PART NO.	ITEM	QTY.	DESCRIPTION
2627093	1	28	Nut, Flare, 5/8 Tube
3026708	2	2	Elbow, 5/8 Tube x 1/2 MPT
0397308	3	4	Valve, Check
0384099	4	1	Pipe, 3/4 x 18 (Threaded One End)
2015865	5	1	Valve, Code Relief
2196939	6	1	Elbow, 1/2 MPT x 1/2 MPT (Brass)
2196947	7	2	Valve, Shut Off Cock, 1/2 Flare x 1/2 FPT
2017903	8	2	Coupling, Brass, 1/2 FPT
2000532	9	6	Clamp, Hose, No. 5216
2017853	10	1	Tee, 5/8 Tube x 5/8 Tube x 1/2 MPT
2028672	11	3	Connector, 1/2 MPT x 5/8 Tube
2027884	12	20	Nut, Flare, 1/2 Tube
2196954	13	4	Nut, Switch, Forged - 5/8 x 5/8
2196896	14	1	Connector, Male, 5/8 Tube x 1/2 Tube
2194686	15	1	Tank, Plastic, Potable Water
2198982	16	1	Tee, 5/8 Tube x 5/8 Tube x 5/8 Tube
2198970	17	1	Tee, 5/8 Tube x 1/2 MPT x 5/8 Tube
2823539	18	2	Bushing, Pipe, 1/2 MPT x 3/8 FPT
2027753	19	2	Insert, Straight, 3/8 MPT x 1/2 Barbed
8800437	20	2	Reducer, Galv., 1/2 FPT x 3/4 FPT
2196988	21	2	Tee, 5/8 Tube x 5/8 Tube x 1/2 Tube
2017713	22	5	Tee, 5/8 Tube x 5/8 Tube x 3/8 Tube
2027876	23	9	Nut, Flare, 3/8 Tube
2017721	24	3	Union, 1/2 FPT x 3/8 Tube
2017747	25	5	Tee, 1/2 Tube x 1/2 Tube x 1/2 MPT
3038664	26	2	Connector, 3/8 MPT x 1/2 Tube
0409482	27	1	Faucet, Shower
2017390	28	3	Valve, Stop, 1/2 FPT x 3/8 Tube
0535500	29	2	Union, 1/2 Tube x 3/8 Tube
0534685	30	1	Faucet, Bathroom
0386321	31	1	Connector, 3/8 MPT x 3/8 Tube
2026921	32	1	Guard,Pump
2016891	33	2	Fitting, Round, 1/2 FPT x 3/4 FCHT w/Plug
2016913	34	1	Pump, Water
0526546	35	1	Faucet, Kitchen
0522409	36	1	Hose, Flexible
N/A	37	1	Switch, Pressure, Pump Control
2220408	38	1	Plug, 3/8 - 16 x 1/2 Long
XX29980	39	1	O-Ring Seal
2221372	40	1	Tee, 3/8 Tube x 3/8 Tube x 1/4 MPT
2220416	41	1	Adaptor, 1/4 FPT x 3/8 - 16 Straight THD
2221653	42	1	Regulator 6N250

LAY.	WAS	REVISIONS	BY	DATE	APPD.

REVISED — Blue Bird Wanderlodge, Inc. — FORT VALLEY, GEORGIA, U.S.A. — SCALE

DIAGRAM, WATER SYSTEM, 1977

TOLERANCE ON ALL DIMENSIONS IS, PLUS ___ OR MINUS ___ UNLESS OTHERWISE SPECIFIED

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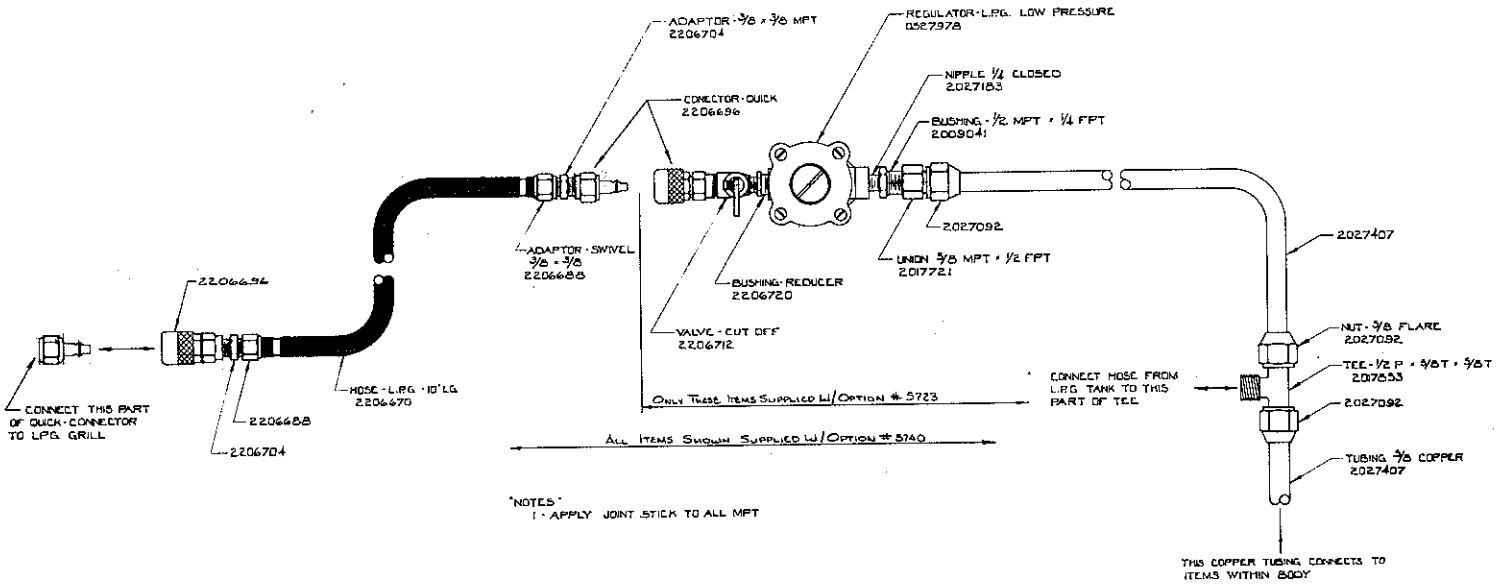
DR. 1/6/77 BY PEARCE — CK. BY — DO NOT SCALE — SIZE C — 2212739



LET.	MAT.	REVISIONS	BY	DATE

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM - GAS GRILL PLUMBING

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DR. 10-16-74 BY GGV
CK. BY
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SIZE C

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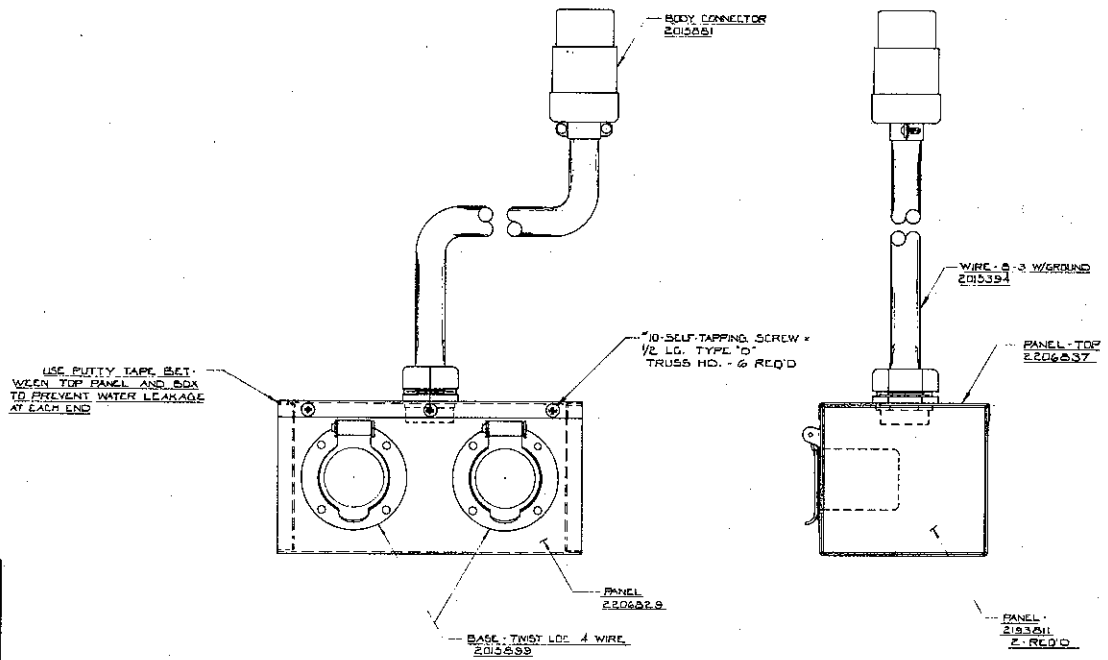
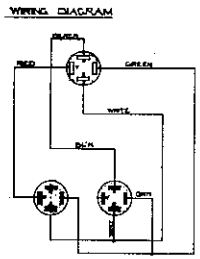




OPTION NO. 5932

LAY.	WAS	REVISIONS	BY	DATE	APP.

APPROVED

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

SIZE M

ADAPTOR ASSY - SHORELINE
2 - 30 AMP
Option 5932

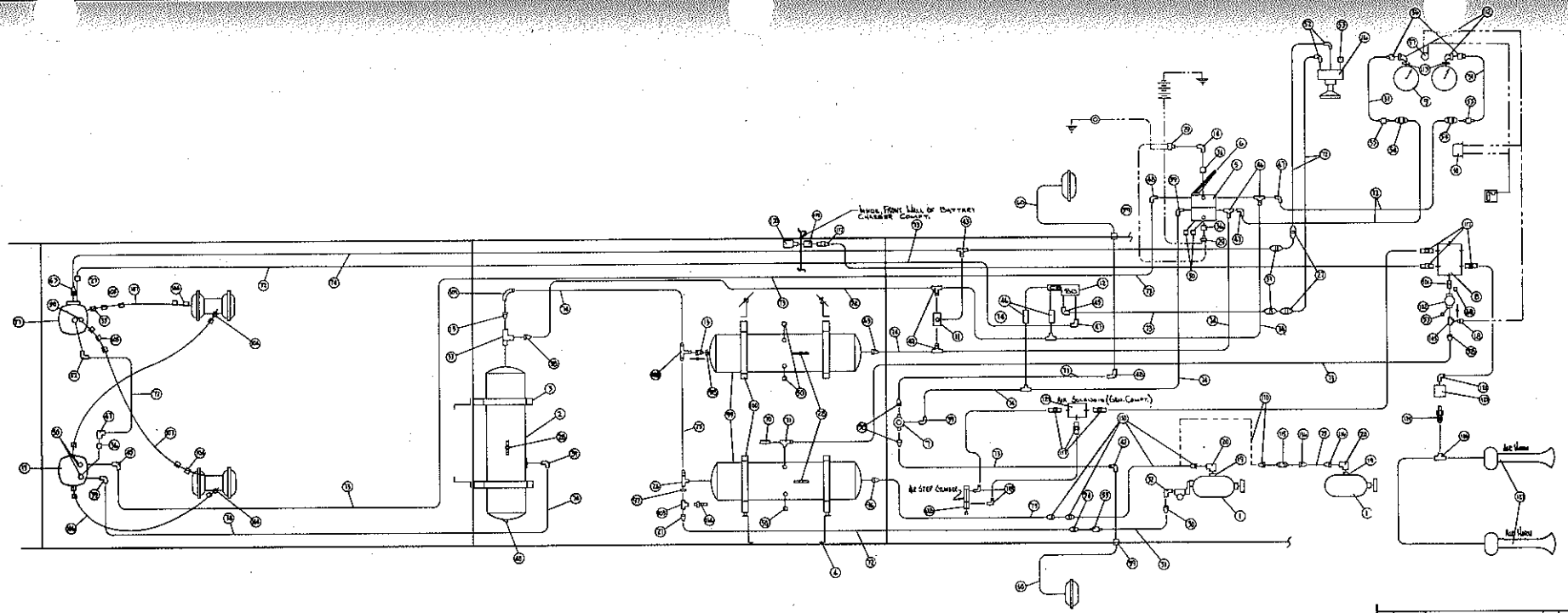
DR. 10-22-74 BY CGV
CK. BY
DO NOT SCALE

SIZE C 2206787

TOLERANCE ON ALL DIMENSIONS IS: PLUS ☐ OR MINUS ☐ UNLESS OTHERWISE SPECIFIED.

INACTIVATED NOS.

REPLACED BY NOS.



TOLERANCE ON ALL DIMENSIONS IS PLUS OR MINUS	UNLESS OTHERWISE SPECIFIED.		
INACTIVATES NOS.			
REPLACED BY NOS.			

LET.	REVISIONS	BY	DATE
RELEASED	**Blue Bird Wanderlodge, Inc.** FORT VALLEY, GEORGIA, U.S.A.		
DIAGRAM, AIR SYSTEM, WANDERLODGE			
DR. J-10-77 BY W.L.		SIZE	
CK. BY		C	0692531
DO NOT SCALE			

PARTS LIST
AIR SYSTEM
WANDERLODGE

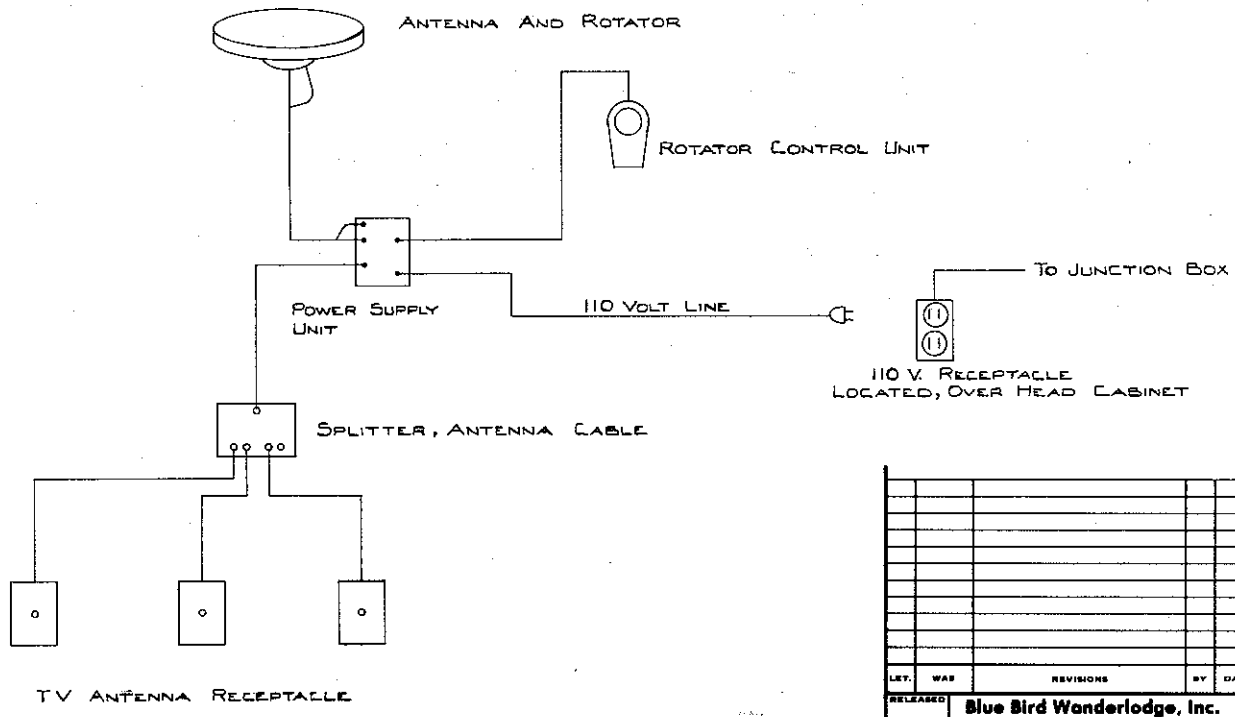
ITEM NO.	QTY.	B.B. NUMBER	DESCRIPTION
1	1		Air Compressor, 12 CFM
2	1	2023025	Reservoir 8" x 28" - 1240 Cu. in.
3	2	0555575	Reservoir Bracket - 1240
4	4	0559080	Spacer, Air Tank Bracket
5	1	0554533	Valve, Dual Brake, E5
6	1	0554525	Treadle, Dual Brake Valve
	1	0554517	Pin, Fulcrum, Dual Brake Valve Not Shown
	1	0554508	Roll Pin, Fulcrum Not Shown
	1	0554491	Stop Button Not Shown
	1	0554483	Plunger Not Shown
	1	0554475	Boot Not Shown
	3	0554459	Capscrew,5/16-18NC x 7/8 long Not Shown
			S.S.
	3	2001188	Lockwasher, 5/16 Not Shown
	1	0554467	Mounting Plate Not Shown
7	1	2023075	Valve, Quick Release,3/8 Pipe Supply
8	1	2025083	Manifold Fitting (Junction Block)
9	2	0804355	Gauge, Air Pressure (Supplied with Instrument Panel)
10	1	2000187	Buzzer, 12 Volt
11	1	0554434	Valve, Double Check, 3/8Pipe
12	1	0554426	Valve, Spring Brake
13	2	0554418	Valve, Single Check, 1/2 Pipe
14	1	2027233	Elbow, 90° Street, 1/4 Pipe
15	1	0417527	Valve, Relay, R-8
16	1	0554392	Valve, PP-1 Control
17	1	0554400	Valve, Relay, R-8
18	1	0554384	Indicator, Low Pressure, 1/4 Pipe
19	1	2023091	Fitting, Discharge, 1/2" Pipe
20	1	2026706	Elbow, 90° Male, 1/2 Male Pipe x 5/8 Tube
26	1	0809339	Tee, 1/2 Female Pipe x 3/4 Male Pipe x 5/8 Tube
27	4	2023224	Connector, 1/4 Male Pipe x 1/4 Tube
28	3	2023117	Drain Cock, 1/4 Pipe
29	2	0554368	Switch, Stop Light (SL-5) 1/4 Pipe
30	1	2020899	Hose End, Inverted Flare Male Swivel 1/4 Tube x 1/4 O.D. Hose
31		2008324	Hose, 1/4 I.D. x 1/2 O.D.
32	1	2026979	Elbow, Male, Inverted Flare, 1/4 Tube x 1/8 Male Pipe
33	1	0554350	Tee, 1/2 Pipe Street
35	2	2027217	Elbow, 45° Dytrry, 1/2 Pipr
36	3	2027134	Bushing, 1/4 x 3/8 Pipe
38	1	2023350	Connector, 1/2 Male Pipe x 1/2 Tube
39	4	2023307	Elbow, 3/8 Male Pipe x 1/2 Tube
40	1	0417550	Plug, 1/2 Pipe
41	2	2023505	Tee, 1/4 Female Pipe x 1/2 Tube x 1/2 Tube
42	2	0556878	Tee, 3/8 Male Pipe x 1/2 Tube x 1/2 Tube
43	1	0554335	Tee, 3/8 Male Pipe x 1/2 Tube x 3/8 Tube
44	2	2009330	Nipple, 1/4 Pipe x 2" Long (Steel)

PARTS LIST
AIR SYSTEM
WANDERLODGE

ITEM NO.	QTY.	B.B. NUMBER	DESCRIPTION
45	2	2023190	Elbow, 1/4 Male Pipe x 3/8 Tube
46	2	0654319	Tee, 1/4 Female Pipe x 3/8 Male Pipe x 1/2 Tube
47	4	2023935	Elbow, 1/4 Male Pipe x 1/4 Tube
48	3	2023265	Elbow, 3/8 Male Pipe x 3/8 Tube
50	6	2009505	Plug, 3/8 Pipe
51	2	2023257	Connector, 1/4 Female Pipe x 3/8 Tube
52	3	2023785	Elbow, 1/8 Male Pipe x 1/4 Tube
53	2	2027118	Plug, 1/8 Pipe
54	3	2052738	Union, 1/4 Tube
55	3	2020807	Hose End, Rigid Tube, 1/4 Tube x 1/4 I.D. Hose
56	2	2008191	Hose End, Female 45° Flare Swivel, 1/4 Tube x 1/4 I.D. Hose
57	1	2006807	Light, Pilot, 17/32 Red Lens
58	3	2023182	Connector, 1/4 Male Pipe x 3/8 Tube
59	2	0758598	Anchor Coupling, 3/8 Pipe Tap
66	2	0770909	Hose, Ass'y, 7/16" I.D. x 23" Long
63	2	0558015	Connector, 3/4 Male Pipe x 1/2 Tube
68	1	2023513	Plug, 1/4 Pipe
70	1	0839019	Safety Valve, 1/4 Male Pipe
71	1	0654285	Tee, 1/4 Female Pipe x 3/8 Male Pipe x 3/8 Tube
72		2008431	Copper Tubing, 1/4
73		2027381	Copper Tubing, 3/8
74		2027399	Copper Tubing, 1/2
75		2027407	Copper Tubing, 5/8
96	1	0558023	Connector, 3/4 Male Pipe x 5/8 Tube
97	1	2027159	Bushing, 1/4 x 1/2 Pipe
98	1	2023950	Bushing, 1/2 x 3/4 Pipe (Steel)
98	2	2023042	Reservoir, 0 1/2 x 27 - 1780 Cu. in.
100	4	0850586	Reservoir Bracket - 1760
101	1	2009322	Nipple, 1/4 Pipe Close (Steel)
102	1	0522508	Valve, Pressure Protection, 65 Ps.
103	2	0654277	Tee, 1/4 Pipe Service
104	4	2008282	Elbow, 45° Street, 3/8 Pipe
105	2	2023539	Bushing, 3/8 x 1/2 Pipe
106	2	0770917	Hose Ass'y, 7/16" I.D. x 26" Long
107	2	0770883	Hose Ass'y, 7/16" I.D. x 20" Long
108	1	2023901	Tee, 1/2 MPT x 1/2 Tube x 5/8 Tube
109	1	2023349	Elbow, 1/2 MPT x 1/2 Tube
110	1	0810630	Hose Ass'y., Air Comp. Disch. Teflon, 24" long, 389, 427 & 534
111	1	0810548	Hose Ass'y., Air Comp. Disch. Teflon, 48" long 548,3208,V504 & 6V53
112	2	2008241	Elbow, Male 1/4 Tube x 1/8 Pipe
113	2	2008209	Coupling, Pipe 1/8
114	1	0816609	Valve, Schrader, 1/4" MPT
115	1	0839001	Union, 5/8 Tube Flare x 5/8 Tube Flare 45°
116	2	2027092	Nut 5/8 Tube Flare 45°

PARTS LIST
AIR SYSTEM
WANDERLODGE

ITEM NO.	QTY.	W.L. NUMBER	DESCRIPTION
117	7	2204634	Connector, 1/4 MPT x 1/4 Tube
118	2	2204826	Elbow, 1/4 MPT x 1/4 Tube
119	1	2203354	Coupling, 1/4" Steel w/Pipe Threads
120	1	2204014	Check Unit, Threaded air line 4004-12
121	1	2205110	Elbow, 1/8" MPT x 1/4 Tube
122	1	2206449	Solenoid, Air Horn
124	1	2205128	Union, 1/8 MPT x 1/4 Tube
126	1	2222890	Tee, 1/4 Tube x 1/4 Tube x 1/4 Tube
127	1	2220564	Air Horn, W/L
128	1	2216398	Air Cylinder, Step
129	1	2216208	Solenoid, Air Step



LET.	WAS	REVISIONS	BY	DATE	REL.

RELEASED

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

SCALE

DIAGRAM, WIRING, TV ANTENNA
110 VOLTS

TOLERANCE ON ALL DIMENSIONS IS, PLUS ____ OR MINUS ____ UNLESS OTHERWISE SPECIFIED.

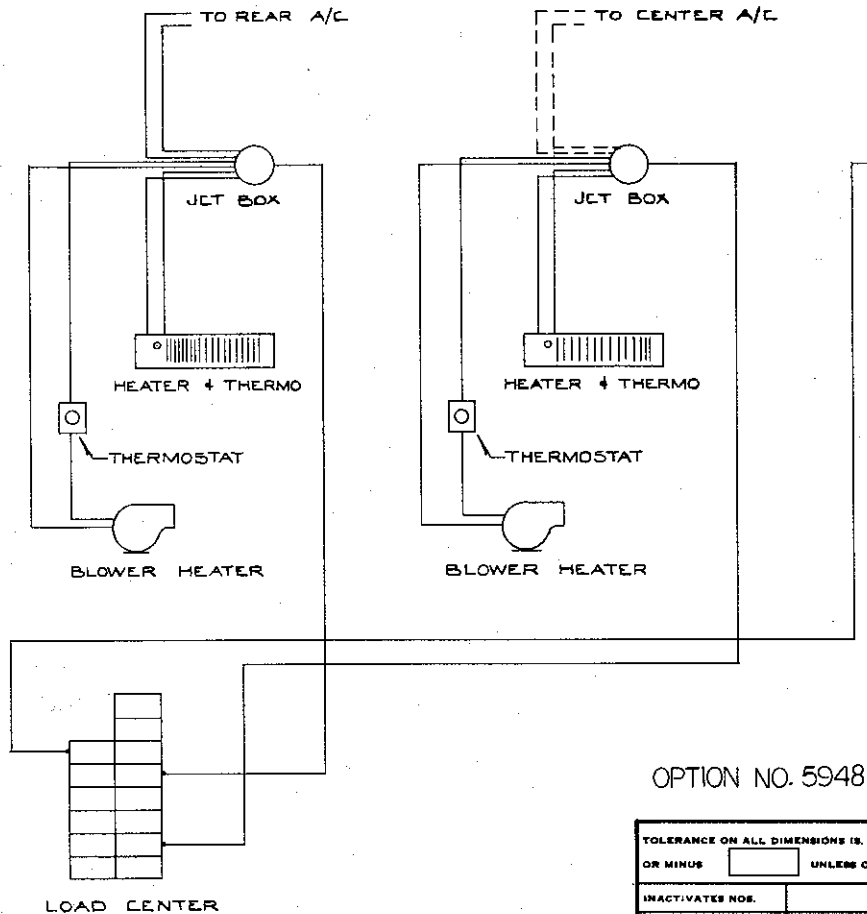
INACTIVATES NOS.

REPLACED BY NOS.

DR. 1-19-77 BY LGJ
CK. BY
DO NOT SCALE

SIZE B

2223097



OPTION NO. 5948

LET.	WAS	REVISIONS	BY	DATE	#

RELEASED

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

SCALE

DIAGRAM, WIRING, ELECTRIC HEAT
OPT NO 5948

TOLERANCE ON ALL DIMENSIONS IS, PLUS ____ OR MINUS ____ UNLESS OTHERWISE SPECIFIED.

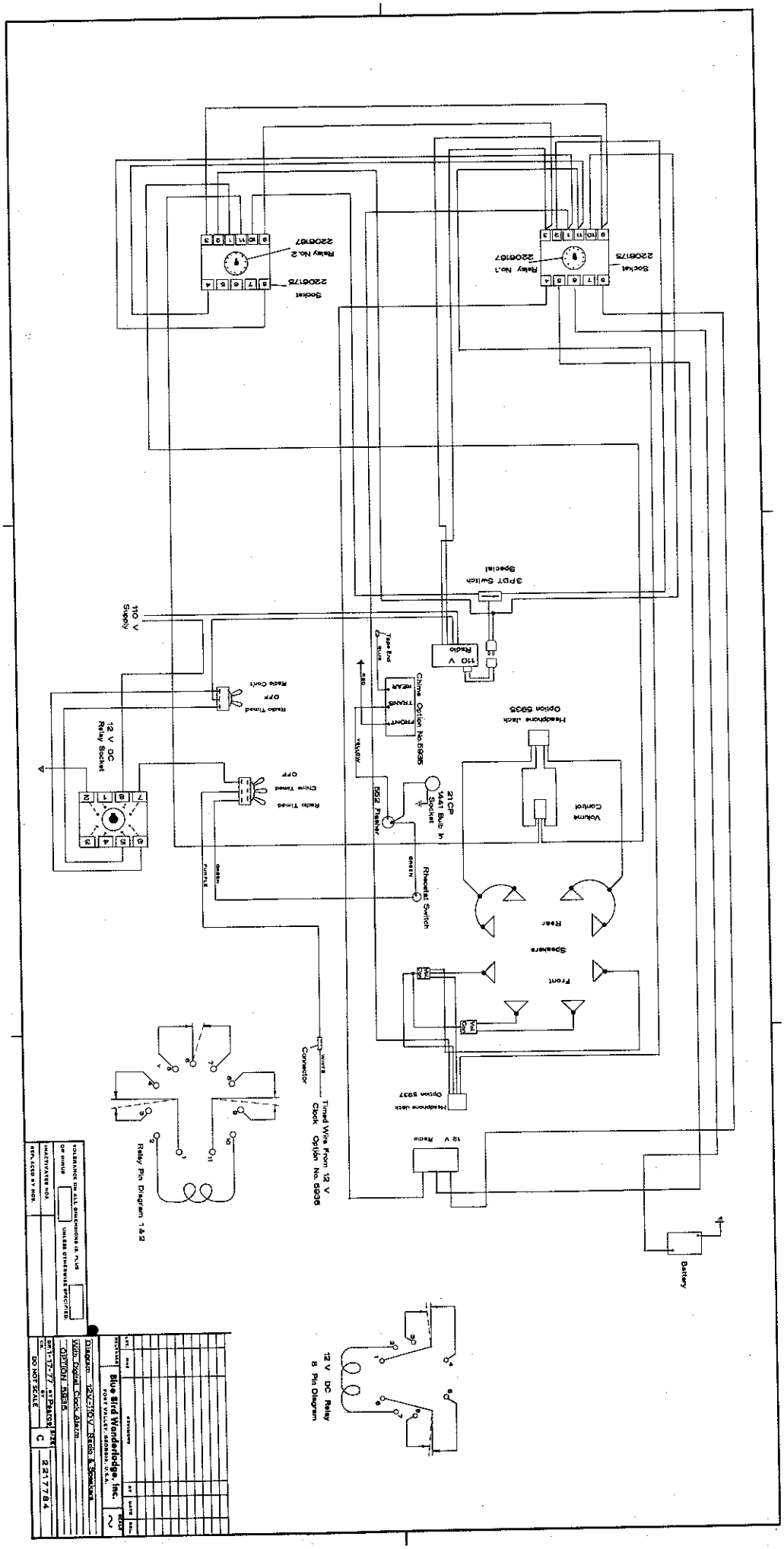
INACTIVATES NOS.

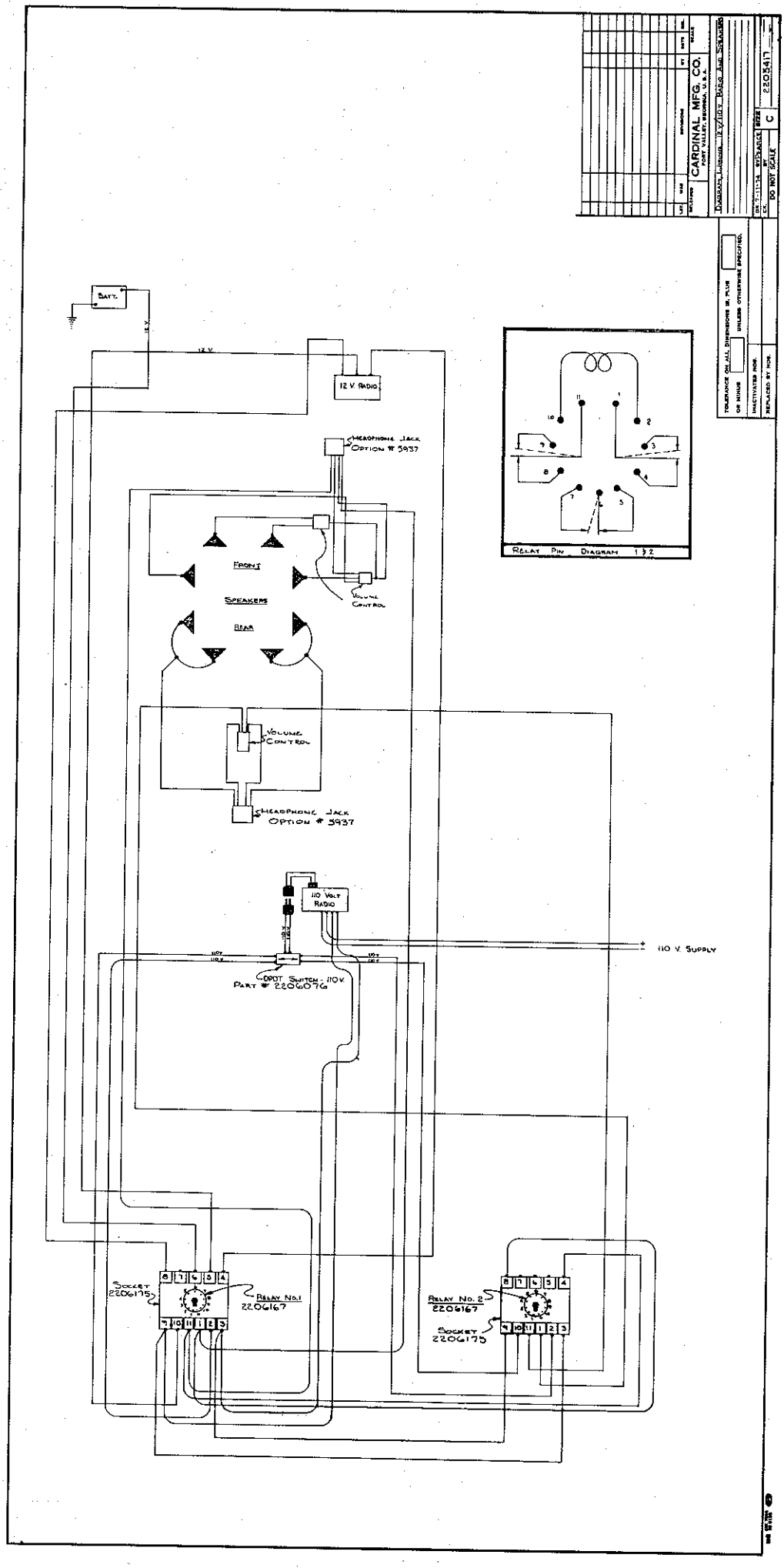
REPLACED BY NOS.

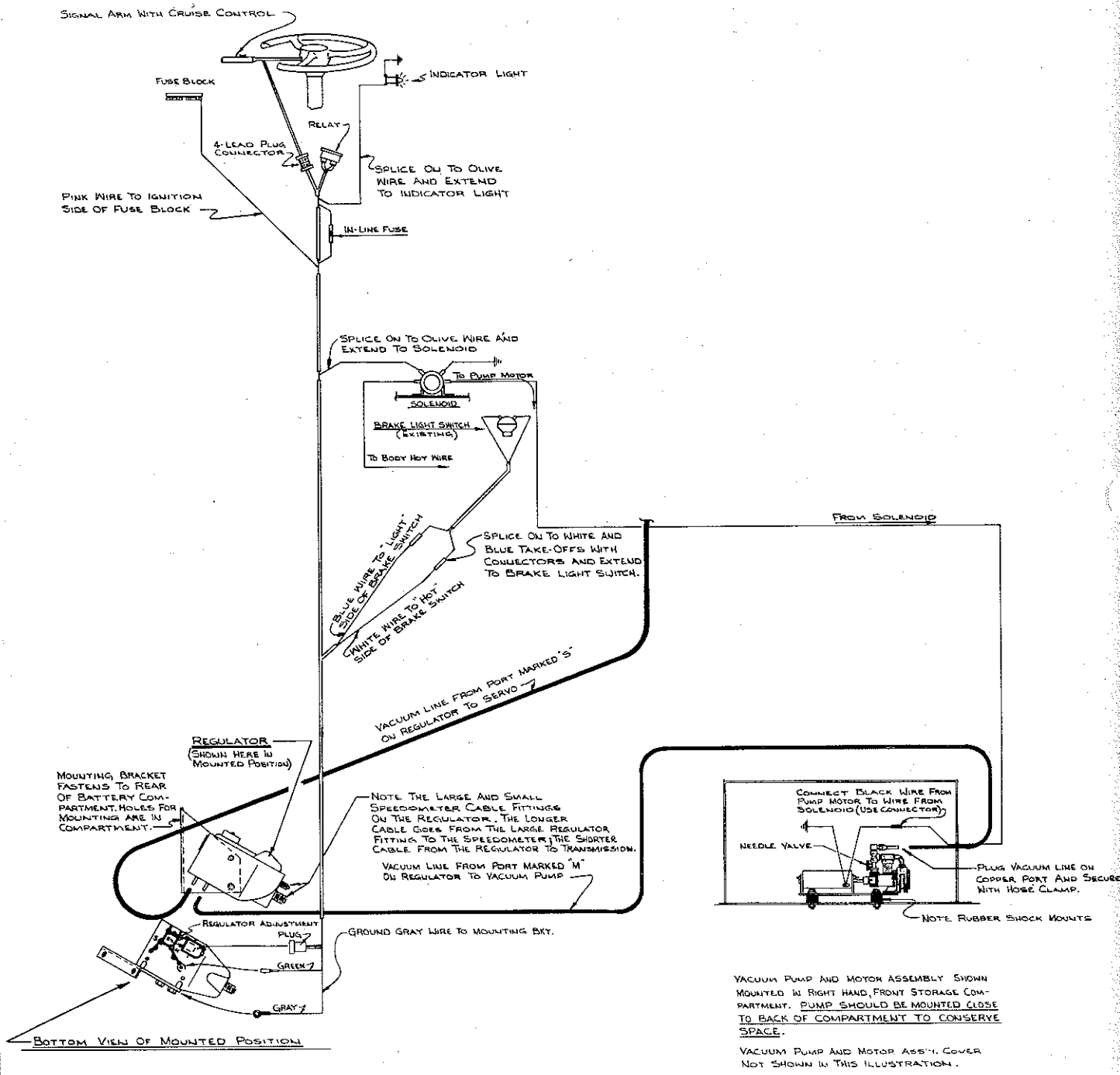
DR. 1-18-77 BY LGJ
CK. BY
DO NOT SCALE

SIZE B

2223055

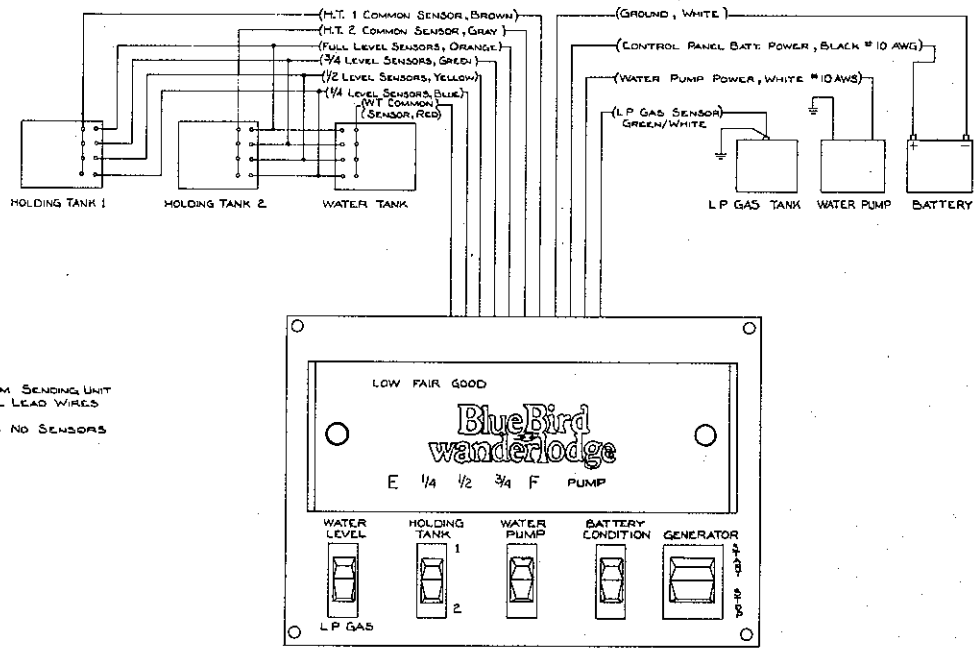

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.
Diagram 12V/110V Radio & Speakers
With Digital Clock Alarm
OPTION 5935
DWG. 12-27-77
221784
C
DO NOT SCALE
Timed Wire From 12 V Clock Option No. 5936
Relay Pin Diagram 1 & 2
12 V DC Relay 8 Pin Diagram
Battery
Speakers
Front
Rear
Volume Control
Headphone Jack Option 5935
Rheostat Switch
Chime Option No. 5935
Radio Timed Chime OFF
Radio Timed OFF
12 V DC Relay Socket
110 V Supply
3PDT Switch Special
Relay No.1
Relay No.2
Socket
Connector
Option 3937
12 V Radio
110 V Radio


CARDINAL MFG. CO.
PORT VALLEY, GEORGIA, U.S.A.
DRAWING, WIRING, 12 V 110 V RADIO AND SPEAKERS
SIZE C
2205417
DO NOT SCALE
TOLERANCE ON ALL DIMENSIONS IN PLUS OR MINUS UNLESS OTHERWISE SPECIFIED.
INACTIVATED NOW.
REPLACED BY NOW.
BATT.
12 V.
12 V. RADIO
HEADPHONE JACK OPTION # 3937
FRONT
SPEAKERS
REAR
VOLUME CONTROL
VOLUME CONTROL
HEADPHONE JACK OPTION # 3937
110 VOLT RADIO
110 V. SUPPLY
DPDT SWITCH - 110 V. PART # 2206076
SOCKET 2206175
RELAY NO. 1 2206167
RELAY NO. 2 2206167
SOCKET 2206175
RELAY PIN DIAGRAM 132



Vacuum Pump And Motor Assembly Shown Mounted In Right Hand Front Storage Compartment. Pump Should Be Mounted Close To Back Of Compartment To Conserve Space.

Vacuum Pump And Motor Ass'y. Cover Not Shown In This Illustration.



NOTES!

1- LP GAS CIRCUIT REQUIRES 90 OHM SENDING UNIT
2- UNLESS OTHERWISE SPECIFIED ALL LEAD WIRES ARE 18 AWG OR SMALLER
3- THE EMPTY INDICATION REQUIRES NO SENSORS

LET.	DASH	REVISIONS	BY	DATE	APPD.

RELEASED

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

SCALE

DIAGRAM, WIRING, SYSTEMS
CONTROL PANEL

TOLERANCE ON ALL DIMENSIONS ± PLUS OR MINUS ____ UNLESS OTHERWISE SPECIFIED

INACTIVATES NOS.

REPLACED BY NOS.

DR. 1-20-77 BY GJ
CH. BY
DO NOT SCALE

SIZE C

2223105

LIST OF TABLES

ILLUSTRATIONS

SECTION I

INTRODUCTION

This section of your Owner's Manual is devoted to providing general hints and recommendations for using your motorhome. Checklists and suggestions are offered which cover just about every phase of motorhome travel.

The remaining sections of this manual, Sections II through IX, describe in detail the operation and use of the individual items and systems which comprise your motorhome. The following paragraphs summarize the contents of these sections:

- Section II OPERATION — Covers driver instrumentation, operating controls, gauges and indicators. General data on operation of coach vehicular systems — gas and diesel — are also covered here.
- Section III LIVING AREA FACILITIES — Covers operation of heating and air conditioning systems, use of accessories and appliances and related general coach facilities data.
- Section IV ELECTRICAL SYSTEMS — Describes operation of coach electrical systems, ac/dc/generator switching is also described.
- Section V WATER DISTRIBUTION SYSTEMS — Covers internal supply and distribution, plumbing, city water hookups, tank fill and sanitizing, holding tank dumping and operation of hot water supply system.
- Section VI LPG DISTRIBUTION SYSTEM — Describes LPG internal supply and distribution, tank filling, precautions and locations of system components.
- Section VII AIR BRAKE SYSTEMS — Covers operation of service brakes and spring brake systems, fail/safe features and general brake systems operation.
- Section VIII GENERAL USER MAINTENANCE DATA — Describes those maintenance procedures which may be within the scope of the owner. Coverage is provided for preventive maintenance schedules, specifications and system capacities, cold weather operation, storage and winterizing procedures. Interior/exterior appearance care and emergency maintenance procedures are also described.
- Section IX.. GENERAL INFORMATION — A list of major components including model number and address of manufacturer.

We hope that our manual will answer any questions that may arise about the use, operation and maintenance of your motorhome. Any suggestions or recommendations that you might have for including or expanding on material of interest will be carefully considered for incorporation in periodic supplements. We are always interested in providing our coach owners with the most current and comprehensive information about our product. Your satisfaction is our assurance that we are fulfilling our responsibilities to our owners.

CHECKLISTS

A little preliminary planning will go a long way to help make your trips successful and enjoyable. As an aid to planning your travels, review the following checklists. If there are any additional items that you should be reminded of, add them where you see fit. Don't be overawed by the large number of items in these lists. These are only recommendations based on the experiences and suggestions of sources well-versed in motor-coach expertise. You will eventually find that a short "walk-around" the coach, outside and inside, will be adequate and, at the same time, be comprehensive enough to ensure that you're ready for travel.

BEFORE YOU LEAVE:

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

IS YOUR COACH READY? BEFORE ENTERING:

- Disconnect and stow:
  a. electrical hook-up cord.
  b. Sewer-hose hook-up hose (flush out).
  c. Water hook-up hose.
- Check all exterior lights for damage.
- Check wheel lug bolts for tightness.
- Check tires for correct pressure (see Section VIII).
- Check that TV antenna is in closed position.
- Check that all external compartments and filler openings are properly closed and/or locked.
- Check that items stored on exterior of vehicle are secured (Be sure these items present no clearance problem.)

NOTE

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

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

INSIDE THE COACH:

- Turn off water pump switch.
- Close windows and vents.
- Check that cabinet doors and drawers are closed.
- Check that refrigerator door is fastened.
- Check that no heavy items are stored in overhead cabinets. Store large items in base cabinets.
- Check that counter tops, range top, table tops and shelves are clear of unsecured items.
- Turn off interior lights; check that step is in up position.
- Secure and lock the main door.
- Adjust exterior and interior mirrors.

AND, BEFORE DRIVING AWAY:

- Check operation of appliances and special equipment.
- Check that the extinguisher is fully charged.
- Check operation of interior and exterior lighting.
- Start generator and check 120V system and wall outlets.
- Adjust the driver's seat so that all controls are within easy reach.
- Make sure seat is locked in position. Do not adjust driver's seat swivel or fore/aft mechanism while vehicle is moving. The seat could move unexpectedly causing loss of control. Check that front passenger's seat is locked in position — both fore and aft adjustment and swivel mechanism.

- Fasten seat belts. Belts should be placed as low as possible around the hips. This places the load of the body on the strong hip bone structure instead of around the soft abdominal area and prevents sliding out in case of an accident. Two people should never try to use the same seat belt.
- Check that warning light bulbs light when key is turned to ON or START position.

SOME ITEMS YOU MIGHT WANT TO TAKE ALONG ON YOUR TRIP.

NOTE

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

- Spare water purifier filter element.
- Adequate supply of prescription medicines.
- Prescription sunglasses or reading glasses.
- Camera equipment and film supply.
- Heating pads, ice bags, etc.
- Stationery, envelopes, stamps.
- Telephone number list
- Reading material.
- Special pet supplies.
- Purchase extra toilet chemical and toilet articles.
- A complete set of spare belts for engine-operated equipment.
- Spare parts for generator: suggested spares include sparkplugs, oil filters, fuel pump, air filter, solenoid. Four quarts of approved generator oil.
- A professional type, double-action tire pressure gauge.
- Under the heading of "Emergency" equipment, it is advisable to consider outfitting your coach with following items:
  - First aid kit
  - Emergency highway flares
  - Flashlight or lantern (with extra batteries)
  - Tool kit
  - Replacement lamp assortment
  - Replacement fuse assortment
  - A trouble light with a long cord

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

...AND SOME OTHER THOUGHTS TO CONSIDER:

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

CHECK YOUR AUTOMOTIVE SYSTEMS BEFORE YOU LEAVE.

- Check that fluid levels are normal (oil, power steering, engine coolant, battery electrolyte, windshield washers, transmission, etc.)
- Check generator oil level, starting battery condition.
- Check operation of turn signals, emergency flasher, stoplights and backup lights.
- Check that headlight high- and low-beams operate.
- Check horn operation.
- Check fuel gauge.
- Start engine and check gauges for signs of trouble.
- Check operation of foot brakes, emergency brake. (See that brake pressure builds up and steadies at about 90 to 105 psi.)
- Check tire pressures (Michelin recommends their tires be inflated to 100 pounds in the front; and 75 pounds in the rear.)

HOT WEATHER OPERATION

Whenever possible, choose a shaded parking site so that the coach will be cooler during the hottest part of the day. The full-length side awning will be especially helpful in lowering inside temperature.

Roof-mounted air conditioners are indispensable in hot climates. Keep in mind that their proper operation depends on adequate line voltage. Low voltage causes motors to run hotter and reduces compressor motor life. Supply voltage in some campgrounds may not be as high as it should be, especially when there are heavy loads from other air conditioners. Check the wall-mounted voltmeter if in doubt.

COLD WEATHER OPERATION

LPG appliances, furnace, and gas refrigerator are designed with sealed combustion areas. This is for your safety to prevent danger from carbon monoxide or depletion of oxygen.

If frost or condensation accumulates in closets or cabinets during long periods of cold weather operation, leave the doors to these areas slightly ajar to provide air circulation. Be sure that kitchen roof vent is open when using oven or burners.

CAMPGROUND COURTESY

Don't forget the "golden rule". Being considerate of your neighbors will help make friends. A few of the "do's and don'ts" are:

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

INSURANCE

As with your automobile, it is important that you have adequate protection with insurance coverages for personal liability, theft, collision, overturn, property damage, etc.

CANADIAN AND MEXICAN INSURANCE

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

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

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

Some insurance services include detailed route maps with "where to stay" recommendations and "things to see" mile-by-mile (or kilometer-by-kilometer post). While the rates set by Mexico may seem quite expensive at first glance, you usually end up not spending quite as much as expected because you can arrange to hold your stateside policy in abeyance during the same period you are in Mexico, thus not having to pay unnecessarily for double coverage. In addition, you can obtain substantial refunds on the Mexican collision insurance after your return to the U.S. Be sure to obtain a certification from the park operator at each location in Mexico to certify the dates your RV was parked there. At the end of the trip, and return to the U.S., apply to the offices of the Mexican insurance company, provide the signed park certificates, and you will be reimbursed for that portion of your policy term when you were in the parks. If your RV is parked for most of the time instead of constantly traveling, your refund may be a major portion of the original cost. This feature is referred to as the "in-storage" credit.

SAFETY CONSIDERATIONS

USING LP GAS

Check for leaks at the connections on the LP gas system soon after purchase and initial filling of LP tanks; continued periodic checks of the system are recommended. Even though the manufacturer and dealer have already made tests for leakage, this check is advisable because of the vibration encountered during travel. The coach construction provides access to all gas line connections. Apply a soapy water solution to the outside of the gas piping connections to find gas leakage (bubbles). Usually tightening of connections will close leaks. (be sure to first shut off gas supply!) If not, ask your authorized dealer service to make the necessary repairs.

Liquified Petroleum Gas (LPG) is heavier than air. Leaking gas tends to flow to low places, much as will water. It will sometimes pocket in a low area. LP gas can usually be detected by an identifiable odor similar to onions or garlic. Never light a match or allow any open flame in the presence of leaking gas.

Be sure that the main LP gas supply valve is closed during refueling to prevent accidental ignition of gasoline fumes by appliance pilot lights.

Do not exceed the rated liquid capacity of the LPG tank. Overfilling may cause LPG to flow through the regulator causing it to freeze and create excessive gas line pressure. It is good practice to watch while the tank is being filled to insure that this safety precaution will not be violated.

ELECTRICAL SYSTEMS

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

Two approved power supply cords are supplied with the coach for hook-up to the external power sources. One cord is intended for hookup to 110 volt 30 ampere power source, and a 20 ampere adapter is also supplied with this cord. A second cord is supplied for hookup to 220 volt, single phase, 50 ampere power source. Note that each cord has a ground pin which provides proper grounding. Grounding is your personal protection from electrical shock. Do not use any adapter, cheater, or extension cord that will break the continuity of the grounding circuit. NEVER remove the grounding pin for convenience of being able to connect a non-grounded receptacle.

NEVER operate your RV with a "hot skin". If you can feel a tingling shock — even a small one — from touching the RV while standing on the ground, immediately disconnect the electrical hook-up until the trouble is located. This fault is usually due to a break in the grounding circuit which should be continuous from the skin or frame to the distribution panel board to the third pin on the power supply cord and from there to the park receptacle and earth ground.

An optional power cord adapter is available that will allow you to connect two 30 ampere 120 volt lines (from separate circuits) to the shoreline plug in the rear of the coach. This will allow use of all motorhome appliances without overloading.

EMERGENCY STOPS

Always carry road flares and/or reflective triangular highway warning devices for emergency warning display. Pull off the roadway as far as possible when changing flats or for other emergency situations. Turn on your hazard warning flashers when parked alongside a roadway, even if only for a short while. Get members of your family out of the RV and have them stand clear of the vehicle area when parked on the edge of a highway.

MORE SAFETY CONSIDERATIONS

- Sanitize fresh water supply system periodically (see sanitizing instructions in Section V).
- Prevent water connection fittings from contacting the ground or drain hose to reduce chances of contamination.
- Consider using a qualified technician for repair of gas or electrical appliances.
- Check fire extinguisher periodically for proper charge.
- Avoid overloading your vehicle.

- Be careful not to cause an improper load distribution which can adversely affect roadability.
- Insure that tires are in good condition and properly inflated at all times. Under-inflated tires overheat and are more likely to blow out.
- Check and tighten wheel lugs regularly.
- Check brakes in a safe area — not while traveling a busy highway.
- Use seat belts.

VEHICLE LOADING

WEIGHT DISTRIBUTION AND LOAD CAPACITY

Located on the dashboard left side of the driver's position is the Federal Certification Label which gives the maximum weight-carrying capacities of your motor home and each axle, designated by the letters "GVWR" and "GAWR," respectively. Identification plates are shown in Figure 1-1

Figure 1-1 Identification Plate

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

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

Your motorhome is rated as follows:

GVWR	=	31,700 lbs.
GAWR (Front)	=	12,000 lbs.
GAWR (Rear)	=	18,500 lbs.

Generally a 31-foot unit will weigh approximately 24,000 pounds; a 33-foot unit will weigh approximately 25,000 pounds; and a 35-foot unit will weigh approximately 26,500 pounds. If optional equipment is installed, add the weight of these items to determine the total weight.

The load capacity is the difference between the GVWR and the actual weight. With standard equipment the load capacity is 31,700 lbs. minus the weight of the coach.

This means the total weight of all food, clothing and other supplies, and all passengers, must not exceed the difference in load capacity.

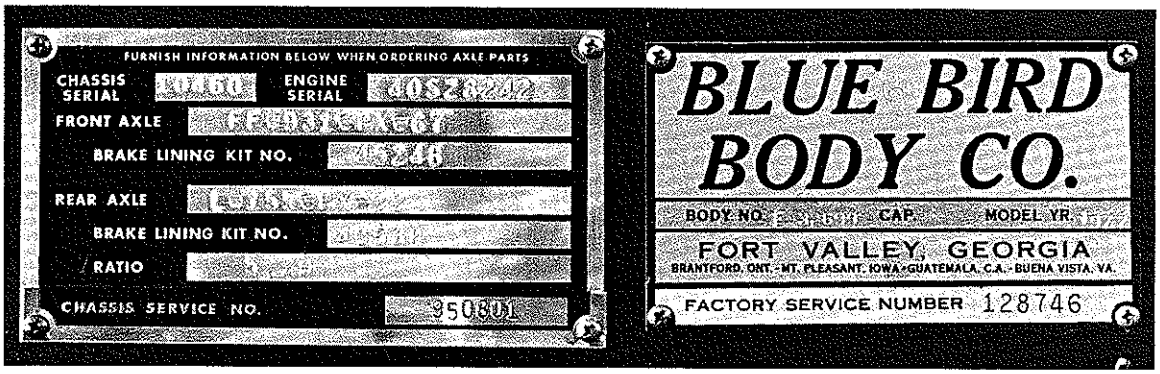
When loading your motor home, store heavy gear first, keeping it on or as close to the floor as possible. Heavy items should be stored centrally so as to distribute the weight more or less evely between the front and rear axles. Store only light objects on high shelves. Distribute weight to obtain even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

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

Additional data plates located underneath the hood table provide information useful for identifying your coach if you are planning on ordering parts. These plates provide the following information:

1. Body serial number.
2. Chassis serial number.
3. Model, year
4. Model number of axle (if axle parts are ordered.
   (See Figure 1-1A, page 1-7.)

Figure 1-1A Identification Plates.



ENGINE EXHAUST GAS [CARBON MONOXIDE]

Avoid inhaling exhaust gases because they contain carbon monoxide, which by itself is colorless and odorless. Carbon monoxide is a dangerous gas that can cause unconciouness and is potentially lethal. If at any time you suspect that exhaust fumes are entering the passenger compartment, have the cause determined and corrected as soon as possible. If you must drive under these conditions, drive only with ALL windows FULLY open.

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

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

Sittting in a parked vehicle with the engine running for an extended period without proper ventilation is not recommended.

ECONOMICAL DRIVING

How you drive, where you drive, and when you drive all have an effect on how many miles you can get from a gallon of fuel. The careful attention you give your vehicle as far as maintenance and repairs are concerned will also contribute to fuel economy.

ENGINE OPERATING HINTS

If your coach is equipped with a gasoline engine, it is designed to operate on regular grade gasoline. The engine does not require Premium grade fuel. If you have a diesel engine, it is recommended that you use Number 2 diesel fuel. In the event you need emergency assistance, Caterpillar Tractor Company, Engine Division, provides a 24-hour emergency number: 800-447-4986. In Illinois, call: 800-322-2806.

"JACKRABBIT" STARTS

Fuel can be conserved (and engine and tire life prolonged) by avoiding unnecessarily rapid accelaration away from lights and stop signs.

STOP-AND-START DRIVING

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

EXCESSIVE IDLING

An idling engine uses fuel, too. If you're faced with more than a few minutes wait and you're not in traffic, it may be advisable to shut the engine off and start again later.

LUBRICATION AND MAINTENANCE SCHEDULES

A properly lubricated vehicle means less friction between moving parts. Consult the maintenance schedule in Section VIII for proper lubricants to use, lubrication intervals, and general coach maintenance schedules.

AIR CLEANER

The mixture of fuel and air which powers the engine is taken into the system through the air cleaner. Replace the air cleaner at required intervals to maintain peak engine efficiency.

ENGINE TUNING

Overall tuning (timing, distributor points, spark plugs, emission control devices, etc.) can improve fuel mileage and engine performance. "Out-of-tune" engines provide poor mileage and air pollution.

EXCESS WEIGHT

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

TIRE INFLATION

Under inflation causes needless tire wear and reduces fuel economy. Check tire pressures on a regular basis. (Michelin recommends that front tires be inflated to 100 pounds; rear tires inflated to 75 pounds.)

OVERNIGHT STOPS

There are many modern recreational vehicle parks with good facilities, including State, County and Federal parks, where electrical, water and sewer connections are readily available. Directories are published which describe these parks in detail and list available services and hook-ups.

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

On longer trips, where sewer connections and utility hook-ups are unavailable, it will be necessary to stop from time to time to dispose of holding tanks wastes and replenish the water supply. Many gas stations (chain and individually owned) have installed sanitary dumping stations for just this purpose. (A good place to stop is a Union 76 Truck Stop for emergency service. Many of these stations have dump facilities.)

When stopping for the night, park the motorhome in a location that is relatively level and where the ground is firm.

EXTENDED STAYS

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

When planning to stay in the same place for several days, weeks, or months, be sure that the motor home is as level as possible. Check attitude with a small bubble level set on the refrigerator freezer shelf or work counter. If corrections are necessary, level the coach from side to side first. This can be done most easily by driving the coach up a small ramp consisting of 2" x 6" boards about four feet long and tapered at both ends. Do not place tires in a hole to level the coach.

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

Plug the electrical cable into the shore line hook-up. Be sure that the ground wire is properly connected.

Attach sewage and/or waste hook-up into the disposal facility.

WINTER TRAVELING

Certain precautions should be taken when traveling in your motorhome during cold winter months. Keep the following points in mind:

- Provide heat in the motorhome at all times.
- Have a plentiful supply of propane gas.
- If your stay is longer than overnight and you do not use the generator, try to have 120V electricity available.
- Minimize use of electricity if 120V power source is not available.
- Leave cabinet doors and wardrobe doors slightly open at night to allow circulation or air in and around all furniture components.

SECTION II

OPERATION

INTRODUCTION

This section provides information on the operation and use of controls, indicators and gauges associated with the vehicular systems of the coach. Figure 2-1 illustrates the driver's compartment.

INSTRUMENTATION PANELS

Two instrumentation panels contain the primary controls required for engine systems operation and monitoring. The dashboard panel, Figure 2-2, provides conventional gauges for monitoring and controlling engine performance; while the overhead instrument panel, Figure 2-4, contains interior climate controls and the radio/tape unit. A third panel, located below the dashboard, contains additional switching and safety brake controls.

DASHBOARD INSTRUMENTATION

FUEL GAUGE Indicates amount of fuel remaining in the fuel tank (maximum capacity is 150 gallons). This gauge reads only when the ignition switch is in ON or ACCESSORY position. Note: When the diesel engine is used, this fuel gauge reads the amount of gas (30 gallons) remaining in the generator fuel tank; or amount of diesel fuel in the main tank depending on the operation of the fuel tank selector toggle switch.

TURN SIGNALS Located on opposite sides of the speedometer, the right or left green turn signal lights blink in conjunction with the outside directional lights when the turn signal lever is moved to the appropriate position. Both turn signals blink in unison when the emergency flasher switch is on.

OIL PRESSURE GAUGE Indicates the pressure of the oil, not the amount of oil in the reservoir. This gauge will normally read on the high side during cruising speeds; and drop towards the low side when the engine is idling.

Figure 2-1. Driver's Compartment.

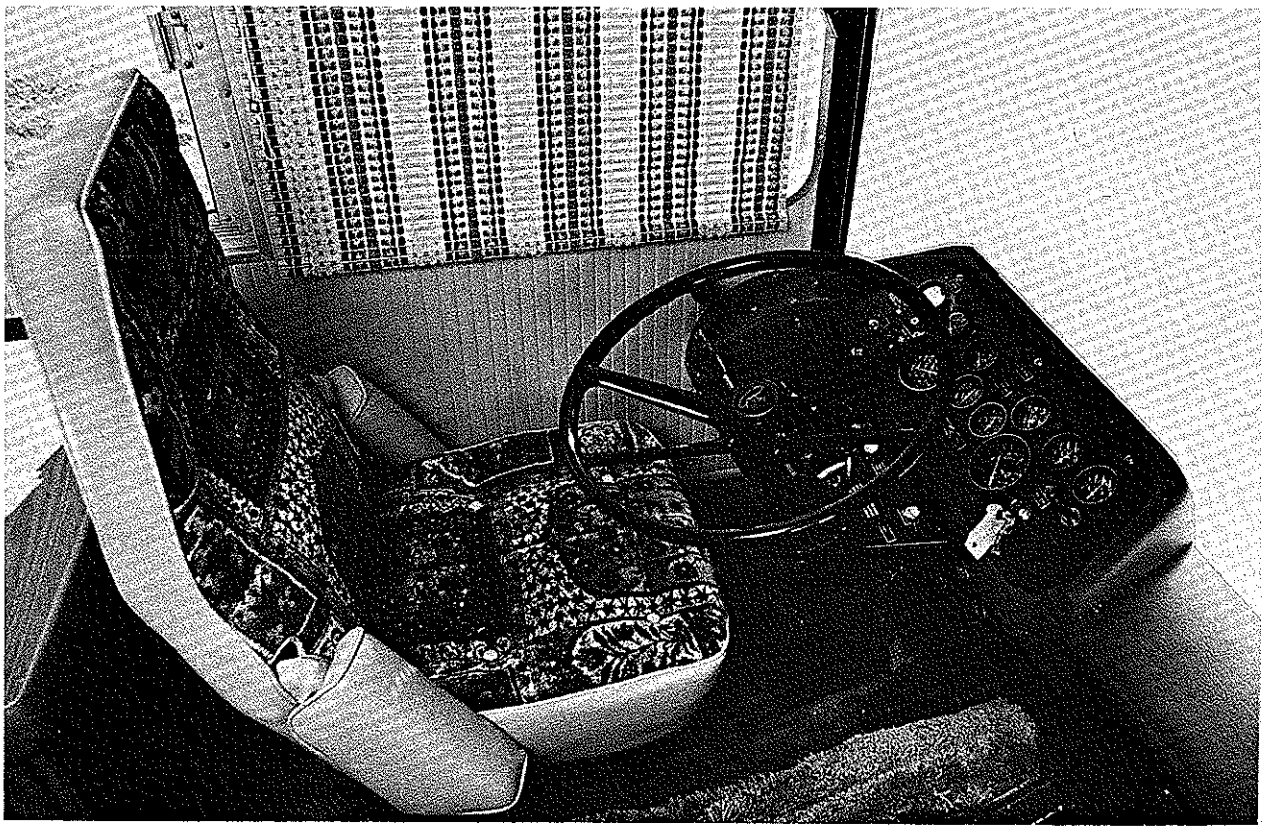
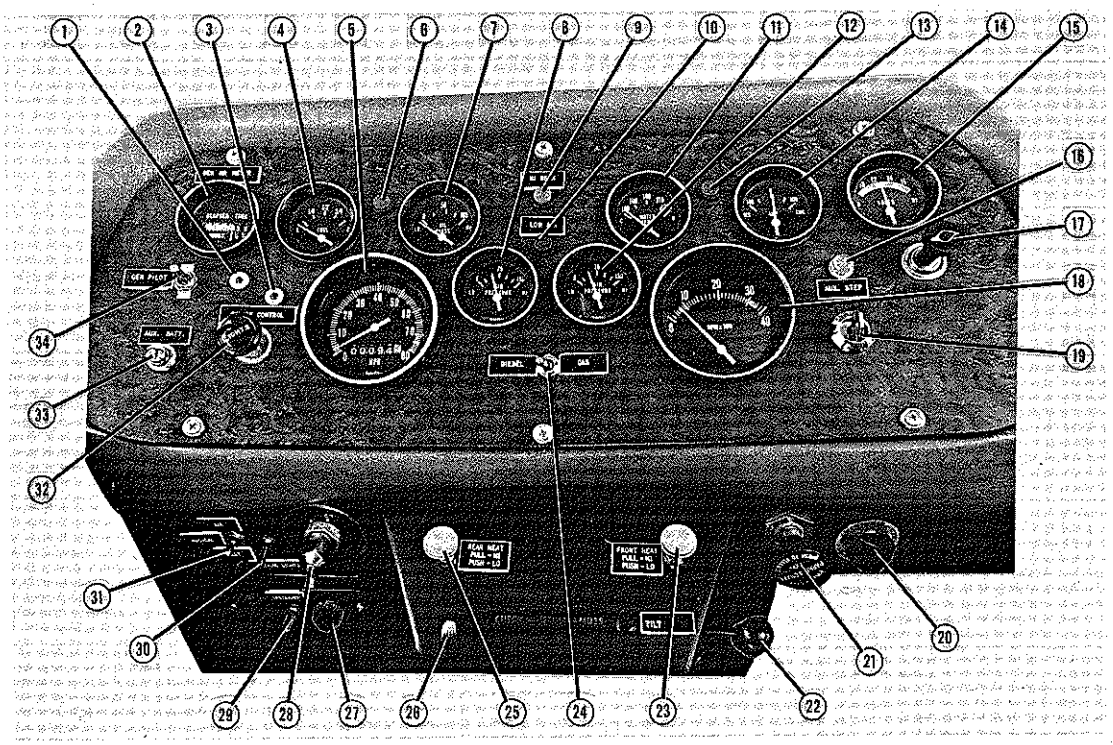


Figure 2-2. Dashboard Instrumentation.



ITEM	DESCRIPTION
1	Generator Pilot
2	Generator Hours Meter
3	Cruise Control Indicator
4	Fuel Gauge
5	Speedometer/Odometer
6	Left-hand Directional
7	Oil Pressure Gauge
8	Air Brake Pressure (Front)
9	High-Beam Indicator
10	Low Air Warning
11	Water Temperature Gauge
12	Air Brake Pressure (Rear)
13	Right-hand Direcitonal
14	Ammeter
15	Voltmeter
16	Auxiliary Step Indicator
17	Lighter
18	Tachometer
19	Ignition
20	Fresh Air Control
21	Safety Brake
22	Wheel Tilt Control
23	Front Heat Control
24	Fuel Gauge Switch
25	Rear Heat Control
26	Throttle
27	Spotlight Position
28	Battery Disconnect Switch
29	Spotlight On-Off Switch
30	Driving Lights Switch
31	Horn Selector Switch
32	Lights Switch
33	Auxiliary Battery Switch
34	Generator Start-Stop Switch

CAUTION

No oil pressure, or low oil pressure readings when the engine is running are trouble indications. Check oil level. DO NOT OPERATE ENGINE UNDER THESE CONDITIONS.

HI-BEAM INDICATOR Lights when headlights dimmer floor switch is pressed for high beam operation and headlights switch is on.

TEMPERATURE GAUGE Registers engine coolant temperature from 100 degrees to 240 degrees.

NOTE

If temperature gauge consistently indicates high engine temperature (over 210°) the engine is overheating and should be stopped before damage occurs. Allow engine to cool off before checking radiator and/or reservoir water level.

BATTERY AMPS METER Center-reading ammeter graduated from -100 amperes to +100 amperes shows whether battery is charging or discharging, while the engine is operating. Normally, the pointer reads center-scale, or slightly to the right (charge). This meter will indicate battery current drawn when the ignition is off. However, it will not indicate battery charging current supplied from the battery charger. This charging current is indicated by the ammeter located in the stepwell.

NOTE

Constant excessive charging or discharging can be an indication of a problem in the battery charging system. Check battery electrolyte level; check battery terminals for looseness or corrosion.

BATTERY VOLTS METER Expanded-scale voltmeter graduated from 10 to 16 volts shows condition of battery charge when ignition is ON. Normal battery voltage is 12 volts (nominal); with engine running and no battery loads, battery charging voltage is approximately 14 to 15 volts. Battery voltage readings of less than 10½ or more than 15 are usually symptoms of battery or electrical system malfunctions.

CIGARETTE LIGHTER Standard lighter which is depressed to heat element, and pops out to normal position when element is hot.

IGNITION SWITCH This is a standard automotive ignition switch, with four positions for accessory and ignition control. In OFF position (center), the ignition and accessory positions are disabled, and the key can be inserted or removed. In ON position (right), the battery is connected to the ignition circuits and the key can be advanced to the START position to start the engine. When released from START, the key returns to ON position.

NOTE

The ignition switch will start the engine only when the transmission lever is in N (neutral) position.

TACHOMETER The tachometer indicates true engine rpm (revolutions per minute) on a 0 to 5000 RPM scale (gas engine); or a 0 to 4000 RPM scale (diesel engine). Use this gauge as an overall engine performance indicator.

NOTE

Normally, gas or diesel engines will idle at about 500 to 700 rpm. However, during normal operation of the coach, maintain engine RPM at 2000 rpm for optimum performance. Normal operating range of gas engine is 2000 to 3000 rpm. Diesel engine normal operating range is 2000 to 2800 rpm.

AIR BRAKE PRESSURE GAUGES The dual air service brakes pressure systems are engine-operated and supply brake system air pressure for front and rear service brake systems, parking brake, and air-operated accessories. Under normal operation, each air pressure gauge reading will build up to approximately 90 to 105 psi shortly after the engine is turned on. Note that the parking brake will not release until air pressure reading are at least 60 psi.

LOW AIR WARNING LIGHT AND BUZZER This warning indicator is lit whenever the air pressure system is below 60 psi; a buzzer located behind the panel also sounds an alarm for low-ressure conditions.

CAUTION

IT IS NOT SAFE TO DRIVE THE UNIT IF THE LOW AIR PRESSURE WARNING LIGHT IS ON AND AIR PRESSURE GAUGES DO NOT INDICATE WITHIN SAFE LIMITS [90 psi to 105 psi]

LIGHTS SWITCH This three-position control operates the dash and exterior lights in the same manner as a standard automotive light control. Extend the switch out to the first position to turn on the panel lights and the parking lights. Turn the control clockwise to decrease the panel lighting; turn it counterclockwise to increase panel lighting level. Pull the control out to the last position to operate the headlights; press floor dimmer swithch to select normal or highbeam lights.

If the coach is equipped with high-intensity auxiliary headlights (foglights), note that these lights can be turned on only when the main headlights are on highbeam.

AUX BATTERY SWITCH Pressing this momentary switch connects the generator battery in parallel with the automotive batteries to provide a greater current source for engine or generator hard-starting situations. Release the switch after the engine starts.

GENERATOR ON-OFF SWITCH Press this center-off momentary rocker switch ON and hold until generator starts, as indicated by illumination of the GENERATOR PILOT light. (If generator does not start within 15-20 seconds, release switch, wait 30 seconds, then try again.) To shut the generator off, press switch OFF and hold until GENERATOR PILOT extinguishes.

GENERATOR TOTAL HOURS METER Elapsed-time meter indicates total hours of generator operation. Use these readings as a reminder for periodic generator maintenance.

FRONT HEATER CONTROL Push-pull control which sets front heater tempererature. Pull outward for more heat; push inward for less heat.

STEERING WHEEL TILT LEVER Pull lever outward to allow positioning of steering wheel to one of four detent settings. Release lever to lock wheel in position.

CAUTION

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

THROTTLE CONTROL Use this control to adjust the speed of the engine.

CHOKE CONTROL Use this control to adjust the air-gas carburetor mixture for easier starting until engine is warmed-up. (Not applicable to diesel engines.)

FUEL PUMP PRIMER SWITCH [Gasoline engines only] This switch bypasses the oil pressure safety switch which normally enables operation of the electric fuel pump when oil pressure is greater than 4 psi. Use this switch if engine does not start after long periods of idleness or when engine is hot after coach has been operated in extreme heat.

REAR HEATER CONTROL Push-pull control which sets rear heater temperature. Pull outward for more heat; push inward for less heat. Also controls the flow to the heat exchanger domestic hot water system.

HORN SELECTION CONTROL On coaches so equipped, this control allows selection of air, electrical, or musical horns.

DRIVING LIGHTS SWITCH Permits operation of driving lights when headlights are on "high-beam".

12 VOLT MASTER SWITCH setting switch to OFF position turns off all 12 volt supplies except for digital clock.

PARKING BRAKE CONTROL Push in to release parking brake; pull to apply brake.

NOTE

Do not push in this control if pressure gauge indicates less than 60 psi.

FRESH AIR CONTROLS Graduated control to the right of parking brake controls flow of air on co-pilot's side of coach, push-pull control, located below dash to right of steering column controls flow of fresh air to driver's side.

SPOTLIGHT Three controls are used to operate the spotlight. One selects the type of beam (flood or spot); one controls the rotation and tilt. The third switch controls the speed of rotation and tilt.

OVERHEAD INSTRUMENTATION

WIPER AND WASHER CONTROLS Two-speed independent wiper arm controls are provided at the left side of the panel. The WASHER switch, located between the WIPER controls, is pushed in to operate a pump which directs a stream of water to each windshield surface.

AUXILIARY PUMP This switch controls an auxiliary water pump that circulates water through the heat exchanger, hot water heater and rear heaters.

CLEARANCE LAMPS SWITCH Operate this switch to turn on the clearance lamps located on the top, sides, and ends of the coach.

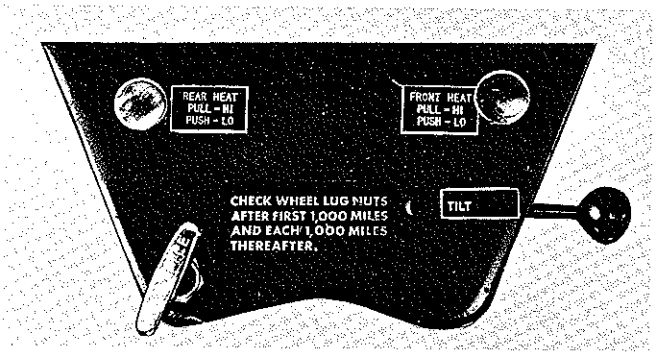
PANEL LOCK The entire panel is hinged at the bottom and may be opened for maintenance access; turn the lock button counter-clockwise to release the latch, then swing the panel downward.

DEFROST SWITCH The dual-speed DEFROST switch controls the operation of the dual blower for motors which direct defroster air to the front windows. Note that automotive air conditioner may also be used for defrosting when thermostat is in off position.

HEAT SWITCHES Two switches, L.H. HEAT and R.H. HEAT, control the operation of heater blower motors at their respective locations. Like the DEFROST switch, these are push-pull switches. The REAR HEAT MASTER CONTROL activates the three rear heaters which have their own individual controls.

AIR CONDITIONER FAN CONTROLS Dual three-speed FAN controls set the speed of the automotive air conditioner blower motors for the front of the coach. The AIR CONDITIONER thermostat, located between these controls, controls the temperature of the cooling air by cycling the air conditioner compressor. Maximum cooling is obtained with this control set to the left.

Figure 2-3. Steering Column Controls.



RADIO CONTROLS

1. Volume Control and ON/OFF Switch — The Volume control varies the sound output of loud speaker. It also functions as the "on-off" switch. Clockwise rotation increases volume.
2. Channel Selector Switch (transceiver) — Tuning of the receiver and transmitter is accomplished by rotating the channel selector switch at the right side. Set the switch to desired channel as indicated on the knob.
3. Channel Selector Switch (8 track) — Push in to switch tracks. This is the manual track switch. Otherwise the unit will automatically switch tracks at the end of each channel.
4. Tone Control — for treble response, rotate clockwise. For bass response, rotate counter-clockwise.
5. Balance Control — Rotate clockwise to increase volume of right speaker. Rotating it counter-clockwise reverses this balance.
6. Squelch Control — The squelch control is designed to reduce excessive noise (such as high line interference, ignition noise, etc.). This control must be set when only noise, no signal is heard. Turn the control fully counter-clockwise and increase the volume until noise or a signal is heard. When only noise is present, turn the squelch control clockwise until the noise is blanked out.
7. Local/Distance Switch — The local/distance switch functions to reduce the effect of cross-modulation which results from strong FM signals that overdrive the radio. Cross-modulation occurs most frequently when driving in an area containing strong

FM signals. When operating your radio in a strong FM signal area, unlock the local/distance switch to the local position. The radio will be set for reception in strong FM signal areas. When in normal FM signal area, press the local/distance switch to the distance position. The radio will be set for reception for normal signal areas.

8. Press-To-Talk Microphone — The receiver and transmitter are controlled by the press-to-talk switch on the microphone. Press in the switch and the transmitter is activated. Release this switch to receive. When transmitting, hold microphone 3 to 4 inches from mouth and speak clearly and in a normal voice.
9. Stand-by Button — Pressing in the stand-by button, while the radio or tape player is being used, will automatically cut off these functions when a transmitted signal is received on the selected CB channel. Note that the squelch control must be adjusted properly.
10. CB Button — Push for CB. Release for Radio and Tape.

8-TRACK STEREO

Rotate the power on-off switch clockwise and then insert an 8-track stereo tape cartridge into the tape slot until it locks to play. The player is simultaneously and automatically turned on and the channel indicator is on. Program 1 through 4 will be indicated in sequence. When the cartridge is pulled out, AM or FM or FM-MPX radio or transceiver are available for listening.

AM/FM/MPX RADIO LISTENING

Rotate the power on-off switch clockwise and then select desired wave band to either the AM or FM position (push the AM/FM change button for AM, unlock for FM) and select a station by turning the turning knob, adjusting volume, tone and balance knobs for suitable level. Whenever a stereo station is tuned in, MPX Lamp will be on (green color). When operating your radio in strong FM signal area, unlock the local/distance switch to the local position.

For best AM reception it is important to properly adjust the antennal trimmer. Tune, while on the AM band, to a weak station around 1,400KHz and turn the antenna trimmer to the point where the sound is the loudest.

TRANSCEIVER

Before operating this transceiver, you are required by law to be licensed and thoroughly understand part 95 of the F.C.C. rules and regulations. Select the channel on which you wish to operate by rotating the channel selector switch to the desired channel.

RECEIVER

Sensitive dual-conversion circuit with ceramic filter and all crystals supplied for CB reception. High sensitivity, built-in controlled squelch circuits and noise-limiting give noise free operation. If you keep STAND-BY button in lock, even when being used as either AM/FM radio or 8-track tape player while driving, these signals will be cut off automatically by break circuit and it is available for anybody to call in. When receiving the signal, the Receiving Indicator Lamp will be on (green color).

TRANSMITTER

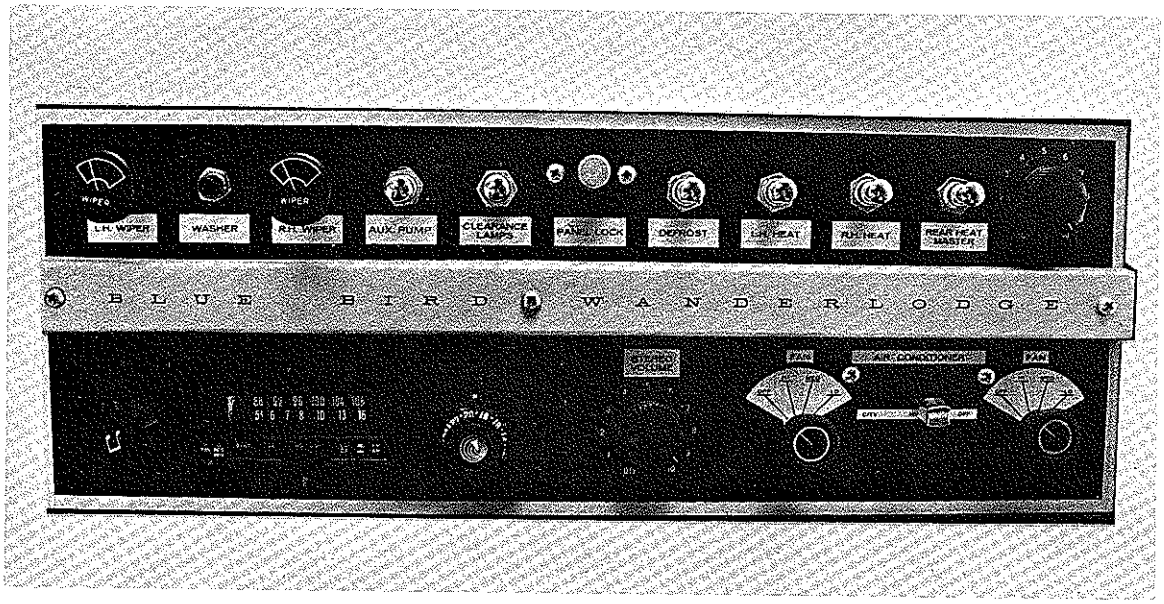
To transmit, press CB button. Speak directly into microphone, pressing in the switch and the transmitter is activated. The transmitting indicator lamp will be on (red color). Release switch to receive. The microphone should be held approximately 3 to 4 inches away from your mouth. Talking louder does not increase transmitting power and only causes distortion.

STEERING COLUMN CONTROLS

The steering column contains the horn button, emergency flasher, turn signal lever and speed control.

EMERGENCY FLASHER The emergency flasher is located on the right side of the steering column. Pull the switch outward to turn on the flashing directional lights; push the switch inward to shut the flasher off. Note that the directional signals on the dashboard flash in unison.

Figure 2-4. Overhead Instrumentation.

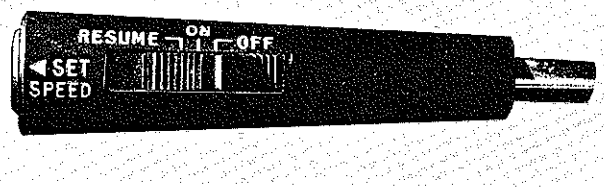


HORN Operate the horn by pressing in on the center section of the wheel. Select air, electric, or musical horn with switch located on lower panel.

TURN SIGNAL LEVER Move lever upward to signal a right turn; move lever downward to signal a left turn.

SPEED CONTROL The speed control, Figure 2-5, is installed as part of the turn signal lever. Before operating the speed control to lock in the coach speed, the unit must be traveling at least 35 to 40 miles per hour. Slide the switch left to ON position and press in the button at the end of the lever to set in the speed to the automatic controls. The accelarator may be used to increase the speed while traveling, but the speed cannot be decreased. Pressing the brake pedal or setting the speed control switch to OFF will disengage the constant speed feature. In the event you desire to resume the speed you were traveling at before the brake was pressed, slide the switch to the left to the momentary RESUME position and the vehicle will automatically resume the original speed. On diesel-powered coaches, be sure to set speed control to OFF when not in use.

Figure 2-5. Speed Control



FLOOR CONTROLS

HIGH BEAM SWITCH Press the switch once to turn on highbeam (when the normal headlights are on). Note that the HI-BEAM light on the dash is lit. Press the switch again to restore the normal headlights.

BRAKES The coach is equipped with a dual air brake system which includes two independent systems for the front and rear service brakes. A separate reservoir and panel-mounted pressure guage is provided for each service brake system. Refer to Section VII for detailed operation of the brake systems.

ACCELERATOR The accelerator pedal controls the speed of the coach by opening and closing the engine carburator throttle valve on gasoline engines; and control fuel flow on diesel engines This pedal also controls the transmission low-gear kickdown mechanism to obtain rapid acceleration at slow speeds.

PARKING BRAKE Use the dash-mounted valve to apply the rear spring brakes when parking the coach.

CAUTION

DO NOT ATTEMPT TO MOVE COACH UNTIL BRAKE SYSTEM RESERVOIR PRESSURE IS SUFFICIENT TO ALLOW THE REAR SPRING BRAKES TO BE RELEASED.

ENGINE OPERATING INSTRUCTIONS

STARTING GASOLINE ENGINES

With an automatic transmission — the transmission selector lever must be in the N (neutral) position before the starter will engage.

ENGINE COLD Depress the accelerator halfway to the floor and pull the CHOKE knob out all the way, then release the accelerator pedal. Turn the ignition key to the START position until the engine starts, then release the key.

ENGINE HOT Depress the accelerator pedal about one-fourth of its travel and hold it there. Pull the manual choke out approximately halfway. Turn the ignition key to START position, releasing it when the engine starts. When the temperature gauge starts to read in the normal operating range, Push the CHOKE knob all the way in. Driving with the CHOKE knob out reduces gasoline mileage.

CAUTION

Do not operate starter for periods longer than 30 seconds at a time. A cooling-off interval of at least two minutes should elapse between cranking periods to protect the starter from overheating.

ENGINE FLOODED To start a "flooded" engine, depress accelerator pedal to the floor and hold in this position. (Do not pump the pedal). Turn the key and hold at START position until engine starts, then release ignition key. Release accelerator pedal gradually as engine speed increases.

GENERAL INFORMATION FOR CATERPILLAR DIESEL ENGINES

CHECK crankcase oil level before starting and when refueling. Always check oil level with engine stopped. The dipstick has 2 marks, and the distance between them represents 3 quarts (2.8 litre). Use oils meeting any of the following engine service classifications:

SC and SD (Ms-Motor Severe Oils)
CB (Supplement 1 Oils)
CC (MIL-L-2104B Specifications Oils)
CD (MIL-L-2104C)

Use SAE 10W, 10W/30, 10W/40 or 30 grade oils, depending on the temperature.

CHECK (with engine stopped) fan, water pump and accessory drive belts for cracks, breaks and frayed edges. Belts for multiple groove pulleys are sold in matched sets. Replace as a set if one is bad. While checking belts, look for oil, water or fuel leaks.

CHECK (with engine stopped) for water in the fuel. Drain a cupful of fuel from the bottom of the tank to remove water or sediment. Fill fuel tanks after completing a run. Partially filled tanks will collect moisture if the coach is allowed to set for an appreciable length of time. Use No 2-D diesel fuel (with a minimum cetane number of 40) in Caterpillar 3208 diesel engines. Keep fuel clean.

Use No. 1-D diesel fuel in cold temperatures when white smoke must be minimized on start up.

CHECK coolant level (the engine should be cool and not running). Fill to the proper level with water and permanent-type anti-freeze. Adding Caterpillar Cooling System Conditioner to permanent-type anti-freeze is recommended if protection is above -20°F (-29°C). Use clean water that is low in scale-forming minerals, not softened water. Leave space for expansion.

STARTING DIESEL ENGINES

Caterpillar 3208 diesel engines are designed to start at temperatures above 10°F (-12°C) without using starting aids. If temperature is below 10°F (-12°C), a starting aid may be necessary and/or crankcase oil may need to be heated.

1. Place the transmission in NEUTRAL.
2. Push the accelerator pedal to HALF SPEED.

3. Turn the starter switch to start. (If engine fails to start within 30 seconds release the starter switch and wait 60 seconds to allow the starter motor to cool before using it again.
4. As soon as the engine starts, reduce engine speed to low idle.
5. Do not apply load to the engine or increase engine speed until oil pressure gauge indicates normal. (Oil pressure should raise within 15 seconds after engine starts.)
6. Operate the engine at low load until all systems reach operating temperatures. Check all gauges during warm-up period.

DIESEL ENGINE OPERATION

Proper operation and maintenance are key factors in determining the useful life and operation economy of a vehicle engine. Follow the directions given here for trouble-free, economical engine operation.

After the engine starts, reduce speed to low idle with no load. When normal oil pressure is reached, run engine at low load for 5 minutes before applying full load. Rapid acceleration causes heavy exhaust smoke and high fuel consumption.

Accelerate to near governed rpm. To avoid lugging, operate in a gear range low enough to allow the engine to accelerate under load.

Continue to accelerate until cruising speed is reached. Under load, maintain engine speed between 80% and 100% of rated rpm.

On upgrade, downshift if engine starts to labor. Down-shift until a gear is reached in which the engine will pull without lugging.

DO NOT lug engine. Lugging results in excessive smoke and increased fuel consumption.

A lug condition exists when an increase in engine speed cannot be achieved with an increase in accelerator pedal position, or when engine speed decreases with an accelerator pedal in its maximum position. Do not lug engine below 2000 rpm for more than several seconds.

On downgrade, do not coast or put transmission in neutral. Select the correct gear to keep the engine speed below high idle and retard the vehicle. A simple rule to follow is to select the same gear that would be used to go up the grade.

Before stopping the engine, operate at low idle for 30 seconds. (This procedure allows hot areas in the engine to cool gradually, extending the engine life.)

DO NOT operate engine at low idle for long periods.

TO STOP THE ENGINE Turn the starter switch to OFF.

TOWING

CAUTION

Do not tow a vehicle equipped with Allison automatic transmission, unless the rear drive shaft has been removed, or the rear wheels have been raised off the ground. Use caution in towing by front axle or cross member. Damage to wiring and/or air lines can result because of mounting proximity to the front cross member.

TRANSMISSION

START-UP INSPECTION

All Allison automatics delivered to an original retail purchaser of highway vehicles are eligible for a Transmission Start-Up Inspection if presented to an authorized Detroit Diesel Allison Service outlet within 90 days of delivery or 10,000 miles. This inspection includes a complete check of the transmission installation and a road test to ensure that the transmission is operating satisfactorily. The inspection will be performed at no additional charge except for lubricants, filter elements, and other maintenance materials. It is recommended that you take advantage of this service to realize the maximum benefits from your Allison-equipped vehicle.

Check the Yellow Pages under Transmissions - Truck or Engines - Diesel for your nearest authorized service outlet.

ALLISON AUTOMATIC TRANSMISSION, MT 640

The Allison transmission provides four forward gears and one reverse gear. Speed selection is provided through the transmission shift lever located on the side of the dashboard, Figure 2-6. The selector lever must be in N (neutral) position when the engine is started. If the engine starts in any other position, the neutral start switch is malfunctioning and should be repaired as soon as possible. Use D position for all normal driving conditions so that the coach begins moving in 1st gear and, as the accelerator is depressed, the transmission upshifts to 2nd, 3rd, and 4th gear automatically. As the coach slows down, the transmission automatically downshifts to the correct gear. Use a lower gear (2nd or 3rd) when road, load or traffic conditions make it desirable to restrict automatic shifting to a lower range. When conditions improve, return range selector to normal driving position. These positions also provide progressively greater engine braking power (the lower the gear range the greater the braking effect.) Use 1st when pulling through mud and snow or driving up steep grades. This position provides maximum engine braking power. Use R (reverse) for backing the vehicle. The vehicle should be completely stopped before shifting from a forward gear to reverse. Reverse gear provides the greatest tractive advantage.

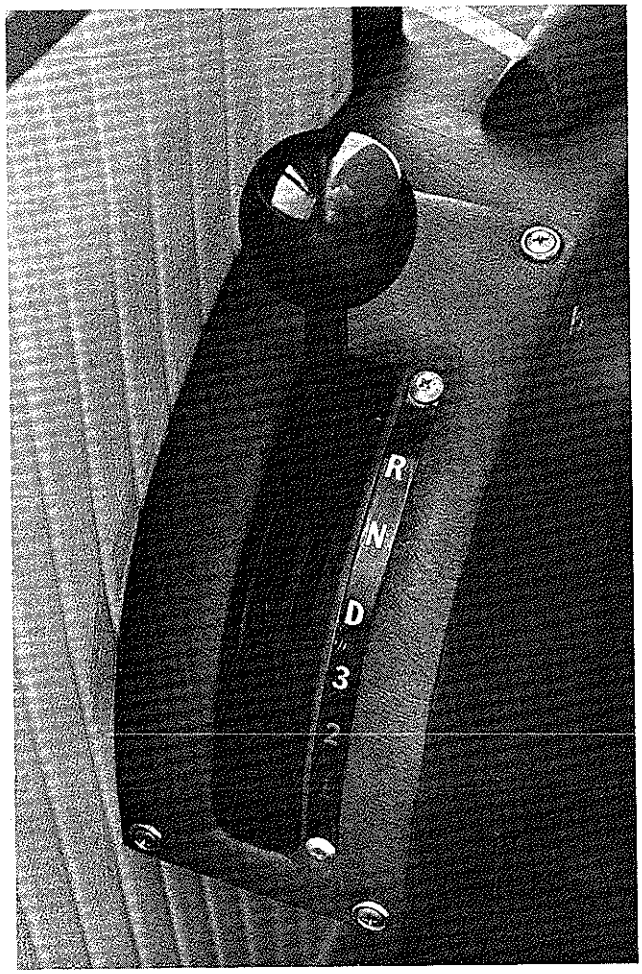
NOTE

In the lower ranges (1,2, and 3) the transmission will not upshift above the highest gear selected unless the recommended engine governed speed for that gear is exceeded.

ALLISON AUTOMATIC TRANSMISSION DRIVING TIPS

ACCELERATOR CONTROL Foot pressure on the accelerator pedal influences the automatic shifting. When the pedal is fully depressed against the floor pedal stop, the transmission automatically upshifts near the recommended governed speed of the engine. A partially depressed position of the pedal causes the upshifts to occur sooner at a lower engine speed. Shift timing is accomplished by using a cam and cable from the throttle (diesel), or by using the vacuum from the engine manifold (gas engine). Either method provides the accurate shift spacing and control necessary for maximum performance.

Figure 2-6. Transmission Shift Selector.



DOWNSHIFT CONTROL The transmission can be downshifted or upshifted, even at full throttle and, although there is no speed limitation on upshifting, there is a limitation on downshifting and reverse. Good driving practices indicate that downshifting should be avoided when the vehicle is above the maximum speed attainable in the next lower gear. Therefore, the good driving habits have been designed into the Allison transmission shift pattern. The downshift inhibitors within the valve body prevent those harmful shifts when the vehicle is going too fast for the next lower gear.

If the downshifts are attempted at excessive speeds, the inhibitors prevent the selected downshift until the vehicle reaches an acceptable speed.

USING THE ENGINE TO SLOW THE VEHICLE To use the engine as a braking force, shift the range selector to the next lower range. If the vehicle exceeds maximum speed for a lower gear, use the brakes to slow the vehicle to an acceptable speed until the transmission may be downshifted safely.

An automatic transmission, compared to a manual-shift transmission, has a longer "coast-down" time. Until becoming accustomed to this characteristic, it may be necessary to manually downshift to reduce speed.

With a little experience in driving with the automatic transmission, you will learn to decelerate a bit sooner, or brake until automatic downshifts occur. This will reduce the need for manual downshifting.

TRANSMISSION OIL TEMPERATURE

Extended operations at low vehicle speeds with the engine at full throttle can cause excessively high oil temperatures in the transmission. These temperatures may tend to overheat the engine cooling system as well as cause possible transmission damage.

If excessive temperature is indicated by the engine coolant temperature gauge, stop the vehicle and determine the cause. If the cooling system appears to be functioning properly, the transmission is probably overheated. Shift to neutral and accelerate the engine to 1200-1500 rpm. This should reduce the oil sump temperature to operating level within a short time. If high temperature persists, stop the engine and have the overheating condition investigated by service personnel.

CAUTION

Do not operate the engine for more than 30 seconds at full throttle with the transmission in gear and the vehicle not moving. Prolonged operation of this type will cause the transmission oil temperature to become excessively high and may result in severe overheat damage to the transmission components.

If the transmission overheats during normal operation, check the transmission oil level.

SECTION III

LIVING AREA FACILITIES

INTRODUCTION

This section provides information on operation of the appliances and systems which contribute to the comfortable living conditions within your motorhome.

GALLEY FACILITIES

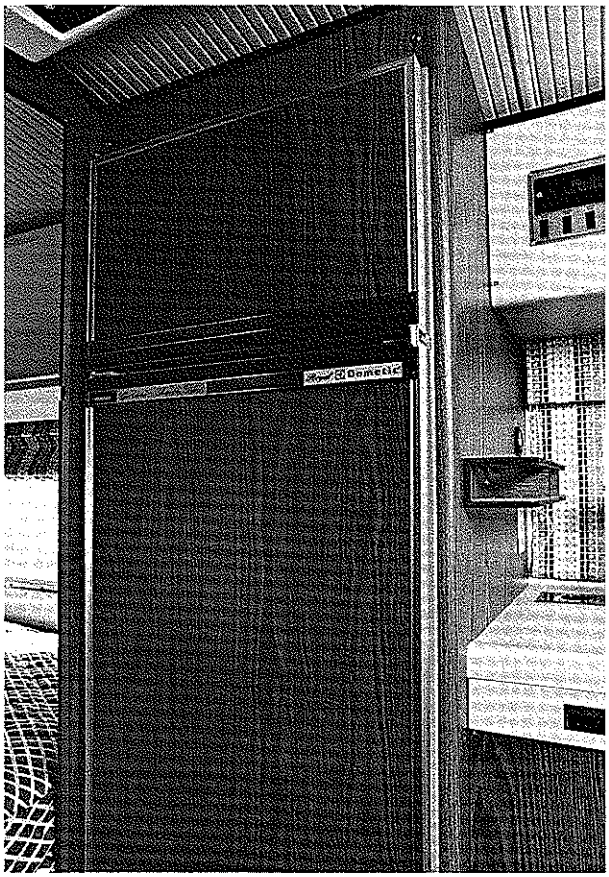
The galley may include a refrigerator-freezer combination, ice-maker, microwave oven, gas range and oven, sink and food center. The refrigerator, ice-maker, microwave oven, and food center are designed for operation on 110 volts ac, as supplied by the internal generator plant, or via the external (shore) ac supply connection. The refrigerator can also be operated from the LP gas supply, as are the range and oven. The turn-on and operating procedures given in the following paragraphs assume that LPG tank is filled and the main gas valve is on.

REFRIGERATOR OPERATION [Dometic, Figure 3-1]

Understanding how the refrigeration system operates will help to explain one of the reasons why it is necessary to level a parked motorhome. The gas-fired (or electrically-heated) boiler converts the ammonia-water solution to distilled ammonia vapor which is carried to the finned condenser, where it liquifies. The liquid flows to the evaporator, where it creates a cooling effect by evaporating into a circulating flow of hydrogen gas. If the evaporator coil is not level the liquid accumulates, forming pockets which do not readily evaporate and impair or block gas circulation, inhibiting the cooling process. It is recommended that the refrigerator be allowed to operate on gas at all times.

When the coach is parked it must be leveled to assure comfortable living accomodations. If the refrigerator is properly installed, with the freezer shelf parallel to the floor, the refrigerator will then also perform well; this can easily be checked by placing a bubble level on the freezer shelf. When the vehicle is moving, the continuous rolling and pitching movement will not affect the refrigerator as long as the movement passes either side of level, but when temporarily parked the refrigerator should be leveled.

Figure 3-1. Refrigerator.



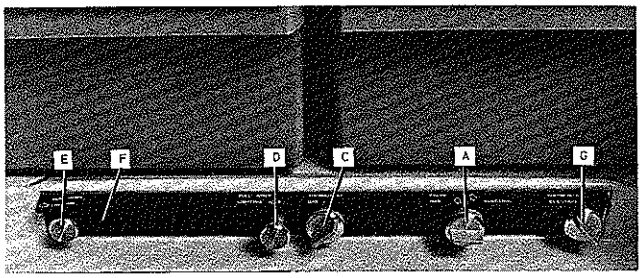
GAS OPERATION

1. To start the refrigerator set knob A to GAS position. This opens LPG valve and disables the electric circuits.
2. Turn gas thermostat knob C to 4 position.
3. Pull outward and hold knob D while pressing piezo lighter button E. Look through reflector F to see if burner is lit. It may be necessary to operate button E more than once to ignite gas pilot.
4. After gas is lit hold knob D in outward position for an additional 15 seconds, then release knob and observe that burner flame stays lit.

NOTE

After LPG tank is refilled, or after a long shutdown period, gas lines may become filled with air. If this occurs, repeat lighting procedure until air is evacuated from lines and gas has reached the burner.

Fig. 3-2. Refrigerator Controls.



ELECTRIC OPERATION

1. Check that refrigerator ac line plug is properly connected to the 120 volts ac supply outlet.
2. Set knob A to OFF position then press knob to bottom and turn to desired electric position.
3. Turn thermostat knob G to 4 position.

USING THE REFRIGERATOR

FOOD STORAGE COMPARTMENT To maintain required low temperatures for food storage, the food storage compartment is completely closed and unventilated. Consequently, foods having a strong odor, or foods liable to absorb odors, should always be covered. Cover vegetables and salads to retain crispness. The coldest locations within the refrigerator are beneath the cooling evaporator and in the lower shelves of the refrigerator; the least cold locations are on the upper door shelves. Consider this when storing different types of food.

DEFROSTING Keep the refrigerator operating at maximum efficiency by periodic defrosting and cleaning. Wash ice trays and shelves with warm water. DO NOT use strong chemicals or abrasives. During extended periods of coach storage, empty and clean refrigerator and leave door slightly ajar to reduce buildup of musty odors.

Refrigerators are equipped with an automatic defrosting device incorporated with the cooling unit. This device makes a quick defrost of the finned evaporator section about once each day without affecting the frozen food storage compartment or the frozen foods contained therein. When the frozen food storage compartment is covered with frost shut down refrigerator temporarily until frost is melted. Before refrigerator is restarted dry compartments, wash and fill ice trays with fresh water.

When the frost on the finned evaporator section has melted water will collect in the drip tray. Empty drip tray at regular intervals. Some refrigerators may have to be defrosted regularly by turning off the refrigerator.

Empty the refrigerator, leaving the drip tray under the finned evaporator and the cabinet and freezer. When all the frost is melted, empty drip tray, if necessary, and dry refrigerator interior with a clean soft cloth. Replace all food stuffs and set thermostat to MAX position for a few hours. Then reset thermostat knob to its normal position.

FROZEN FOOD STORAGE COMPARTMENT Ice trays should always be placed in direct contact with freezer shelf for fastest ice making. Quick-frozen soft fruits and ice cream should be placed in the coldest part of the compartment, at the bottom of the aluminum liner, or, in models with a shelf, on or just below the shelf. Frozen vegetables may be stored in any part of the compartment.

The freezer compartment is not designed for deep or quick freezing of foodstuffs. Meat or fish foods, whether raw or prepared, provided they are pre-cooled in the refrigerator, can be stored in the frozen food storage compartment about three times as long as in the normal temperature compartment. To prevent dehydration, keep food in covered dishes, in plastic bags or wrapped tightly in aluminum foil.

ICE MAKING Fill the ice trays with water to within 1/4 inch from the top. To release ice cubes pull handle upwards. Return unused cubes to the tray. Refill tray with water, dry the outside, and replace in frozen storage compartment.

The ice-making process can be accelarated if the thermostat is set to MAX position. It is a good idea to do this a few hours before an anticipated need for ice, but be sure to turn back the thermostat to its original setting when the ice is formed, or the foodstuffs in the cabinet may also become frozen. (Ice making time is also reduced if unused cubes are left in ice trays when they are refilled with water.)

REFRIGERATOR SHUT-DOWN For temporary shut-down, set thermostat to zero position and turn off the gas valve. If the cabinet is to be shut down over a period of weeks, it should be emptied and cleaned, and the door left ajar. Ice trays should also be dried and kept outside the cabinet.

CAUTION

If the refrigerator is used only intermittently it should be checked at least once a year.

CLEANING Clean interior cabinet lining with a lukewarm weak soda solution. Clean evaporator, ice trays and shelves with warm water only. DO NOT use strong chemicals or abrasives to clean these parts or protective surfaces may be damaged. Always keep cabinet clean.

CAUTION

Do not use refrigerator for storage of Flammable liquids.

REFRIGERATOR OPERATION [Norcold]

Your Norcold dual-voltage refrigerator has been designed exclusively for the recreational vehicle industry.

It is operable on either 12 volt, dc or 120 volt, ac and, if used properly, will offer many years of carefree operation.

Unlike the absorption-type refrigerator which requires a constant heat source for efficient operation, your dual-voltage refrigerator operates on the same principle as the standard domestic refrigerator, that is, it has an electrically-operated compressor and uses freon as its refrigerating medium.

DUAL-VOLTAGE OPERATION

The swingmotor compressor in your refrigerator must have alternating current for its oscillating operation. At present, there are two sizes of compressors being used on Norcold units.

The 40 watt compressor is the smaller of the two and is used on Models 703-DE and 704-DE. Its operational voltage requirement is 20 volts ac. The 60 watt compressor is used on the Model 707-DE and requires 23 volts ac.

The low voltage used for these compressors is desirable because it provides non-hazardous electrical operation.

Note that on either ac or dc operation the voltage to the compressor is always alternating current. This is accomplished by means of the invertor and dual-voltage transformer.

On 120 volt ac operation, such as in the garage, on shoreline or motor generator set, the standard household current is routed through the dual–voltage transformer and reduced to 20/23 volts ac.

Because the swingmotor cannot over load, the protective fusing normally used to protect the standard rotary compressor is not required. However, to protect the electrical components such as the invertor or dual-voltage transformer, the protective devices have been incorporated in the operating circuit.

PROTECTIVE CIRCUITS - AC OPERATION

During operation on 120 volts ac, the invertor and its immediate components are isolated from any electrical source by the automatic selection relay.

To prevent transformer failure due to a short circuit of its secondary windings caused by a grounded condition, for instance, of the motor windings, the following protective device becomes effective.

Within the primary windings or high side (120V ac) of the transformer is installed a bi-metallic current limiting device. Should an excessive overload occur on the secondary or low side (20/23 v ac) of the transformer, this bi-metallic element will open and prevent any current flow. This protective device works automatically to make and break the circuit. It is activated by heat and under normal load conditions of the transformer will not open. When a shorted secondary occurs, the heat created by this short causes the device to open and prevent transformer damage.

PROTECTIVE CIRCUITS - DC OPERATION

To protect the solid state components of the inverter necessitates the use of a ten-ampere in-line fuse or circuit breaker in the dc circuit. This fused is located behind the kickplate or access cover at the bottom front of the refrigerator and is

mounted by means of a clip which is fastened to the right hand sway brace. This fuse will protect the invertor components such as diodes, transistors, and resistors when excessive current is drawn due to improper power supply or overload conditions. The fuse is inactive when the refrigerator is operated on 120 volts ac.

BATTERY OPERATION

The battery power required for the operation of your refrigerator is dependent upon the number of dc appliances being used and the type of operation desired: whether remote from any power source for an extended period; or overnight operation only.

AC OPERATION

Your Norcold dual-voltage refrigerator automatically switches from ac to dc or from dc to ac. When a power supply of 120 volts ac is connected to the vehicle, the voltage selection relay is energized and disconnects the unit from dc operation.

When the ac supply is disconnected, the refrigerator automatically reverts to dc operation. Turning the thermostat knob to the "off" position will prohibit operation on ac or dc.

OPERATING SUGGESTION

The following operating suggestions will serve as a guide in operating your unit efficiently during battery operation.

1. The thermostat dial is numbered from 1 through 5, with the number 5 setting the maximum or coldest position. In order to conserve battery power, it is advisable to set the thermostat dial at the lowest setting that will provide adequate refrigeration. This practice will reduce the running time of the refrigerator and draw less current from the battery. A setting of "3" is a normal position.
2. Always operate the refrigerator on 120 volts ac, when available, especially during initial start-up or pull-down cycle of the unit. Depending upon the ambient temperature, the initial start-up may require 1 - 2 hours of continuous operation before refrigeration temperatures are attained and unit cycling begins.

THERMOSTAT

A single thermostat controls the operation of the refrigerator on ac or dc. This thermostat is mounted at the rear of the cabinet with the control knob at the upper right and to the rear of the freezer compartment. The knob is marked "off, 1,2,3,4, and 5". The nearer the dial is set to "5", the colder the temperature becomes in the cabinet. There is no need to readjust the setting of the thermostat for dual operation. Once the desired temperature is reached, the thermostat will control the cabinet temperature equally well on either voltage supply.

INITIAL OPERATION

Before operating the refrigerator for the first time, check to see that the ac and dc supply connections are correct and that the thermostat is turned to the "Off" position.

With the vehicle connected to the external ac power supply, turn the thermostat knob to the number "3" setting. The unit should be operating. If the compressor motor cannot be heard, place your ear against the outside of the refrigerator door. This procedure will enable you to determine if the swingmotor is operating.

Allow approximately two minutes of operation and open the freezer compartment door. Place your hand at the right hand corner of the evaporator plate. This is the area of the evaporator that will begin cooling first. If you notice a cooling effect at this point, then the unit is functioning properly.

Close the refrigerator door and allow the refrigerator to operate on ac until it cycles or shuts itself off. This indicates the thermostat is operating and that the refrigerator is cooling on ac operation.

Now, disconnect the ac supply and open the refrigerator door so that the cabinet interior will warm up and allow the thermostat to demand cooling. As soon as the unit compressor begins to operate, close the refrigerator door allowing the unit to run. It should shut off or cycle within 10 to 20 minutes indicating the dc operation is correct.

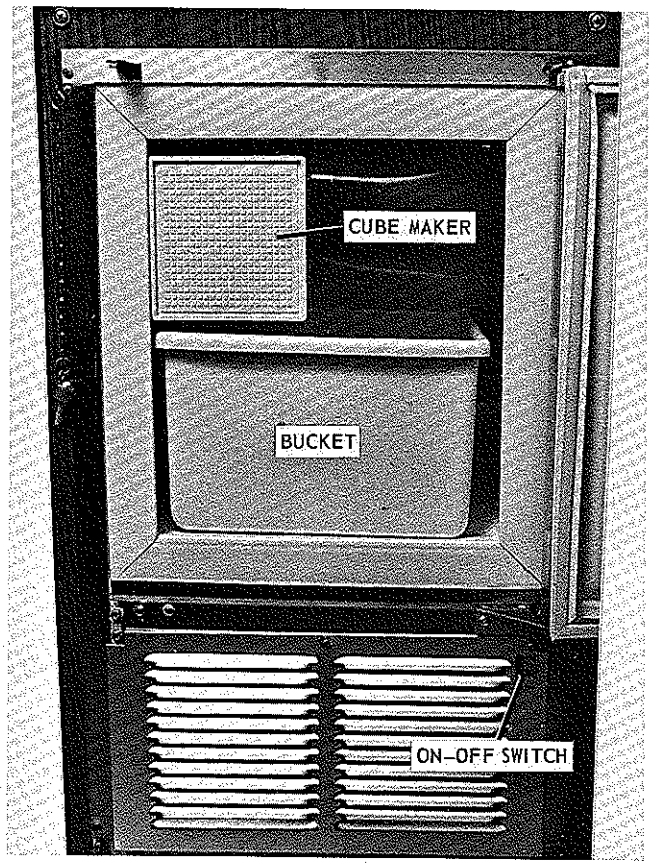
ICE-MAKER

The ice maker, Figure 3-4, is designed to provide a continuous automatic supply of ice cubes. It will operate unattended providing that the water supply line is open and the ac power switch is turned on. The power on-off switch is located on the front grillework. When the ice cube supply is full, the ice-making mechanism shuts off automatically. However, the refrigeration system continues to operate to prevent prepared ice cubes from melting. When removing cubes do not use a sharp instrument to separate cubes that are frozen together or the interior may be damaged.

Note that the ice-maker may supply small cubes the first time it is used; this is due to accumulated air in the lines. Subsequent cube batches will be normal size.

If the machine is used only intermittently, empty ice periodically (every week to 10 days) to ensure a fresh supply of cubes.

Fig. 3-4. Ice Maker.



Do not clean cabinet interior with solvent cleaners, abrasives, or other cleaners that might cause ice cubes to acquire a bad taste. Clean exterior of the unit with a furniture-type cleaner/polish. Clean condenser (behind grille) with a blower/vacuum at least 3-4 times per year, depending on usage.

SHUT-DOWN To shut-down the ice-maker, set power switch to OFF, shut off water source, and remove all cubes. Leave the door open slightly for ventilation to avoid accumulation of mold or odor.

MICROWAVE OVEN

The microwave oven, Figure 3-5, provides both microwave cooking and conventional "browning" features. Three operating controls located on the right-hand panel provide for power ON-OFF operation; selections of Microwave or Browning features; and cooking timed interval. The microwave oven is also equipped with a defrost cycle.

Cooking with microwaves is considerably different than cooking with a conventional oven. Do not use conventional metal pots or pans (frozen dinners may be cooked directly in the shallow aluminum tins, no more than 7/8-inch high). Use glass, ceramic, china, plastic or paper containers: these are transparent to microwaves and allow food to heat quickly. Refer to microwave oven Owner's Manual for further information.

Interior spatters, soil or condensation are easily cleaned with a damp rag.

Fig. 3-5. Micro Wave Oven.

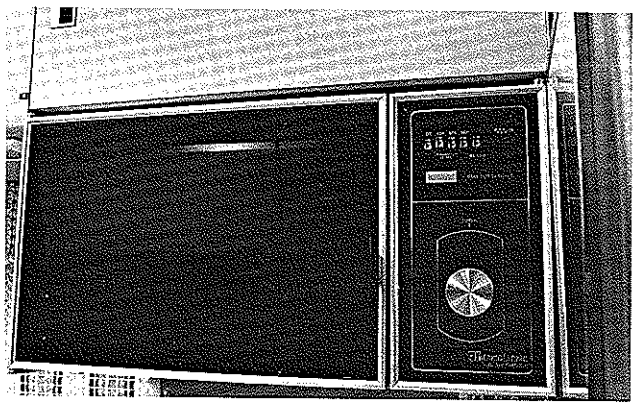


Figure 3-6. Gas Range or Oven.

GAS RANGE OR OVEN

The gas supply for the range burners and oven, Figure 3-6, is provided from the LPG tank. Make sure that the main valve (on tank) is turned ON before lighting pilots.

CAUTION

It is good safety practice to leave oven control in TOP AND OVEN PILOTS OFF position [maximum counter-clockwise] when oven is not in use or while unit is in motion.

LIGHT PILOTS To light range and oven pilots, set oven control to OVEN OFF position then hold a match near range pilot (lift up burner top surface to gain access to burner pilot): and then hold a match to oven pilot (located above and to right of oven main burner.)

LIGHT RANGE BURNER Once the range pilot is lit, light desired range burner by pushing in and turning the respective burner control knob clockwise.

NOTE

The oven in your motorhome is equipped with an automatic lighting device. There will usually be a short delay (30 to 40 seconds) after the oven is turned on before the burners will light. This is a normal condition is and is not an indication of an oven malfunction.

LIGHT OVEN BURNER Once the oven pilot light is lit, turn oven control to desired temperature setting and oven burner will light automatically and maintain correct temperature.

SHUT OFF RANGE AND OVEN BURNERS Turn oven control to TOP AND OVEN PILOTS OFF position (maximum counter-clockwise position.)

GALLEY SINK

The heavy gauge stainless steel sink provides maximum durability with minimum care. After use, rinse sink thoroughly with warm water and wipe dry with a cloth to avoid streaks and spots. For stubborn stains, a mild abrasive cleaner can be used **with care**. Be sure to wipe in the direction of the steel finish to help maintain the original appearance. Always wash counter surface before applying a complete wax coating; regular cleaning prevents wax buildup.

CAUTION

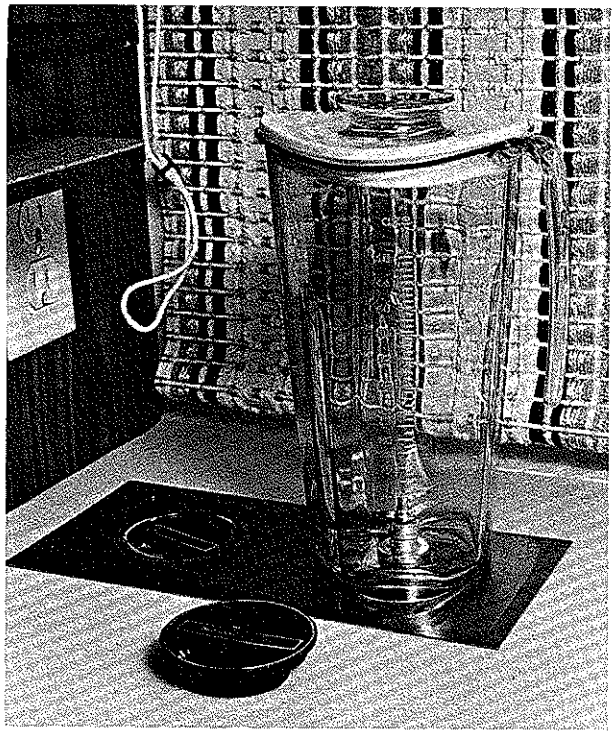
Abrasive cleaners will scratch sink counter top surface.

Boiling water will not harm stainless steel; however, salt, mustard, mayonnaise, ketchup, and other similar food acids can cause pitting. If any of these are spilled on the surface, clean off immediately.

FOOD CENTER — OPTIONAL

A built-in variable-speed motor driven counter unit, Figure 3-7, may be used with mixing and blending attachments for a large variety of food preparation tasks. The food center is designed for ac operation and is operable only when generator is on; or when coach systems are connected to external ac hookup.

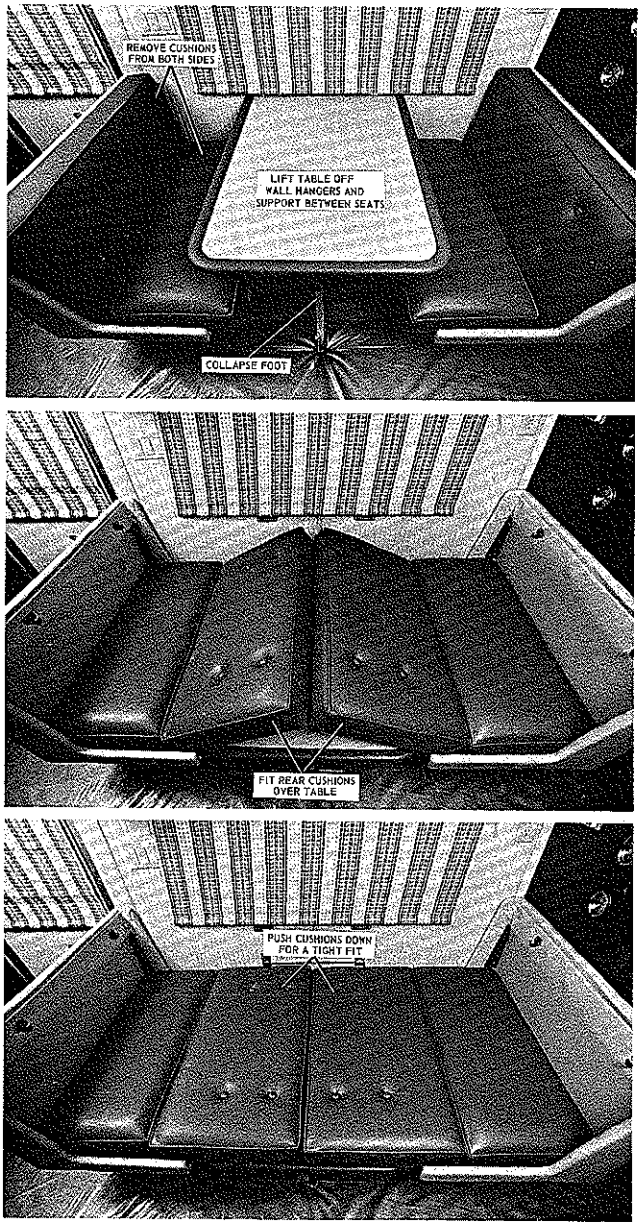
Figure 3-7. Food Center.



DINETTE CONVERSION

The dinette table is attached to the wall by two hooks and brackets and is held erect by a single, folding leg. To convert the dinette to a bed, fold leg upward, lift table upward and outward from wall brackets and carefully lower it to rest on overhang edges at the front of each dinette seat. Unhook seat back cushions from each dinette seat and place side-by-side across gap formed by table surface, completing bed conversion. Dinette conversion is shown in Figure 3-8

Figure 3-8. Dinette Conversion.



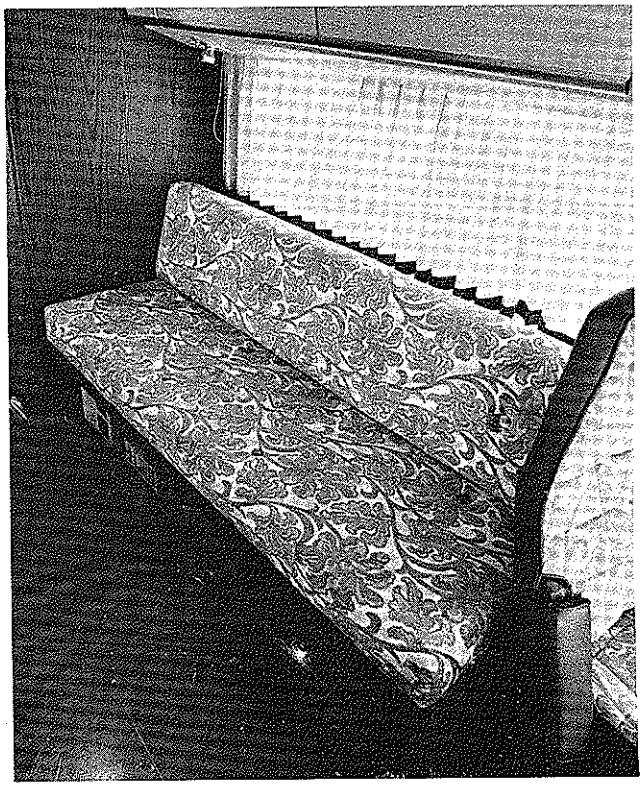
SOFA CONVERSION

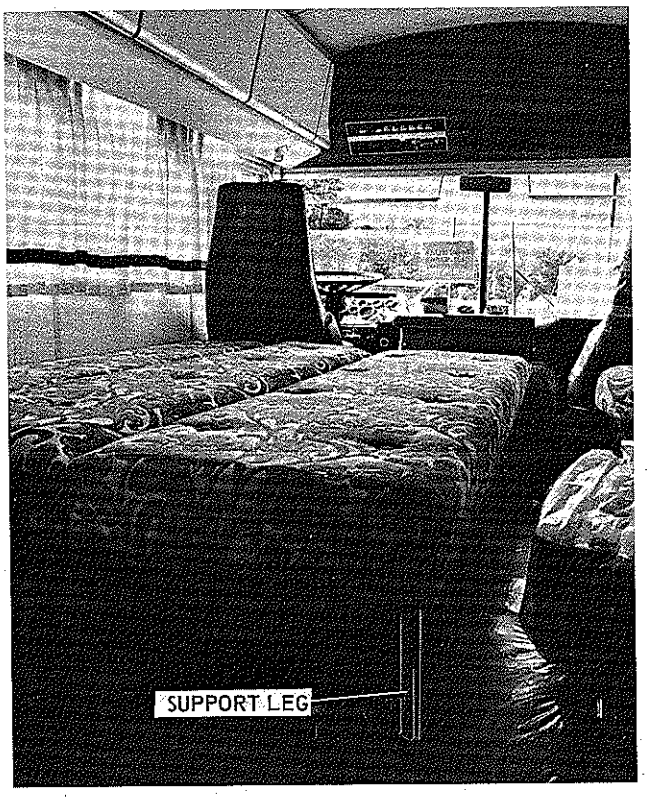
To convert the sofa into a large double bed, on coaches that are so equipped, pull platform outward, **lower and lock** supporting legs at each corner, and arrange rear cushions to completely cover platform area. Sofa conversion is shown in Figure 3-9.

CAUTION

Be sure that legs are extended, or platform may be damaged.

Fig. 3-9. Sofa Conversion.





VACUUM CLEANER — OPTIONAL

The vacuum cleaner system (not shown) is completely self-contained and supplied with a 30-foot flexible hose and wand, carpet, upholstery, and crevice tools. Install the flexible hose end-fitting into the corresponding intake hole, accessible when the spring-loaded door is swung aside. The disposable paper bag, located in the compartment to the right of the intake, is easily removed and replaced when compartment door is opened (vacuum cleaner should be off when changing bags.) A new bag is installed by sliding the cardboard ring on the bag over the intake tube. Clean or replace foam filter periodically to keep system operating efficiently. Note that vacuum cleaner will shut off automatically when bag is full.

TRASH COMPACTOR — OPTIONAL

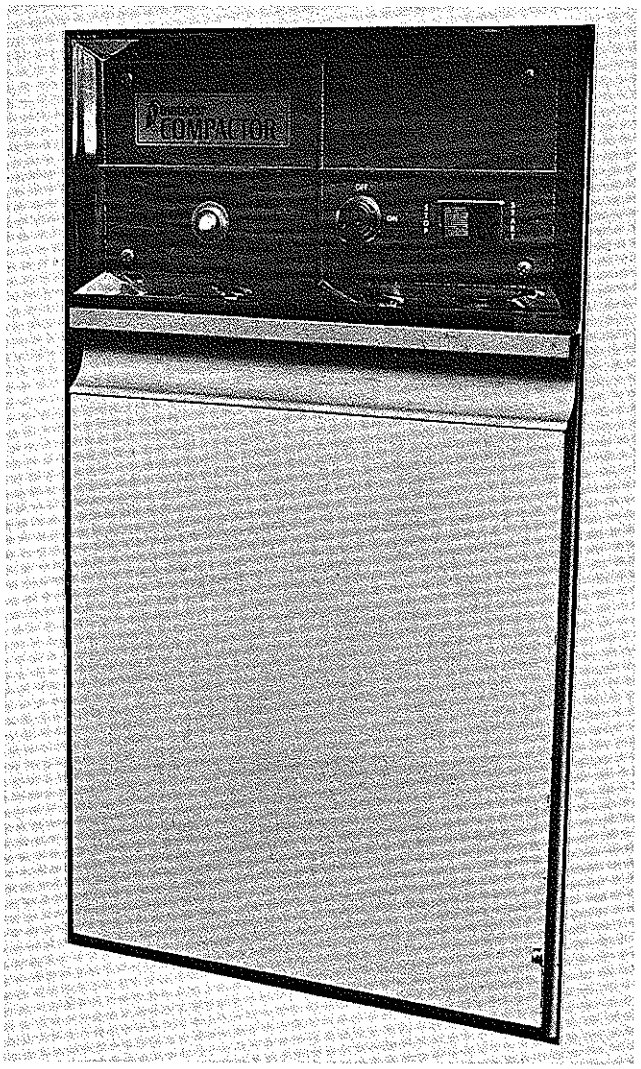
The built-in trash compactor, Figure 3-11, compresses an accumulation of trash into one-quarter of the original bulk and seals compacted trash in a sturdy waterproof bag. Compactor operation consists of inserting a garbage bag, loading trash, operating key switch to ON, then setting rocker switch to START. The compactor stops automatically when trash load has been compressed. When bag is full, tilt drawer panel forward and lift bag from drawer for easy disposal.

Use soap and water or a mild detergent for cleaning. Periodically use a spray disinfectant on drawer interior surfaces.

BATHROOM FACILITIES

WATER PUMP SWITCH The water pump switch is located on the Systems Monitoring Panel. Set rocker switch to PUMP position to pressurize water system. The pump operates upon demand to keep system water pressure constant. Continuous or erratic pump operation is an indication of an empty water tank, a leak in the system, or the presence of an air lock in the hot or cold water lines. (Air locks are normally caused by movement of water within the tank while the pump is operating.) Tank water level and water pressure can vary with road movement. To avoid this condition, leave water pump switch OFF while unit is in motion.

Figure 3-11. Trash Compactor.



SHOWER To use the shower, turn on the faucets and adjust the water temperature to suit. Turn shower water off and on during use by operating pushbutton on the shower head.

MARINE TOILET The marine toilet, Figure 3-12, operates from the fresh water supply, flushing wastes directly into the sewage holding tank. Two foot pedals are located at the bottom of the bowl. The smaller, right-hand pedal (bowl fill) controls the amount of water delivered into the bowl; while the left-hand pedal (bowl drain) opens the sliding valve to the tank. To prepare the toilet for use, depress the bowl fill pedal until the water level in the bowl is as high as needed. After use, depress bowl drain pedal until water swirls, draining wastes into tank, then release pedal.

Fig. 3-12. Marine Toilet.

NOTE

To ensure sanitary conditions within the system, it is advisable to include an approved chemical additive.

RECIRCULATING TOILET

The recirculating toilet, Figure 3-13, is electrically-operated from the 12 volt system and recycles charge water for maximum conservation.

To prepare toilet for use, push dump handle fully into toilet base until handle "locks" in closed position. With water pump turned on, open refill valve. Watch the sight gauge until water level reaches "C" position (approximately 3 gallons), then close refill valve. Raise toilet cover and add the prescribed amount of chemical concentrate directly into bowl. Depress flush button and release one time to mix chemical. The toilet is now ready to use.

Fig. 3-13. Recirculating Toilet.

When the content level reaches "F" marking on sight gauge, or when sewage odor becomes noticeable, dump toilet wastes into sewage holding tank by pulling dump handle fully outward. It may be necessary to slide the carpet out from under the dump handle so that the handle may be slightly depressed to free it from the "locked" position. When all liquid has disappeared from sight gauge, close handle and recharge toilet.

CAUTION

It is of the utmost importance that NOTHING other than waste matter and an approved grade of toilet tissue be deposited in the recirculating toilet. Almost all malfunctions, of the toilet and particularly in a waste destruction system if installed, can be traced to non-observance of this procedure.

Remember that low temperatures in combination with high winds cause an equivalent chill temperature much below what your thermometer is reading. For instance, with an outside temperature of zero degrees and the wind velocity of 10 miles per hour, the equivalent chill temperature is minus 20 degrees F.

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

WASTE DESTRUCTION SYSTEM — OPTIONAL

The Thermasan System captures the super-heat energy from the engine's exhaust and uses it to disintergrate holding tank wastes into a harmless, invisible, emission.

The Thermasan System follows a relatively simple procedure. A chemical and biochemical reaction is first created in the holding tank. This prepared waste is next pumped by metered injection into the heart of the system, the Sanijector. The stainless steel sanijector screens and sprays this prepared waste into the super-heat of the engine's exhaust stream. Within the exhaust this super-heat batters and destroys all waste and bacteria. All remaining gaseous by-products are rendered invisible, bacteria free and totally harmless.

The complete operation is activated by simply turning a switch on the dash mounted, solid state control panel, right from the driver's seat.

ROOF VENT AND EXHAUST FAN

Ceiling exhaust fan operation is controlled by a two-speed toggle switch located in the housing. Be sure that roof vent is open before fan is turned on. The exhaust fan screen can be removed for cleaning by pulling the crank handles down and off and removing the screen.

GAS HEATERS

Three furnaces are used in your coach, each with a separate zone thermostat, Figure 3-14. One furnace is located in the living room; another in the kitchen oven; another in the bedroom.

OPERATION

a. To light the furnace, turn manual valve to "off" position and wait 5 minutes. Set thermostat at its lowest setting. Open manual valve. Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.

b. Set thermostat at desired position. Main burner will light within 15 seconds and furnace will operate automatically.

Figure 3-14. Thermostat.

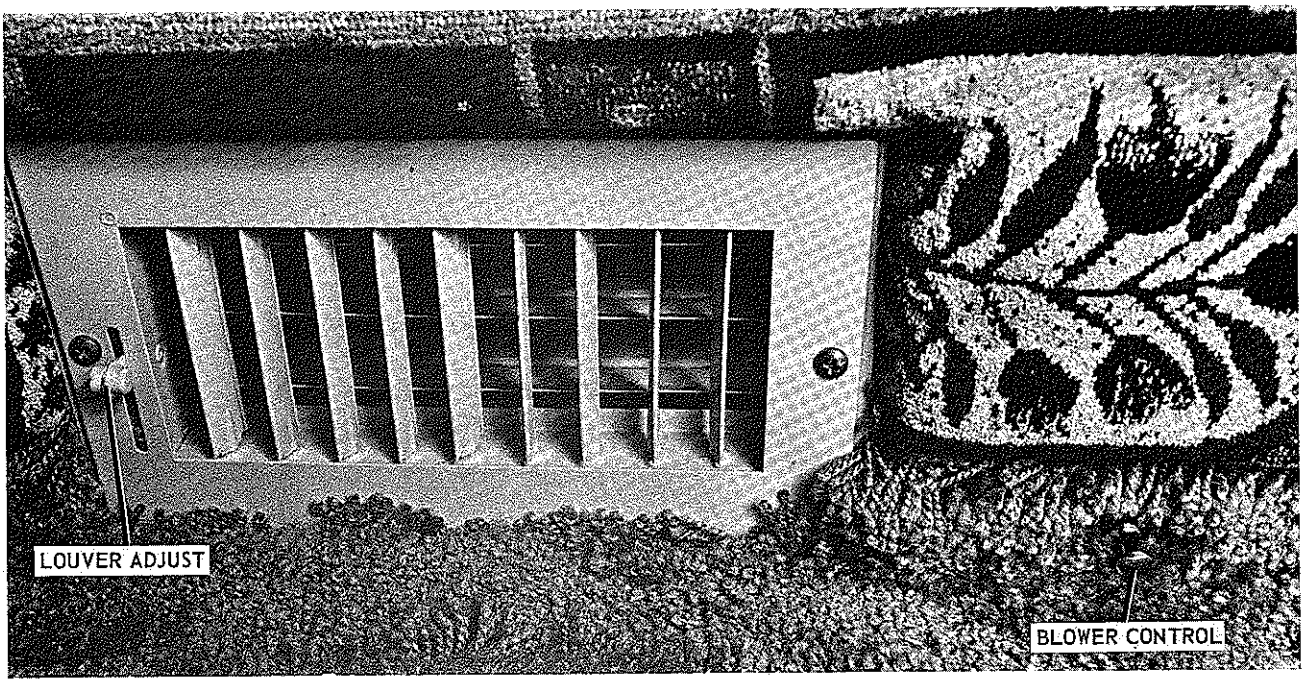
When coach temperature drops below the thermostat temperature setting, the internal relay contacts close to operate the main blower. The air flow created by the blower closes an air-actuated switch that in turn energizes a solenoid valve which opens the gas lines to the main burner, which then lights from the electronic ignition.

CAUTION

Do not store items in or near the burner compartment.

When coach temperature exceeds the thermostat setting, the relay contacts open. This shuts off the burner gas supply, but the blower continues to operate until the residual heat within the furnace is dissipated, then a thermostatically controlled relay turns off the blower. Air for the sealed combustion chamber is pulled in from outside the coach, routed around the heat exchanger, then exhausted through the same vent. Recirculated fan-forced air blowing across the heat exchanger is used to heat the coach interior.

Fig. 3-15. Heating Systems Controls.



HEATING SYSTEM

In addition to the gas heater, a secondary source of heat used in the coach is supplied by hot water–type heaters which depend on heat generated by engine operation. Engine heat is picked up by the engine coolant which is pumped through the heaters inside the body and back into the engine. A typical heater inside the body consists of a heat exchanger or core, and fans which move air across the core. Air moving across the core picks up heat from the engine coolant and transfers it into the living area. The REAR HEAT MASTER switch on the overhead instrumentation panel must be ON for the blowers and rear heaters to operate. Location of heater outlets and controls is shown in Figure 3-15.

Satisfactory performance of this type of heating depends on the following basic factors:

1. Engine (coolant) temperature — This can be altered by thermostat rating, (which should never be higher than recommended by the engine manufacturer.
2. Coolant flow — This varies with engine speed. Diesel-powered units are equipped with an auxiliary pump with a switch on the overhead panel. This switch should be ON whenever heat is desired or when hot water is to be supplied from the heat exchanger.
3. Proper fan operation — All motors are 2-speed and can easily be checked for function by operating motor switches individually and listening for speed variations.

Under extremely cold weather conditions, turning on the heater fans will lower the engine temperature noticeably as heat from the engine is being transferred into the body, but as air temperature inside the body rises, engine temperature will also rise. More heat will also be generated by the engine when it is caused to do work in moving the machine.

Be sure engine radiator is full and all coolant flow valves, Figure 3-16, are open.

CAUTION

DO NOT LEAVE ENGINE RUNNING WHILE OPENING OR CLOSING VALVES UNDER ENGINE HOOD.

Warm up engine to operating temperature with engine at fast idle, if possible, and turn on heater fans and auxiliary water pump (diesel engine only) if unit is so equipped. The automotive engine is designed for a continuous-duty cycle and, when

Figure 3-16. Coolant Flow Valves

parked, may be operated continuously to provide a constant heat supply. This should only be done during extreme cold conditions where no other source of heat is adequate. Be sure that the exhaust is clear.

The coach living area is equipped with a heater at the right front hand corner, and three rear heaters; underneath the front dinette seat; front sofa; and the curb side bed. These heaters use chassis engine hot water as a heat source.

The front heater is equipped with three large squirrel-cage two-speed blowers which are operated by separate controls on the driver's instrument panel. One blower is used for defogging; one blower provides hot air to the driver; and one blower provides hot air for the right side of the unit.

NOTE

If additional defrosting action is needed turn auto air conditioning temperature control to OFF and turn auto air conditioning fans to high-speed. This will circulate additional warm air about the windshield area.

The rear heaters are also controlled by a master switch on the driver's instrument panel; each heater also has a separate two-speed control switch.

The living area heating system is equipped with six valves which control circulation of the engine hot water through the heater cores. Two of the valves are on the lower instrument panel and control heat for front and rear heaters. Two valves are located in the rear adjacent to the hot water heater grill. Set these valves according to the instruction plate next to the heater. The remaining valves are located within the engine compartment and are used to bypass the system in the event of leaking. The coolant level in the radiator should be checked after these valves have been opened. If the liquid in the heater lines has evaporated during the summer, the radiator will lack sufficient coolant and may overheat.

The rear heater dual-speed switches are located adjacent to the heater. Pull the switch outward to the first position for low-speed fan operation; pull out to the last position for high speed fan operation.

HOT WATER HEATER

The hot water heater core is also part of the engine cooling system loop. When the engine is operating, the heat exchanger ensures a constant supply of hot water. In addition, the water supply can be electrically heated. The 110 volt electric heater core in the hot water system is controlled by a circuit breaker in the rear closet.

CAUTION

Be sure that the electric heater is turned OFF if there is insufficient water in the tank.

AIR CONDITIONING

Conditioned air is maintained throughout the coach by ceiling-mounted air conditioner units. Each unit provides dual low- and high-speed fan or cooling operation for high velocity air movement through individually controlled outlets. Air conditioning cool-down occurs faster if all windows, doors, and vents are closed.

Maximum air conditioning efficiency also depends on the outside temperature and operating voltage level. Because the air conditioners represent the largest load for the electrical system, never start both units simultaneously. (Air conditioner compressor starting current can be twice or three times the normal current drain of an operating unit.)

CAUTION

To insure the full efficiency of the air conditioning units it is recommended that periodic removal and washing of the air conditioner filters be accomplished. This is easily done by removing the retaining screens, washing the filters in a warm, soapy water; pressing dry with paper towels and then replacing filters and screens.

If an external ac hookup is being used, and the system is not operating efficiently, this may be caused by lower voltage. Turning on the generator and switching over to generator operation will supply enough power to ensure correct airconditioner operation.

Before starting the generator, check that each air conditioner is off to prevent generator starting under load. Allow generator to warm up and produce the proper voltage and frequency output before turning on the air conditioner(s).

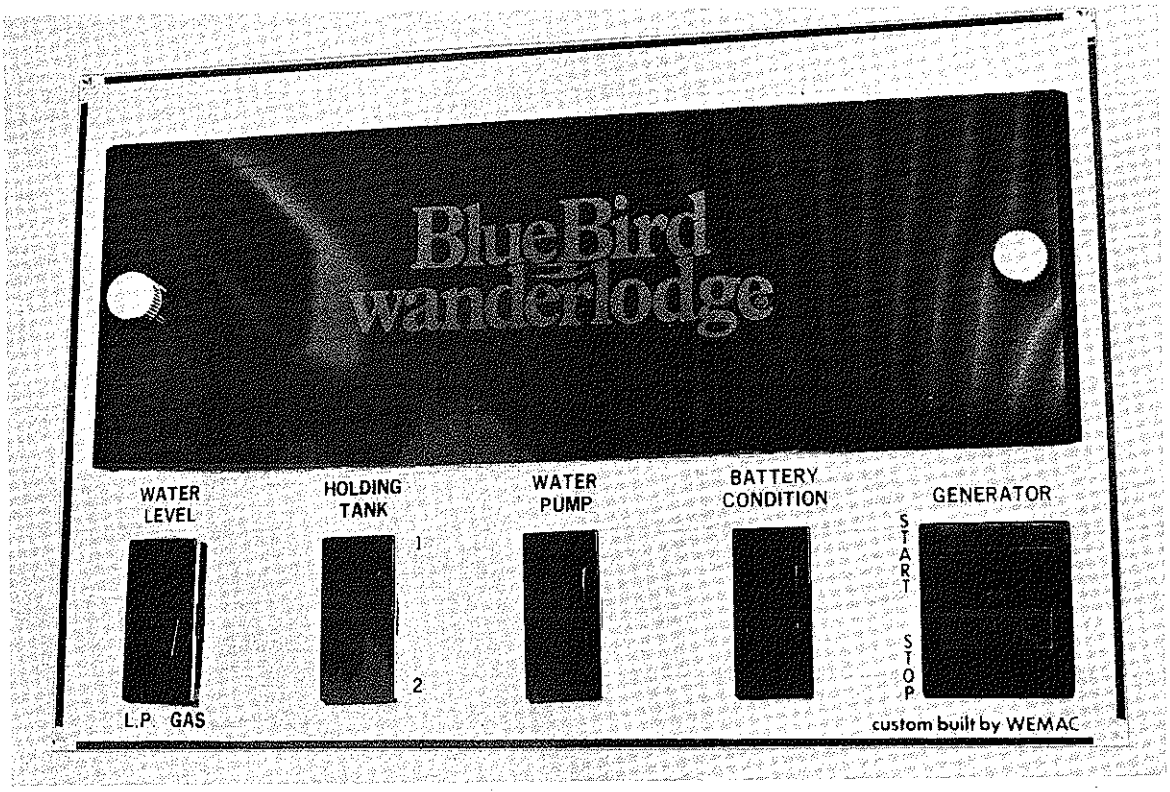
MISCELLANEOUS INSTRUMENTION

SYSTEMS MONITORING PANEL The systems monitoring panel, Figure 3-19, contains a water level indicator, selector switches, and indicators which monitor individual holding tanks level, potable water supply level, LPG tank supply, and control the operation of the water pump. In addition, the battery condition can be monitored by operating the selecto switches.

The control panel is located above the sink on the overhead cabinet door and controls and indicators are within easy reach. It's good practice to scan these status indicators periodically to be sure of adequate tank levels.

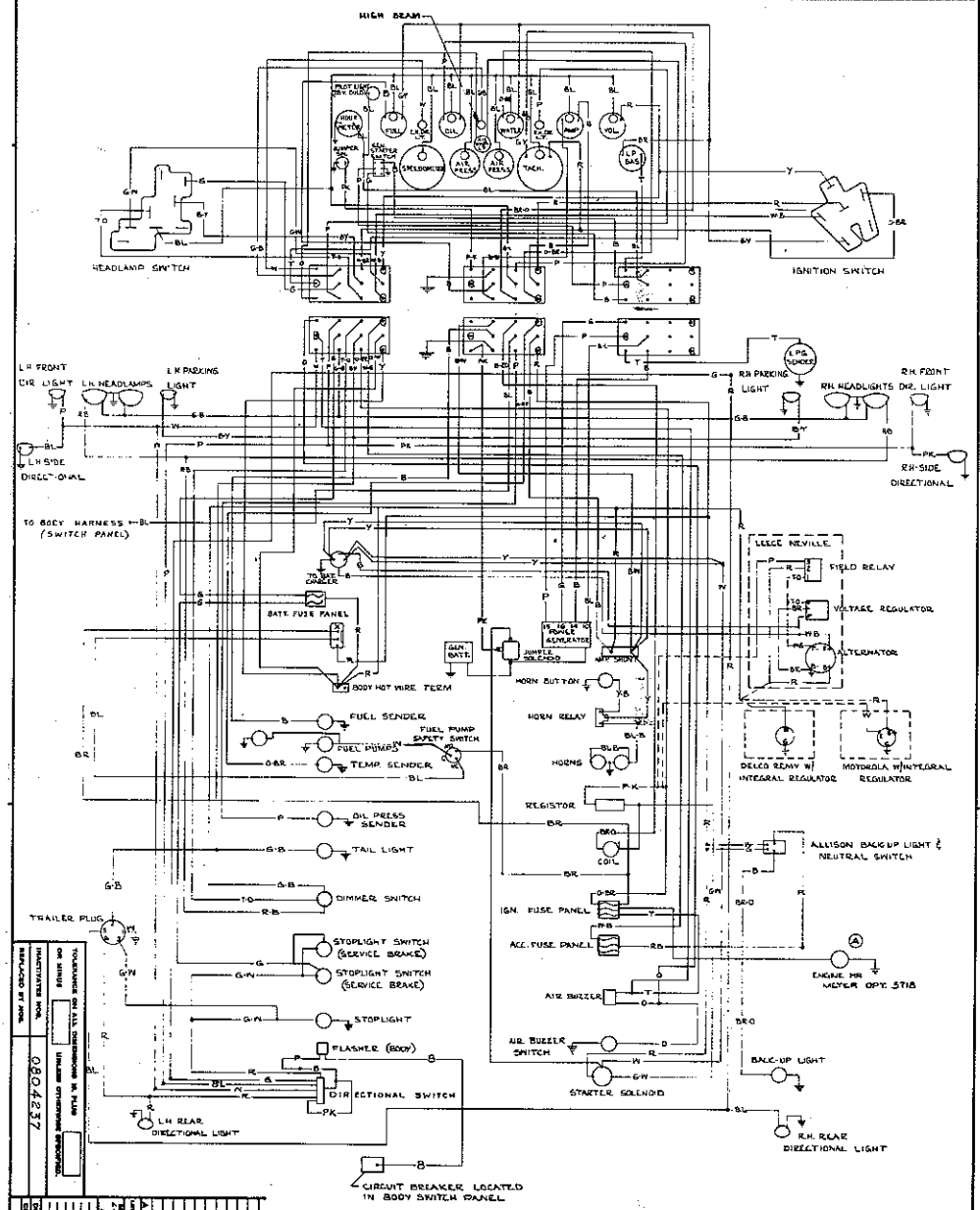
WATER PUMP OPERATION To turn on the water pump to pressurize the water supply system, operate the selector switch to PUMP position. This is a demand-type system and the pump will operate only when there is insufficient water supply line pressure. When the lines are pressurized, the pump shuts off. Also note that the PUMP ON indicator is lit whenever the selector is in PUMP position.

Fig. 3-19. Systems Monitoring Panel.



COLOR SYMBOL	GAUGE	COLOR	STRIPE	CIRCUIT
W	6	White	---	Main Hot Wire From Battery
R	6	Red	---	Body Hot Wire
T	10	Yellow	---	Ignition Switch Hot Wire
G-W	14	Green	White	Headlight Switch Hot Wire
R	14	Red	---	Starter Wire
W	14	White	---	Starter Wire (Neutral Switch Lead Allison Trans.)
G	14	Green	---	Starter Wire (Neutral Switch Lead Allison Trans.)
PK	14	Pink	---	Coil Wire
G-Y	14	Green	White	12 Volt Starting Wire
W-R	14	White	Black	"ACC" Fuse Panel Hot Wire
O-BR	14	Orange	Brown	"Ign" Fuse Panel Hot Wire
GY	16	Gray	---	Instrument Hot Wire
O-BR	14-16	Orange	Brown	Temperature Sender Wire
P	14-16	Purple	---	Oil Pressure Sender Wire
B-Y	14-16	Black	Yellow	Parking and Taillight Wire
BL	14-16	Blue	---	Instrument Light Wire
T-O	14	Tan	Orange	Headlight Hot Wire
G-B	14	Green	Black	Headlight High Beam Wire
G-B	14-16	Green	Black	High Beam Indicator Wire
R-B	14	Red	Black	Headlight Low Beam Wire
G-B	14	Green	Black	Tail Light Wire
G	14	Green	---	Stoplight Hot Wire
G-W	14	Green	White	Stoplight Wire
Y	14	Yellow	---	Horn Relay Hot Wire
Bl-B	14	Blue	Black	Horn Wire
Y-B	14	Yellow	Black	Horn Button Wire
T	14-16	Tan	---	Air Buzzer and Warning Light Wire
O	14-16	Orange	---	Air Buzzer and Warning Light Switch Wire
BL	14	Blue	---	Pilot Light
B	14	Black	---	Generator Stop
G	14	Green	---	Generator Start
PK	14	Pink	---	Push Button Switch
T	14	Tan	---	LPG Sender
P	14	Purple	---	Flasher Hot Wire
R	14	Red	---	Voltmeter Hot Wire
B	8	Black	---	Battery Charger
B	14	Black	---	Battery Disconnect Switch (Voltage regulator/field circuit.)

COLOR SYMBOL	GAUGE	COLOR	STRIPE	CIRCUIT
T	10	Yellow	---	Battery Disconnect Switch Wire
W-G	14	White	Green	Body Instrument Panel Lights
P	14	Purple	---	Directional Switch Hot Wire
B	14	Black	---	Directional Switch Hot Wire (Switch Lead)
G	14	Green	---	R.H. Rear Directional Light Wire (Switch Lead)
R	14	Red	---	R.H. Rear Directional Light Wire
BR	14	Brown	---	L.H. Rear Directional Light Wire (Switch Lead)
BL	14	Blue	---	L.H. Rear Directional Light Wire
P	14	Purple	---	R.H. Front Directional Light Wire (Switch Lead)
PK	14	Pink	---	R.H. Front Directional Light Wire
P	14 -16	Purple	---	R.H. Directional Light Pilot
W	14	White	---	L.H. Front Directional Light Wire (Switch Lead)
P	14	Purple	---	L.H. Front Directional Light Wire
W	14-16	White	---	L.H. Directional Light Pilot
R	14	Red	---	Back Up Light Hot Wire (Switch Lead Allison Trans.)
BK	14	Black	---	Back Up Light Wire (Switch Lead Allison Trans.)
BR-O	14	Brown	Orange	Back Up Light Wire
R	6	Red	---	Alternator Load Wire
R	16	Red	---	Field Relay Hot Wire (Leece-Neville)
P	14	Purple	---	Ignition to Field Relay Wire (Leece-Neville)
W-G	14	White	Green	Alternator Field (-) Wire (Leece-Neville)
T-O	14	Tan	Orange	Regulator Hot Wire (Leece-Neville)
BK	14	Brown	---	Alternator Ground Wire (Leece-Neville)
W-B	14	White	Black	Alternator Field (+) Wire (Leece-Neville)
B	14	Blue	---	Generator Hour Meter
B	14	Blue	---	Generator Pilot
P	14	Purple	---	Generator Start
Br	14	Brown	---	LPG Ignition
BR-O	14-16	Brown	Orange	Tachometer Sender Wire
R-B	14	Red	Black	Ignition Hot Wire
BR	14	Brown	---	Hazard Signal Switch Hot Wire
R	14	Red	---	Hazard Signal Switch Wires
Y	14	Yellow	---	Hazard Signal Switch Illumination Wire
B	14 -16	Black	---	Fuel Sender Wire (Inst. Panel)
BL	14	Blue	---	Fuel Pump Safety Switch N.C.
BR	14	Brown	---	Fuel Pump Safety Switch N.O.
BR	14	Brown	---	Fuel Pump Primer Switch Hot Wire
R	14	Red	---	Fuel Pump Primer Switch S-I Wire
W	14	White	---	Fuel Pump Wire
W	14	White	---	Alternator Exciter Wire (Monitorin)
R-B	14	Red	Black	Back Up Light Hot Wire
R	16	Red		Tachometer Hot Wire (Tach Lead)
GY	16	Gray		Tachometer Sender Wire (Tach Lead)
W	16	White		Fuel Sender Wire (Chassis)



NOTE: The following accessories connect to the ignition fuse panel:

Electric Fuel Pump

Air Buzzer and Warning Light

The following accessories connect to the accessory fuse panel:

Back-up Lights
Radio

0804237

BLUE BIRD BODY CO.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM, MASTER WIRING

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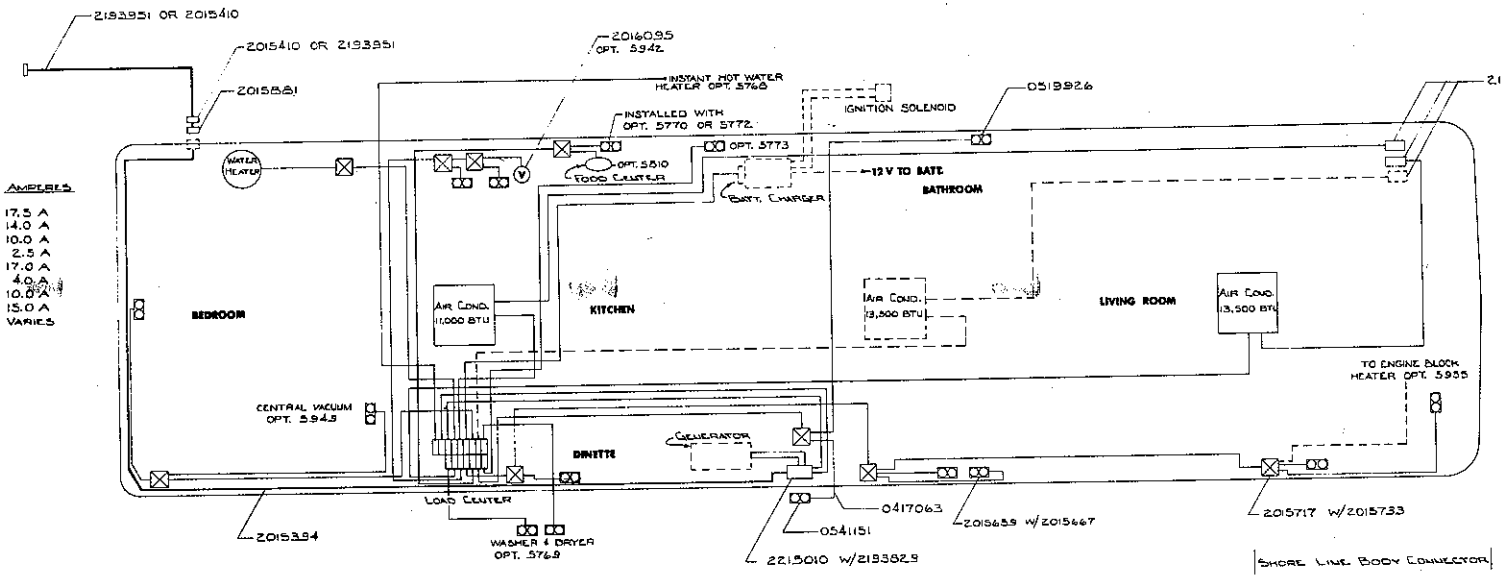
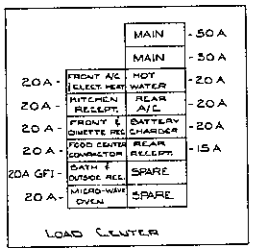
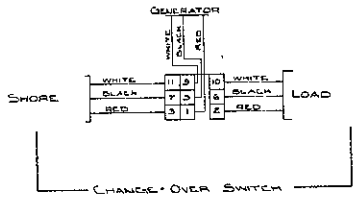


NOTE!! MIDDLE AIR CONDITIONER APPLIES ONLY FOR 35 Ft. UNIT.

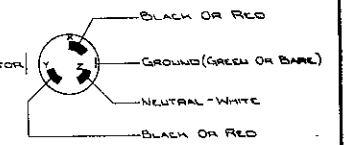
ELECTRICAL ITEMS	AMPERES
FRONT AIR CONDITIONER	17.5 A
REAR AIR CONDITIONER	14.0 A
HOT WATER HEATER	10.0 A
ICE MAKER	2.5 A
BATTERY CHARGER	17.0 A
FOOD CENTER	4.0 A
TRASH COMPACTOR	10.0 A
MICROWAVE OVEN	15.0 A
RECEPTACLES	VARIES

PART NO.	DESCRIPTION
2193951	CORD SET, 110 V.
2015410	CORD SET, 220 V.
2015451	CABLE GRIP, 110 V.
2015444	CABLE GRIP, 220 V.
2015881	CONNECTOR, BODY
2015436	CLAMP, CORD
2207918	BOX, SWITCH, 12.2.4 FMC
2215010	SWITCH, CHANGE-OVER
2015717	BOX, JUNCTION
2015733	COVER, BOX, JUNCTION
2015659	RECEPTACLE, DUPLEX
2015667	PLATE, RECEPTACLE
2015683	BOX, RECEPTACLE
0519926	BOX, SWITCH (USED FOR RECEPTACLE)
0541151	RECEPTACLE, WEATHER PROOF W/COVER
2193829	COVER, CHANGE-OVER SWITCH
2199222	CONVERTER, 100 AMP
2209088	CLIP, GROUNDING
2016095	VOLTMETER, AC 2.31
2015394	WIRE, 6-3 W/GROUND
2015386	WIRE, 12-2 W/GROUND
0417063	WIRE, 12-2 W/GROUND, TYPE BX
2198190	SWITCH, A/C MASTER





NOTE! ALL GROUND WIRES MUST BE GROUNDED TO THE CHANGE-OVER SWITCH ENCLOSURE, OR OUTLET BOX, OR JUNCTION BOX.



TOLERANCE ON ALL DIMENSIONS IS. PLUS OR MINUS ____ UNLESS OTHERWISE SPECIFIED.
INACTIVATED NOS.
REPLACED BY NOS.

LTR.	WAS	REVISIONS	BY	DATE	APP.
RELEASED					SCALE

Blue Bird Wanderlodge, Inc.
FORT VALLEY, GEORGIA, U.S.A.

DIAGRAM, WIRING 120/240 VOLTS
1977 MODEL

DR. I-6-77 BY (G.)
CK. BY
DO NOT SCALE

SIZE C | 2222669

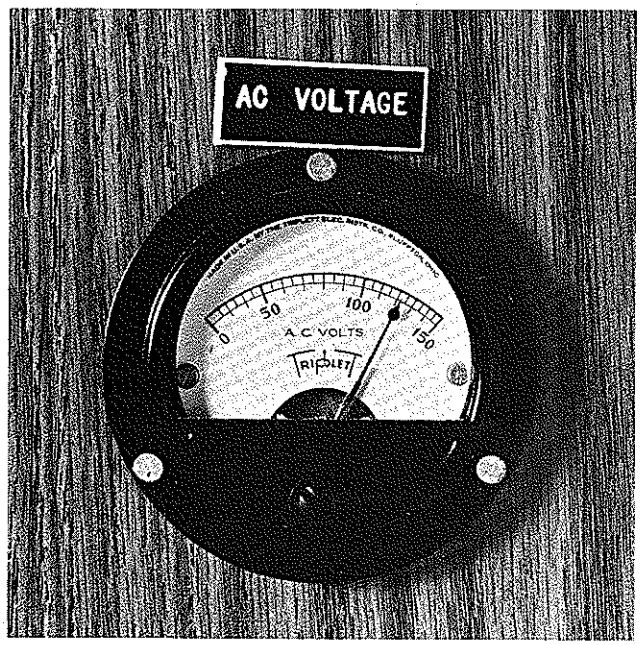
WATER LEVEL INDICATOR, LPG TANK SWITCH, AND HOLDING TANKS LEVEL INDICATORS The water level indicator indicates the amount of potable water remaining in the supply tank. To read; press switch to WATER level (upper) position. To read LPG tank level press switch to LPG (lower) position.

At the same time, note that the back-lighted holding tanks level indicators above the selector are also lit. Holding tanks level is indicated in quarter-fractions: "3/4" for more than 3/4 full, "1/2" for more than half full, "1/4" for less than half full, and "0" for empty.

BATTERY CONDITION INDICATOR Press battery condition system to read battery condition in terms of good, fair, and poor. (For coach batteries only)

AC VOLTMETER The AC Voltmeter, Figure 3-20, continuously monitors the supply voltage from the external ac hookup; or from the output of the internal generator. The meter will normally indicate between 110 and 120 volts ac, depending on the electrical load within the coach and the ac supply voltage level.

Fig. 3-20. AC Voltmeter



GENERATOR SWITCH The Generator rocker switch on the system monitor panel duplicates the functions of the generator switch located on the dashboard. When the generator is operating on ON indicator is lit.

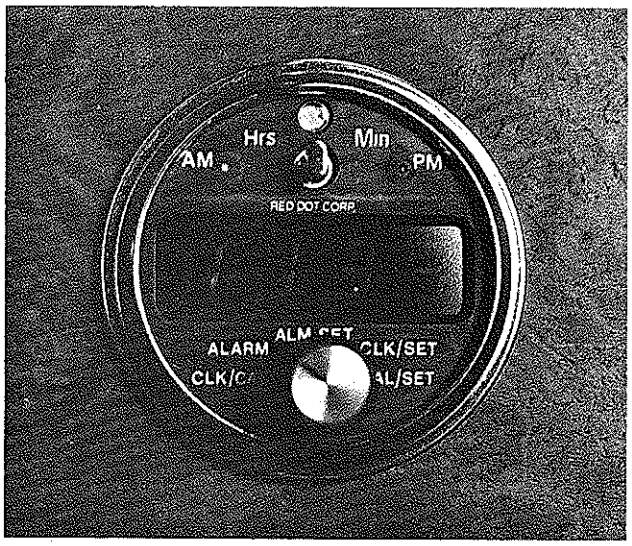
FIRE EXTINGUISHER

A portable, multi-purpose dry chemical fire extinguisher is located beneath the forward part of the dinette. To use, release the clamp and remove the extinguisher from the bracket. Pull the safety pin from the handle, squeeze handle, and apply chemical under flame.

DIGITAL CLOCK

If so equipped, the digital clock, Figure 3-21, may be used in conjunction with the radio in the rear compartment to provide a timed wake-up feature; or it may be used with the chime for the same purpose. Dual time/radio controls are located in the rear compartment, in a panel adjacent to the radio; and in the front driver's compartment.

Fig. 3-21. Digital Clock.



Set the clock timing and alarm functions as follows:

To SET CALENDAR — Turn rotary switch to "cal/set". Move toggle to "Hrs" position to set months, and to "Min" position to set days. After setting, return rotary switch to "clk/cal" position for proper time and date display.

NOTE

Calendar should be set before 11:59 a.m. to ensure proper date change.

TO SET TIME — When first setting, cycle clock thru 24 hours. Turn rotary switch to "clk/set". Move toggle to "Hrs" position and hold until proper hour and time of day (a.m. or p.m.) is displayed. Move toggle to "min" position to set minutes. After setting, turn rotary switch to either "clk/cal" position for proper time/date display, or to "alarm" for time only display and alarm function.

TO SET ALARM — Turn rotary switch to "alm/set" position. Move toggle to "Hrs" position and hold until desired hour AND time of day, (a.m. or p.m.) the alarm is to go off is displayed. Move toggle to "Min" position to set minutes. After setting, to activate alarm, turn rotary switch to "alarm" position.

ALARM SHUT-OFF — Turn rotary switch from "alarm" position to "clk/cal" position.

NOTE

The alarm can be set again for the same time, the following day after 1 minute past the time the alarm went off.

SECTION IV

ELECTRICAL SYSTEMS

INTRODUCTION

There are actually two interrelated electrical systems used in your motorhome: the 12-volt dc supply system; and the 120-volt ac supply system. The 12-volt dc supply sytem is divided into two branches, each functioning from a common 12-volt source. One branch provides the 12-volts required for the automotive starting, ignition, and charging systems; the other branch supplies 12-volts to motorhome appliances which require 12-volts for operation. The 120-volt ac system includes those motorhome appliances which require 120-volts ac for operation, which may be supplied from the internal generator plant; or from an external 120-volt ac supply, via the "shore" line. Each of the systems is described in the following paragraphs. Figure 4-2A.

12-VOLT DC SUPPLY SYSTEMS

The 12-volts dc supply is furnished to the standard automotive starting, ignition and charging system; and to the motorhome 12-volt distribution circuits. A degree of interface exists between these systems in that the motorhome distribution circuits also provide some circuit breaker protection for certain automotive lighting functions. Each of these circuits relies on the 12-volts supplied from the four series-parallel connected 6-volt batteries, located in the battery compartment on the left side of the coach. A simplified block diagram of the 12-volt supply and distribution system is shown in Figure 4-1; more detailed information is provided in the wiring diagrams located in Section VIII.

MOTORHOME 12-VOLT CIRCUITS

The 12-volts supplied to all motorhome appliances, outlets, and accessories is routed from the batteries through a 12-volt bus and individual circuit breaker protectors. The circuit breaker panel is located in the overhead panel above the driver. Circuit breaker functions are listed in Table 4-1 and shown in Figure 4-2.

Figure 4-2A. Electrical Systems.

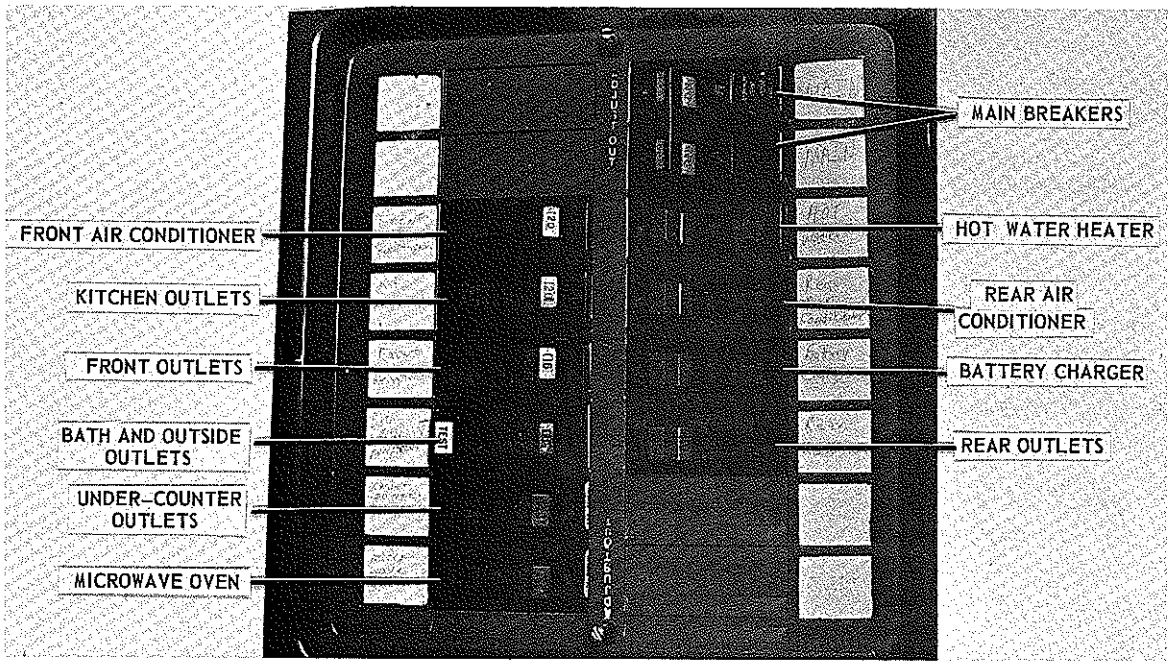
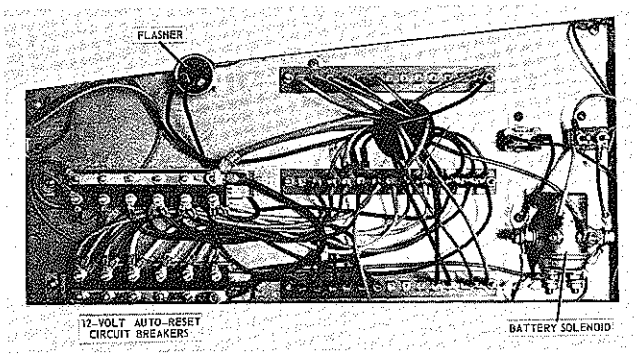


Table 4-1 Circuit Breaker Functions

Protected Circuit[s]	Circuit breaker and Rating
Clearance lights (4), cluster lights (6), side marker lights (2), water level detector, water pump, holding tanks gauges, recirculating toilet.	CB 8, 20 ampere
Bedroom lights (2), closet lights (2)	CB 12, 20 ampere
Reading lights (3), 12-volt outlets	CB 2, 20 ampere
Furnace circuits, defroster blower motors	CB 3, 20 ampere
Rear heater motors (3)	CB 1, 20 ampere
Driver's side heater motor	CB 4, 20 ampere
Passenger's side heater motor, exhaust fans (2)	CB 7, 20 ampere
Left wiper motor	CB 5, 6 ampere
Right wiper motor	CB 6, 6 ampere
Battery charger, auto air conditioner solenoid, ignition circuits	CB 10, 30 ampere
Auto air conditioner condenser fan motor	CB 11, 20 ampere
Living room lights (2)	CB 13, 20 ampere
Reading lights (4), outlets (2), shower, bath lights (2), exhaust fan, dinette light, outside light, stepwell light, voltmeter circuit	CB 14, 20 ampere
Headlights and instrument lights (3)	CB 9, 20 ampere
Blank (dummies)	CB 15, 40 ampere
Radio/tape unit (fuse-protected)	F1, 2 ampere

Figure 4-2. Circuit Breaker.



BATTERY CHARGER

The 12-volt battery supply is maintained in a fully-charged condition by either the engine alternator (when the engine is operating) or by the separate battery charger. This is a completely automatic electronic battery charger, located in the left-hand mid-mount storage compartment, Figure 4-3, which operates whenever a source of 120-volts ac is supplied to the coach circuits (either shore line, or generator operation). When the charger is operating, the batteries are effectively placed off-load, and charged, and the battery charger supplies the 12-volts dc to the motorhome circuits. This makes it possible to use all 12-volt systems while charging all storage batteries. The charger ensures rapid battery recharging of the main batteries and furnishes 80 amps of service available in one main circuit.

NOTE

When using battery power only for operation of heavy load motorhome circuits such as the lighting, motors, and furnace, check battery condition periodically to avoid discharging the batteries. If battery condition is marginal, run the generator plant to keep the batteries charged.

Figure 4-3. Battery charger.

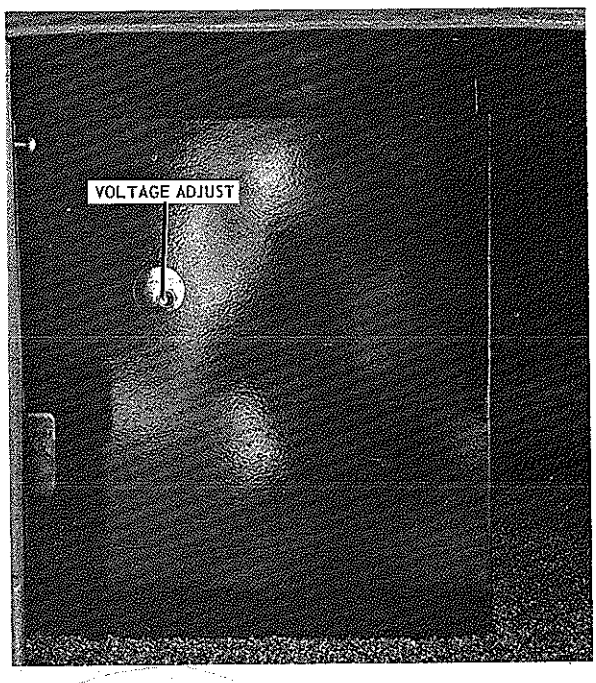
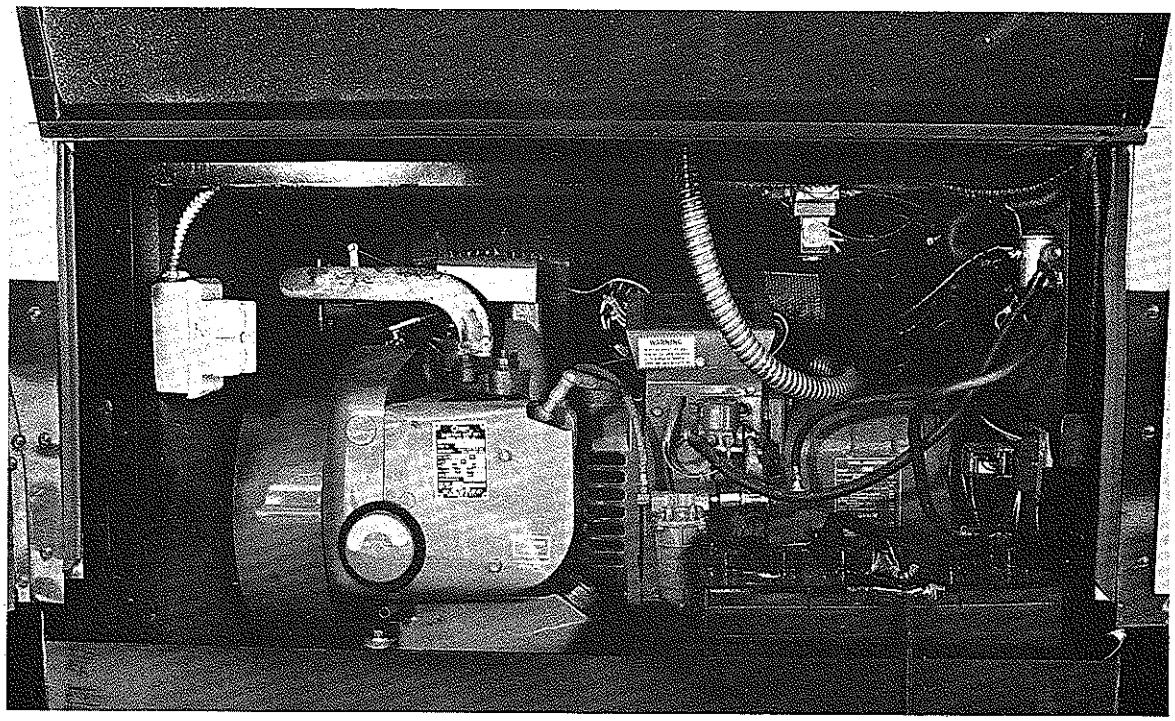


Figure 4-5. Generator Plant.



Most external shoreline hookups will not be rated to operate all electrical appliances in your coach. Check with facility personnel to determine the maximum current capability of the hookup. Usually, only one air conditioner or electrical hot water heater may be operated at a time. The current ratings for the appliances in your coach are listed in Table 4-2.

Table 4-2
Electrical Ratings for
Motorhome Appliances

Appliance	Normal Current Rating
Air Conditioners:	
13,500 btu	17.5 amperes
10,000 btu	14.0 amperes
Hot water heater	10.0 amperes
Television Receivers:	
Black and white	.5 amperes
Color	1.0 amperes
Battery Charger	0 - 12.0 amperes
	to
Microwave Oven	15.0 amperes
Food preparation center	4.0 amperes
Vacuum cleaner system	9.0 amperes
Refrigerator	2.5 amperes
Ice Maker	2.5 amperes
Compactor	10.0 amperes
Washing Machine-Dryer	25.0 amperes

Notes

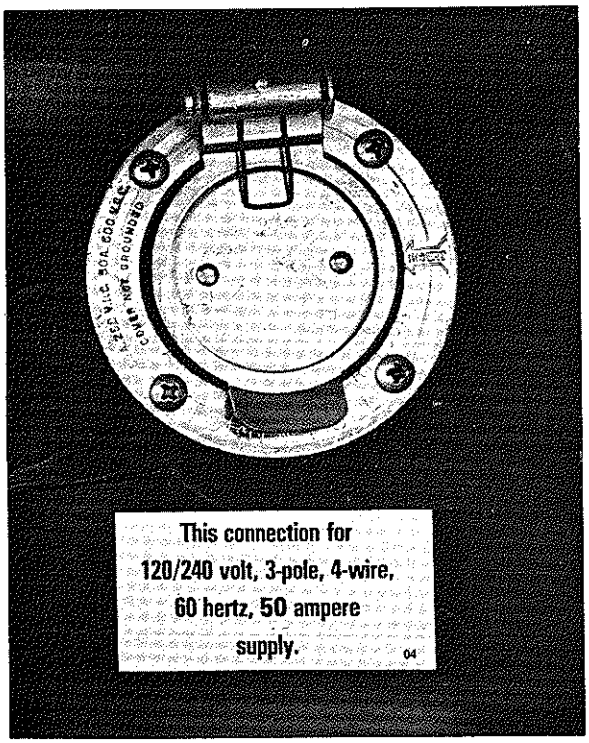
Starting current is _____amps
Starting current is _____amps

Charger current drain will vary, depending on 12-volt sytem drain.

For commercial power (120 volts ac), the coach is equipped with a 25 foot 12-3 shore line; for 220 volt ac power a larger 8-3 cable is used.

To hookup to the external receptacle, first shut-off all ac appliances, then set the selector switch (under the dinette seat) to SHORE position. Connect the proper shore line to the coach receptacle located in rear adjacent to the left-side tail light, Figure 4-6, then hook up to the external receptacle.

Figure 4-6. Coach Shoreline Receptacle.



SECTION V

WATER DISTRIBUTION SYSTEMS

INTRODUCTION

The motorhome is equipped with a completely self-contained water system which has piping, heating, and drainage facilities similar to those found in standard home installations. The water supply and distribution system includes three networks: (1) a potable water supply system, which includes the water tank, pump, and supply lines; (2) water heater and interior hot water heating systems; (3) waste and sewage drainage systems.

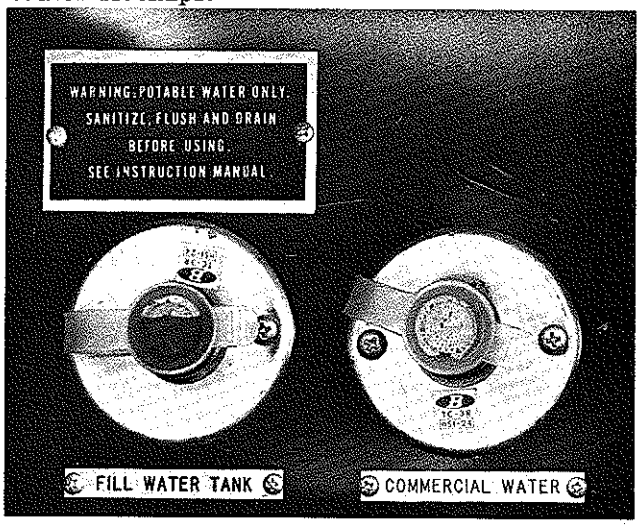
WATER SUPPLY AND DISTRIBUTION SYSTEMS

FILLING AND SANITIZING THE WATER SUPPLY SYSTEM

As shown in Figure 5-1, the water fill and commercial water connections are located in the utility compartment at the left-rear of the coach, together with the shoreline hookup connection; the plastic water storage tank, located beneath the rear left bed, is a non-pressure type tank. This means that the system water pressure is developed by pumping action directly into the supply lines, rather than applying air pressure to the tank.

FILLING THE TANK To fill the tank, insert the end of a sanitary ("white") hose into the WATER FILL inlet, open some interior faucets, and turn on the garden hose water supply. A filled tank will be indicated by water overflow under the coach.

Figure 5-1. Location of Water Fill and Commercial Water Hookups.



COMMERCIAL WATER HOOKUP

When facilities are available, use the COMMERCIAL WATER hookup to obtain system water supply requirements. By attaching a hose connection directly to this inlet, the motorhome water tank and pump system is bypassed and the supply lines water pressure is developed by the exterior connection. A check valve, connected in series with the water supply inlet, automatically bypasses the pump and tank, making pump operation unnecessary.

SANITIZING THE WATER SUPPLY SYSTEM

Since the only source of potable water in the motorhome is contained in the supply tank, it is extremely important that this water supply be as free of impurities and contamination as possible. Accordingly, water tank sanitizing procedures should be followed before the tank is filled for the first time; after long idle periods, where water may become stagnant; or after any suspected contamination of the water supply. Whenever possible, use a commercially-approved tank sanitizer and follow the procedures on the product package. If it is not possible to use a commercial product, prepare your own mixture and sanitize the tank in accordance with the following procedures.

1. **Empty the Water Tank** — To completely drain the water system, open all five drain valves listed below:
   a. Tank drain valve, at end of tank, beneath left-side bed (Figure 5-4A)
   b. Drain valve in water line behind check valve near water tank. (Figure 5-4A)
   c. Hot and cold water drain valves, located beneath the bathroom cabinet. (Figure 5-4B)
   d. Hot water tank drain valve. (Figure 5-4A)

NOTE

If it is necessary to drain only the tank, just open the tank drain valve and several of the faucets.

If a complete system drainage is required, such as that normally accomplished before placing the motorhome in cold-weather storage, install a blow-out plug on the COMMERCIAL WATER connection and blow out the system with compressed air. Be sure to close the valves after draining is finished.

2. **Prepare the Sanitizing Mixture** — Prepare a concentrated sodium hypochlorite solution from a mixture of water and household bleach (Clorox) (5¼ to 6% solution). The proportions are: 1/4 cup of bleach to 1 gallon of water.
3. **Add Mixture to Tank** — Open the WATER FILL connection and, with the aid of a funnel, pour in one gallon of sanitizing solution for each 15 gallons of tank capacity. (Tank capacity is 64 gallons, 4 gallons of solution will be required.)
4. **Fill Tank to Capacity** — Connect the hose to WATER FILL inlet, and fill the water tank completely. Remove hose, close WATER FILL connection and allow the system to stand for several hours.
5. **Drain System** — Open several faucets, open the tank drain valve, and allow the tank to drain completely.
6. **Refill System with Potable Water** — Close tank drain valve, connect garden hose, and fill system completely. When tank is full, disconnect hose, replace fill cap, and turn on water pump. When water flows from the opened faucets, close them and open other faucets until water flows. This flushes out the system and ensures that the fresh water supply is ready for use.

NOTE

Residual water tastes or odors can be removed by again draining and rinsing the system with a vinegar solution made from mixing in the ration of one quart of vinegar to five gallons of water.

POTABLE WATER DISTRIBUTION SYSTEM

The major components of the potable water distribution system, shown in Figure 5-2, are the 64 gallon water tank, water pump, 12 gallon hot water heater, piping and fixtures. Note that the hot water heater is also part of the heat exchanger loop for the engine cooling system, Figure 5-3.

The water pump is equipped with a factory-calibrated pressure control switch which is preset to turn the pump on when the water pressure falls below 25 psi; and turn the pump off when the pressure reaches 35 psi. If the pump has been out of service for some time, its advisable to open a faucet before the pump is turned on. This will allow for easier startup by reducing the pump starting load. When water flows steadily from the opened faucet, close the faucet and note that the pump shuts off when the system is properly pressurized. (It may also be necessary to bleed the air from the other faucets first.) When the potable water supply tank level is very low, or empty, shut the pump off to prevent possible damage to the pump motor. In addition to integral motor overload protection, the pump mechanism is protected from jamming by the presence of a pump guard, located in the inlet line. The pump guard is basically a filter with a fine mesh material placed between the pump and the water supply.

It is advisable to clean the filter periodically to prevent reduction in water pressure due to clogging of the fine mesh screen. The hot-water heater is a fibreglas-jacketed coil-type heat exchanger which ensures a continuous supply of hot water through heat exchanger action with the automotive cooling system. When the engine is off, the hot water heater can still supply hot water through use of an electrical heater. The heater is on all the time that the ac supply is available. The electric heater circuit breaker, located in the rear closet, should be switched off when heated water is not needed. For electrical operation, a source of 120 volts ac must be available; either from the shore hookup, or from the internal generator plant.

The hot and cold water piping is routed first to the galley sink, then to the shower, bathroom sink, and the toilet. The toilet water supply shut-off valve is located beneath the sink, Figure 5-4B. Note that the hot and cold water drain valves are also located beneath the sink. These valves are used only to drain out the lines in preparation for winterizing the unit or to drain the systems completely for sanitizing and will be left closed at all other times.

CAUTION

When adding anti-freeze solution to the water system for more positive protection, be sure it is a type approved for potable water systems. DO NOT use automotive type anti-freeze.

7. Leave all faucets and valves closed during storage. Before restoring the coach to service, be sure to sanitize the water system in accordance with the instructions previously described in this section.

PREPARING DRAINAGE SYSTEM FOR STORAGE

The entire drainage system should be thoroughly drained and flushed with fresh water. The following procedures are recommended:

1. Completly drain holding tanks of waste material.
2. Flush sinks, shower, and lavatory with solution of hot water, water softener and soap. Rinse well and allow solution to drain into tanks. Flush with clean hot water.
3. Agitate water in tank by rocking vehicle or, for more thorough cleaning, drive vehicle for a few miles. Drain tanks again.
4. Alternate to Step No. 3 is to use a chemical deodorant — let mixture stand a few days and then drain.
5. Flush with fresh water and again drain.
6. Fill traps and partially fill tanks with an anti-freeze approved for use in plastic pipes. Normally a cupful of anti-freeze poured into each drain will fill the trap. Do not use anti-freeze solutions with an alcohol base.

ICE MAKER STORAGE

Since the ice-maker is connected into the water system, it will also be necessary to prepare this unit for winter storage. Proceed as follows:

1. Set power switch to OFF position.
2. Empty out contents of unit and leave door ajar to melt residue, which will collect in drip tray. Empty drip tray, clean and store separately.

BATTERY STORAGE DURING FREEZING WEATHER

A battery that is not kept up to full charge must be given protection against freezing. A partially charged battery will freeze at low temperatures, so it must either be left connected to a trickle charger or removed from the vehicle and stored in a warm location. A battery will normally discharge itself in a few weeks, so if it is to maintain a charged condition, it still must be charged from time to time even in warm storage. Add water as required.

NOTE

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

GENERAL STORAGE NOTES

Drawing drapes will reduce fading of rugs and upholstery. Leaving an air freshener agent will minimize odors from plastics and other materials. Slight opening of windows and vents will allow air circulation without worry of water entering. Spraying silicone on folding antenna mechanisms will minimize effects of corrosion. Covering wheels to eliminate direct rays of the sun on tires will reduce sidewall cracking.

CHECKING FOR LEAKS

Periodically check the LPG system for possible leakage. Although the entire system and associated appliances undergo extensive factory testing for leakage, normal road shock and continual vibrations can loosen or damage piping and fittings. Leaks will usually become noticeable by the presence of the characteristic odor-additive of garlic, or onions. If you encounter this odor immediately turn off all flames and begin a systematic search for the leak throughout the entire gas system. Use a bubble or soap solution and brush on connections and fittings. NEVER BRING A LIGHTED MATCH NEAR A SUSPECTED LEAK! Gas leakage will be indicated by the presence of bubbles at junctions or at piping breaks. If it is necessary to tighten a gas connection, turn off the main valve, then use two wrenches, with opposing torques, to prevent twisting and distortion of the copper tubing. If the leak cannot be found in this manner, the appliance may be at fault. Shut down the suspected appliance to isolate it from the system until authorized repairs can be made.

LPG CONSUMPTION

Most gas appliances are intermittently operated. Operation during cold weather conditions, however, does cause a heavy use of the gas furnaces. Extensive oven use also consumes a great amount of fuel. The amount of LPG consumption depends on the total use and manner of use of these appliances. Note that each gallon (4¼ pounds) of LPG fuel produces approximately 91,500 BTU's of heat energy. The LPG tank used in your coach will furnish about 4 million BTU's. Following is a listing of typical appliance consumption ratings when operated for one full hour.

Appliance	Average BTU Consumption
Refrigerator	1,350 BTU's
Furnace (each)	30,000 BTU's
Range Oven	10,000 BTU's
Each Range Burner	5,000 BTU's

SECTION VII

AIR BRAKE SYSTEMS

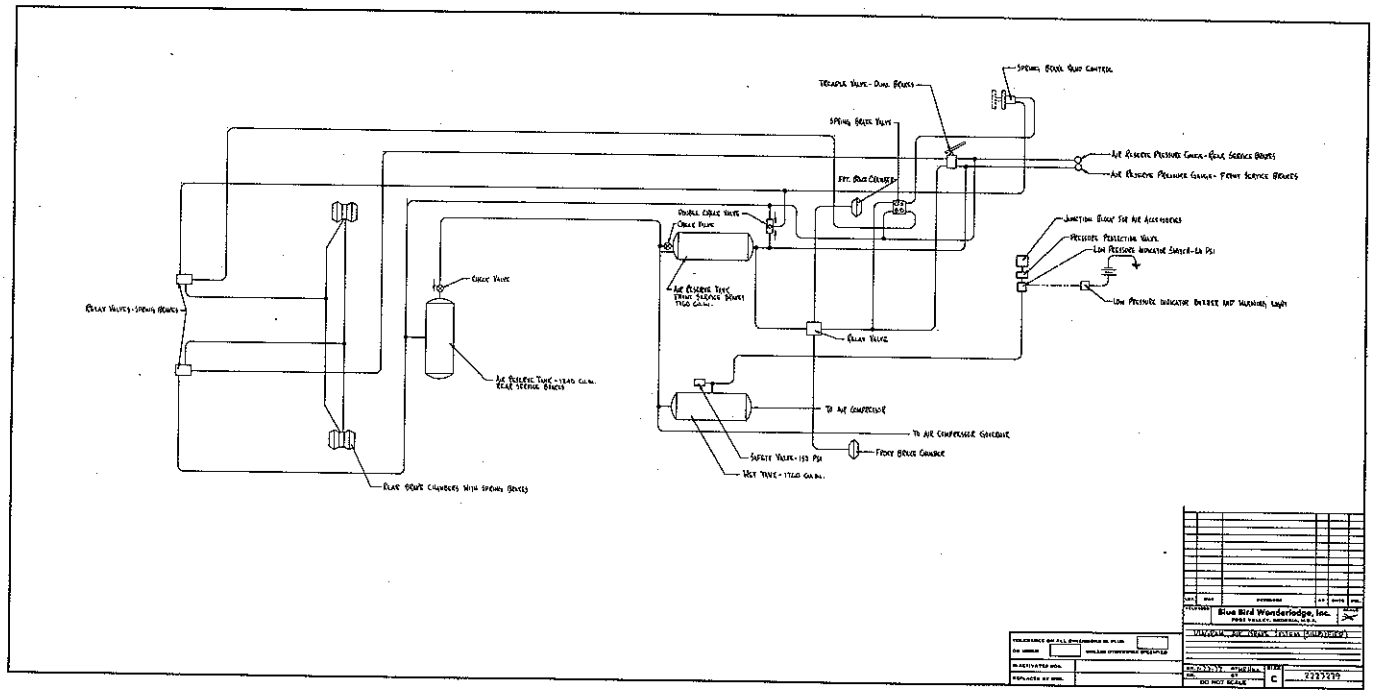
INTRODUCTION

Your motorhome is equipped with dual service air brake systems, with integral fail/safe operation; and manual/automatic rear spring (parking) brakes. As shown in Figure 7-1, the service brakes are completely independent systems, each including a reservoir and separate distribution lines and valves; a separate reservoir is also supplied for the rear spring brakes which function independently of the service brakes. All three reservoirs are pressurized from a single compressor. Both service brake systems are brought into operation each time the brake treadle is pressed to slow or stop the coach. Reservoir pressure for each service brake system is monitored by a respective pressure gauge on the front panel; system failure(s) are indicated by low pressure readings, illumination of the brake system failure lamp, located above the pressure gauges, and by sounding of the low air warning buzzer.

OPERATION

When the coach is parked, and the engine off, the rear spring brakes will normally be set by pulling out the PARKING BRAKE knob located on the lower driver's instrument panel. The spring brakes cannot be fully released until the air reserve pressure is above 60 psi. These brakes are in the released position when the control is pushed in; and in the applied position when the control is pulled out. In the event that there is a loss of air pressure, the spring brakes will set automatically, at the brake-applied position, and will not release until the air reserve has again built up to the required value. Consequently, there will be a normal delay, after the coach is first started,

figure 7-1. Motorhome Air Brakes System, Simplified Block Diagram.



before the compressor builds up sufficient pressure in the three reservoir tanks, before the brakes can be released and the coach can be driven. When the brake treadle is depressed, to slow or stop the coach, reservoir air is applied simultaneously to both front and rear service brakes to effect the braking action. The spring brakes are held in a released position by the air pressure supplied from the associated reservoir tank.

CAUTION

Do not attempt to drive coach until system pressure is 90 to 105 psi.

BRAKE FAILURES

Brake system failures are protected against by a combination of fail/safe features. Each service braking system, front and rear, has a backup capability in the form of the rear spring brakes, in the event of partial or total system failures. If the front brakes fail, operating the break treadle activates both the rear service brakes **and** the rear spring brakes, providing sufficient braking action to effectively stop the coach. Under these conditions, the spring brakes do not lock in, as in normal released position, but instead their application is "modulated" in the same manner as the service brakes, thereby providing a normal braking "feel".

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

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

NOTE

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

534 Ford
3200 RPM
Governor

SECTION VIII

INTRODUCTION

OWNER MAINTENANCE DATA

TOWING WEIGHT TONGUE 500 LBS
5000 LBS

INTRODUCTION

This section provides general information for use in performing scheduled services as well as preventive and routine maintenance on your motorhome.

SYSTEM CAPACITIES AND SPECIFICATIONS

Table 8-1. Engine Capacities and Specifications

Item	Capacity / Specifications Ford	Caterpillar
Fuel Tank Capacity	150 Gallons	150 Gallons*
Type of Fuel	Gasoline	Diesel Fuel
Cooling System Capacity		
w/Front Heater	32.9 quarts	46 quarts
w/Front and Rear Heater	47.1 quarts	60.2 quarts
Crankcase Capacity		
Dry	9 quarts	12 quarts
Refill	8 quarts	10 quarts
Specification	Ms	Ms, Series 3
30°F to 100°F	SAE30 or SAE20W/40	SAE10W/30, 10W/40 SAE-30
0°F to 30°F	SAE20 or 10W-30	10W-30 or -40
Frequency of Change	Every 4 months or 4000 miles	every 3 months or 6000 miles
Transmission Capacity	19 quarts	19 quarts
Allison 640 MT FLUID		
Tire Pressure (900 x 20, 14 ply)		
Front	100 lbs.	100 lbs
Rear	95 lbs.	95 lbs.
Tire Pressure (10:00 x 20, 14 ply)		
Front	105 lbs.	105 lbs.
Rear	75 lbs.	75 lbs.

*A separate 30 gallon gas tank is provided for generator.

POWER STEERING FLUID

Table 8-2. Generator Capacities and Specifications

Item	Specification/Capacity
Fuel	Tops off gas tank when Ford Engine is used; uses separate 30 gallon gas tank when diesel engine is used.
Cooling System	Air Cooled
Crankcase Capacity	5 quarts (w/wo Filter)
Specification	
30°F to 100°F	SAE 30
0°F to 30°F	Sae 10W

Table 8-3. Motorhome Capacities and Specifications

Item	Specification Capacity
Potable Water Tank	64 gallons
Holding Tank, Sewage	42 gallons
Holding Tank, Waste	60 gallons
LPG Tank	180 lbs.
Water Pump	2.8 GPM
Furnaces	16,000 BTU (2) 12,000 BTU (1)
Hot Water Heater	12 gallon
Batteries	4 6-volt batteries connected in series-parallel supply 12 volts at 440 AH
Converter/Battery Charger	100 amperes output

Table 8-4. 12 Volt Lighting and Equipment, Current Requirements

Item	Quantity	Total Amperes
Automotive Lighting:		
Marker/identification	16	9.6
Stop	4	7.2
Parking	4	2.1
*Headlights (Hi-beam)	6	13.4
*Headlights (lo-beam)	4	9.2
Ignition	1	2.5
Instrument Panel	1	1.0
Stepwell-outside	2	2.5
Back-up	2	4.2
Interior Lighting:		
Reading spots	7	1.7 (each)
Front living area	6	7.8
Bathroom	1	1.3
Shower	1	1.0
Dinette	2	2.6
Kitchen	1	1.3
Bedroom	4	5.2
Windshield Wipers	2	8.0
Water Pump	1	6.2
Blower Motors:		
Front Heater (Hi/Lo)	1	9.0/4.5
Defroster (Hi/Lo)	1	9.0/4.5
Foot Warmer (Hi/Lo)	1	9.0/4.5
Rear Heater (Hi/Lo)	1	9.0/4.5 (each)
Stereo System	1	2.0
LPG furnace	1	7.3
Ceiling Vent	1	4.0

*Includes tail-lights

CHANGING TIRES

The tires used on your motorhome are heavy-duty truck-type tires. These tires are heavy and may be difficult to handle. If at all possible, tire changes should be accomplished by a service station equipped to handle truck tires; if a situation arises where no service facilities are available, the following procedures may be used:

NOTE

These procedures are applied only to front tire changes. A blown-out rear dual tire will not prevent you from reaching a service stop providing that you drive slowly (25 MPH max.) to prevent tire overheat and possible blowout of the other tire in the pair.

WHEN A SPARE TIRE IS AVAILABLE

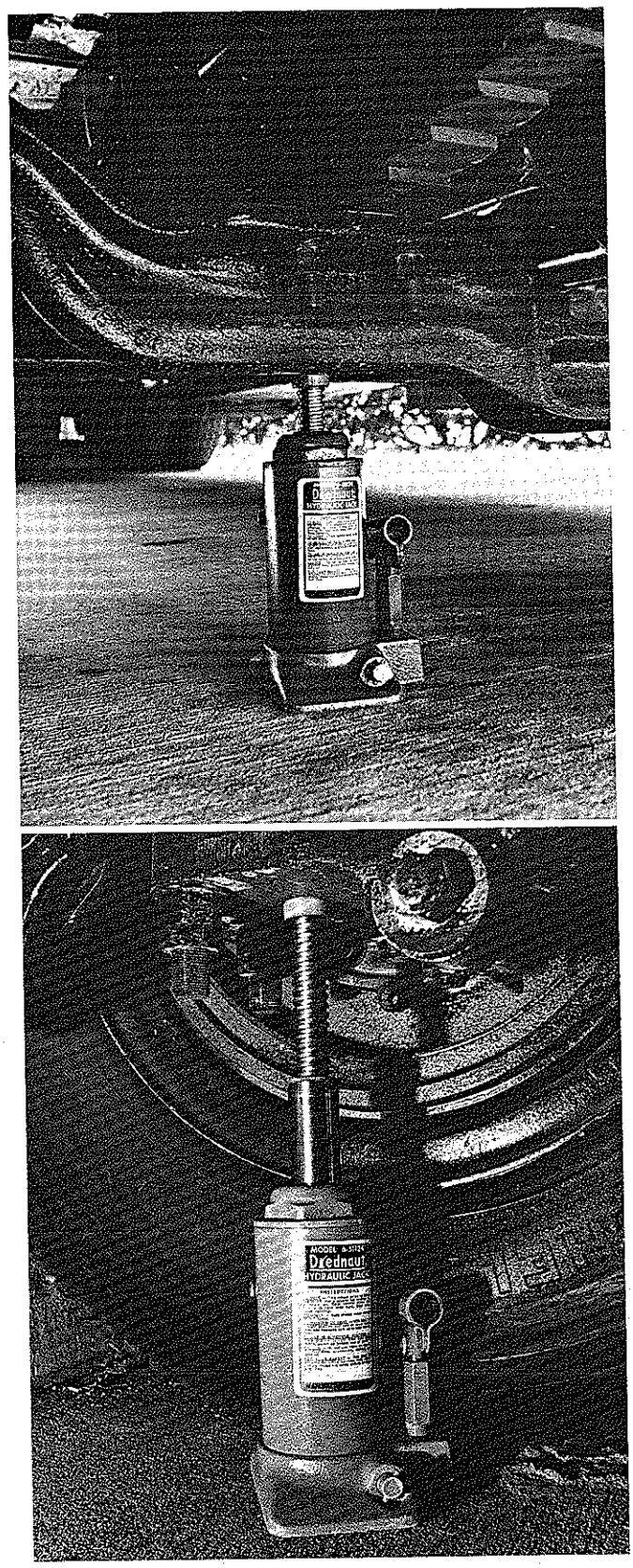
1. Drive motorhome out of traffic lane, if possible, onto a level surface.
2. Turn on hazard flasher and apply emergency brakes before leaving coach.
3. Turn off ignition and set transmission selector to Neutral (N) position.
4. Remove jackstand, lug wrench and handle from front right side storage compartment.
5. Place wheel chocks against wheels on opposite side of work from flat tire.
6. Place jack under spring pad and raise jack slightly until secure in place. See figure 8-1 for location of jacking points.

CAUTION

Truck tires are heavy! Two people will make tire handling an easier chore.

7. Remove spare tire from tire mounting and on ground near work area.
8. Loosen lug nuts slightly then jack up coach until tire is clear of ground.

Figure 8-1. Tire Jacking Points



NOTE

Lug nuts on right side of coach are right-hand threaded (turn counterclockwise to loosen; clockwise to tighten); lug nuts on driver's side of coach are left-hand threaded (turn clockwise to loosen, counterclockwise to tighten).

9. Remove lug nuts and tire.
10. Install spare tire and replace lug nuts tightly.
11. Lower coach to ground and remove jackstand and handle.
12. Replace lug wrench, jackstand and handle in storage compartment and tie down to prevent road noise.
13. Remove and stow wheel chocks.
14. Turn off hazard flasher before returning to traffic.

CAUTION

Check lug nuts for tightness every 1000 miles.

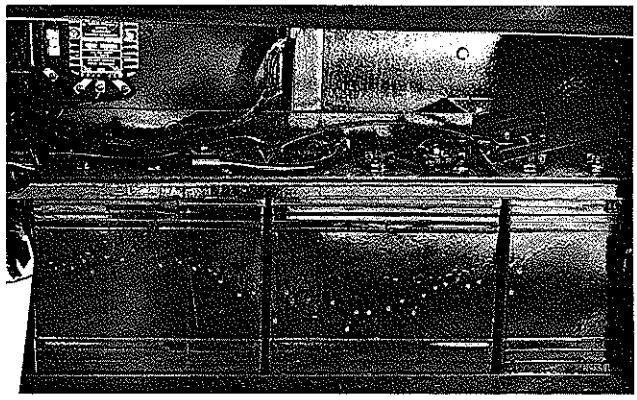
WHEN NO SPARE TIRE IS AVAILABLE

To replace a front tire when no spare is available, remove one of the outer rear dual tires and use as a spare. To remove the tire, it will be necessary to run the inside dual tire up on a small wooden ramp which is high enough to raise the outer tire above ground level. Remove the tire to be used as the spare and back the coach off the ramp. Replace the front tire by following the previous instructions.

BATTERIES

Your motorhome is equipped with four 6-volt batteries, connected in a series-parallel arrangement to provide 12 volts for engine and motorhome operation. Batteries are located in the front outside compartment on the driver's side of the motorhome, as shown in figure 8-2. Unlock or unlatch cover for accessibility. A separate 12-volt battery is contained in the generator compartment and is used only to start the generator; it is also charged by generator operation.

Figure 8-2. Motorhome Batteries



BATTERIES HOOK-UP

The engine/motorhome batteries are charged by the engine alternator while the engine operates. The batteries are also charged by the 100-ampere battery charger when generator or shoreline ac power is available.

PERIODIC CHECKS

Check the level of the battery electrolyte on a regular basis. How often fluid is added depends on the battery usage, climate and proper use of the battery charger. Experience with coach operation will soon provide a guide as to how often the batteries should be checked. Add only colorless, odorless drinking water or distilled water, as necessary, to bring the electrolyte level to the split ring in the filler opening. (A small mirror and flashlight will simplify checking electrolyte level.)

CAUTION

DO NOT expose battery to open flame or electric spark — battery action generates hydrogen gas which is flammable and explosive. Avoid contact with battery acid. This is a sulphuric acid that can cause personal harm. Flush exposed area immediately with water. This will neutralize and remove the acid. Also, do not allow acid to come in contact with clothes, painted surfaces, etc., or damage will result.

Use caution when working on or near the battery, cables, solenoid, or chassis wiring — do not wear metal rings, watchband, or jewelry. This may short out a 12-volt line. (It is more likely that personal damage would result, rather than equipment damage!)

To make sure that the batteries are always ready for use, periodically check and charge as necessary. Check batteries at least every two weeks in freezing weather; every four weeks in warmer weather. A fully-charged battery will not freeze under normal circumstances, so it is imperative that the batteries remain charged during winter. A safe level of charge is a specific gravity reading of 1.225. A fully charged battery has a specific gravity of 1.250 to 1.280. Always use a hydrometer which has a temperature correction scale.

BATTERY MAINTENANCE

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

EXTERIOR CARE

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

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

INTERIOR CARE

The interior can be kept in good condition with the use of approved cleaning agents for vinyl walls and ceilings, plastic fixtures, stainless steel, formica, etc. Never use abrasive agents on interior of refrigerators or on plastic sinks, as they may cause permanent scratches. Be sure the cleaning agent will not damage the material to be cleaned. Note that some plastics are incompatible with certain cleaners. Read directions on cleaner container before using. For the most part, the cleaners and polishes that would normally be used in your home are equally well-suited for your motorhome.

CRANKCASE OIL LEVEL

The crankcase engine oil supply should be maintained at the proper level. If checking oil level immediately after engine has been running, allow a few minutes for the oil to drain back into the crankcase before checking dipstick reading. Refer to Figure 8-3 for dipstick location in gas engines; see Figure 8-4 for location in diesel engines.

In coaches with diesel engines, the oil level must be checked and oil added, from inside the coach. The best time to check the oil is, therefore, before getting underway; the engine is cool and the dipstick reading most accurate. Carrying a few quarts of approved type lubricating oil will allow you to service your own coach while the engine is cool. Use a funnel with a long (2 ft.) flexible tube when adding oil.

Figure 8-3. Oil Dipstick Location, Gas Engines

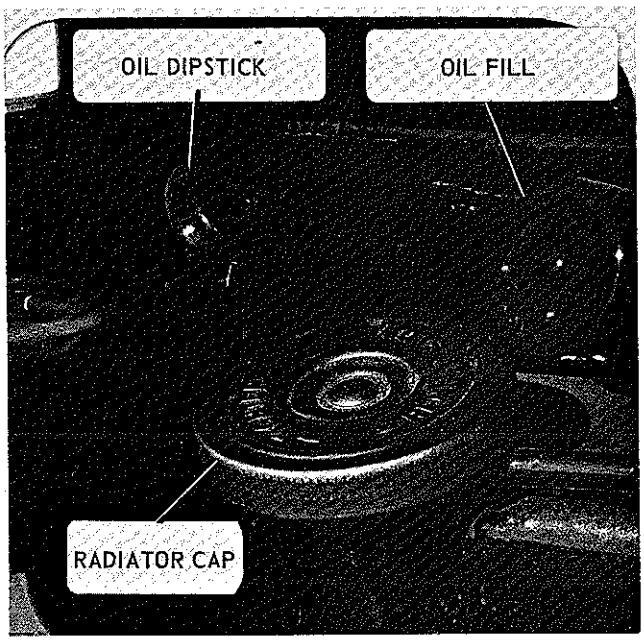
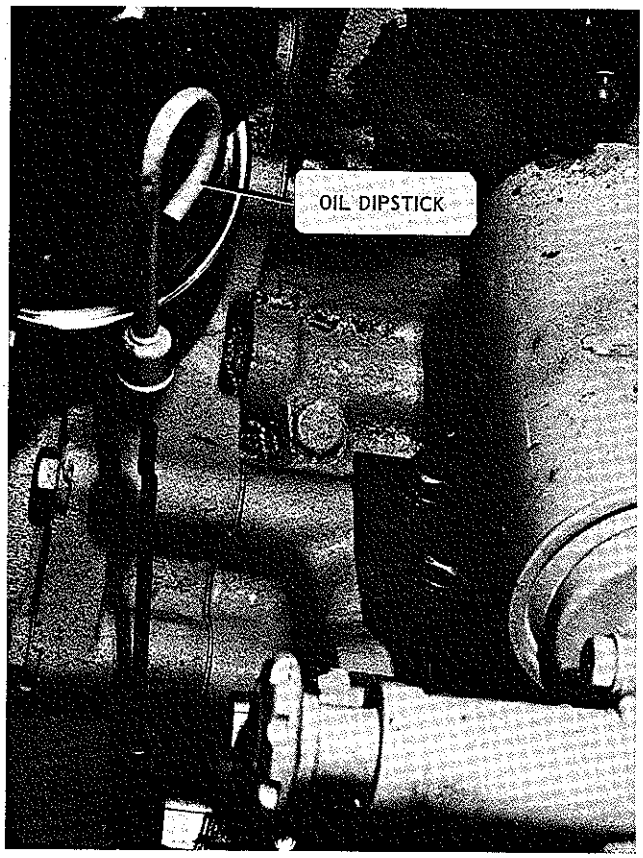


Figure 8-4. Oil Dipstick Location, Diesel Engines



To check the oil level, remove dipstick; wipe clean, and reinsert it completely for an accurate reading. If oil reads at or below the "add oil" mark on the dipstick, add oil as necessary. Maintain oil level in the safety margin, staying between the "full" and "add oil" lines.

POWER STEERING FLUID LEVEL

Regularly check hydraulic fluid level in the power steering pump reservoir, each fuel stop. Add power steering fluid (or automatic transmission fluid) as necessary to maintain the correct dipstick reading, depending on fluid/engine temperature.

If the fluid is at normal operating temperature (approximately 150 degrees, and hot to the touch), the dipstick should indicate 1/2 to 3/4 full. If checking at room temperature (approximately 70 degrees), fluid should be 1/2 full. Power steering fluid does not require periodic changing.

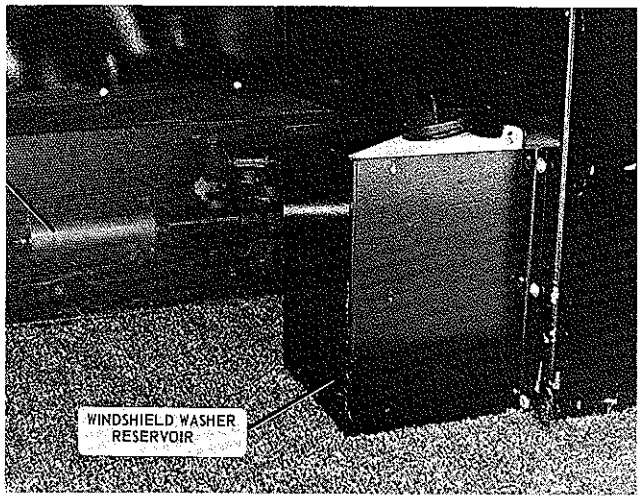
WINDSHIELD WASHERS

Check reservoir fluid level periodically. Use a prepared washer solution, if possible. The washer reservoir is accessible through the outside right–side storage compartment, (figure 8-6).

GENERATOR SERVICE

Follow a regular schedule of inspections and servicing, based on operating hours, to keep the generator operating at peak effieciency. Keep an accurate log book of maintenance, servicing, and operating times. Regular service periods are recommended for normal servicing and operating conditions. When operating in very dusty or dirty conditions, service will be needed more frequently. Check condition of crankcase oil and air filter frequently until the proper service/time periods can be determined.

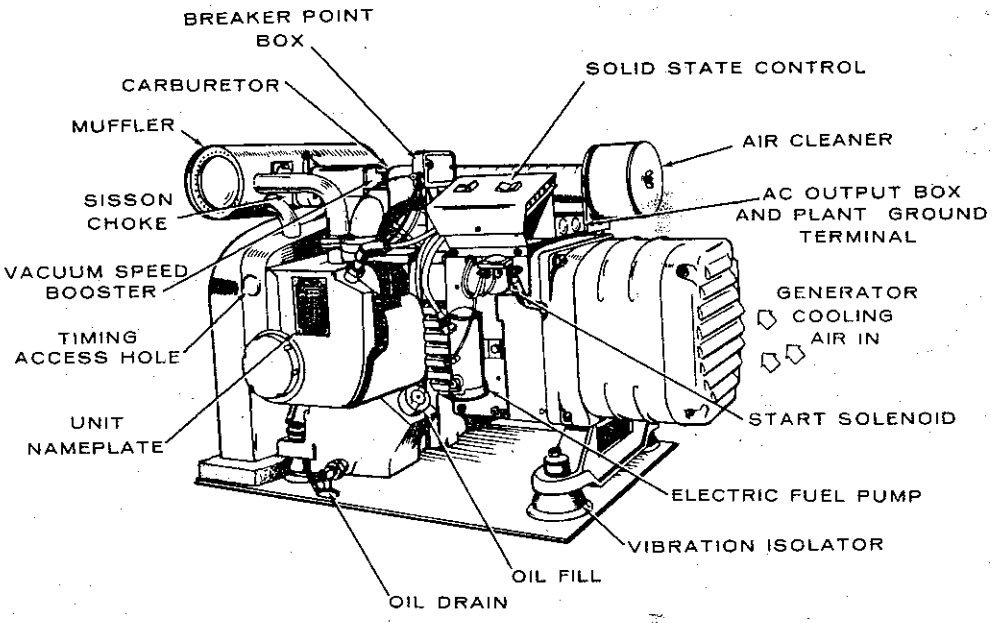
Figure 8-6. Windshield Washer Reservoir.



MAINTENANCE SCHEDULE

Use the following schedule as a guide to routine and periodic maintenance procedures. Neglecting generator maintenance can result in failures or permanent generator damage. Refer to figure 8-7 for generator compartment component locations.

Figure 8-7. Generator Diagram.



TYPICAL NH FOR RECREATIONAL VEHICLES

Table 8-5. Generator Maintenance Schedule

Hours of Operation	Maintenance Task
8	• inspect generator set • check fuel supply • check oil level • check exhaust system for leaks
50	• clean governor linkage • service air cleaner
100	• change crankcase oil (See Note 1) • check battery • clean or replace fuel filter • replace oil filter • check breaker points
200	• replace spark plugs
500 Call Onan Service Personnel	• check brushes • remove deposits from combustion chamber • check valve clearance (See Note 2)
1000 Call Onan Service Personnel	• clean commutator and slip rings • clean generator inspect valves, grind if necessary

Note 1 — Change every 50 hours when operating at high ambient temperatures (100°F 38°C) and above.

Note 2— Tighten head bolts and adjust valve clearance after first 50 hours on a new overhauled engine.

Periodically, make a complete visual inspection of the unit when running at rated load.

1. Check for possible leakage from oil and fuel lines.

2. Inspect exhaust line, mufflers, and connections for possible cracks or leakage.

3. Periodically check air shrouds for leakage and security. Check that cooling fins are clean.

4. Inspect electrical wiring for frayed wires, corroded connections, and general wire damage.

BATTERY

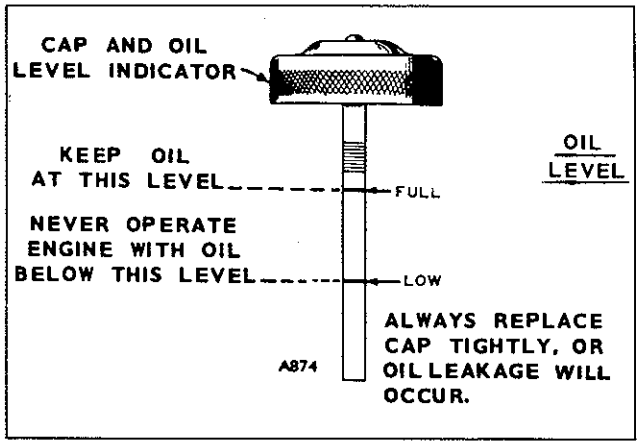
Check the condition of the generator battery at least every two weeks. See that battery connections are clean and secure. A light coating of non-conductive grease will prevent corrosion at terminals. Keep the battery electrolyte at the proper level above the plates by adding water, as necessary. Check specific gravity and recharge if hydrometer reads below 1.250. Refer to Battery Maintenance procedures provided earlier in this Section.

CRANKCASE OIL

The oil capacity of the crankcase is four U.S. quarts (3.78 lit). With a filter change, the capacity becomes 4½quarts (4.26 lit). Fill the crankcase to the "FULL" mark on the oil level indicator, Figure 8-8. Use a quality heavy duty oil with the API designation SE or SE/CC. Oil should be labeled as having passed the MS Sequence Tests (also known as the ASTM G-IV Sequence Tests) and the MIL-L-2104B Tests.

When adding oil between changes, always use the same brand that is in the crankcase. Various brands of oil may not be compatible when mixed together.

Figure 8-8. Generator Oil Dipstick Markings.



Oil consumption may be higher with a multi-grade oil than with a single grade oil if both oils have compatible viscosities at 210°F (99°C). Therefore, single grade oils are generally more desirable, unless the engine is subjected to a wide range of temperatures. Use the proper grade oil for the expected conditions.

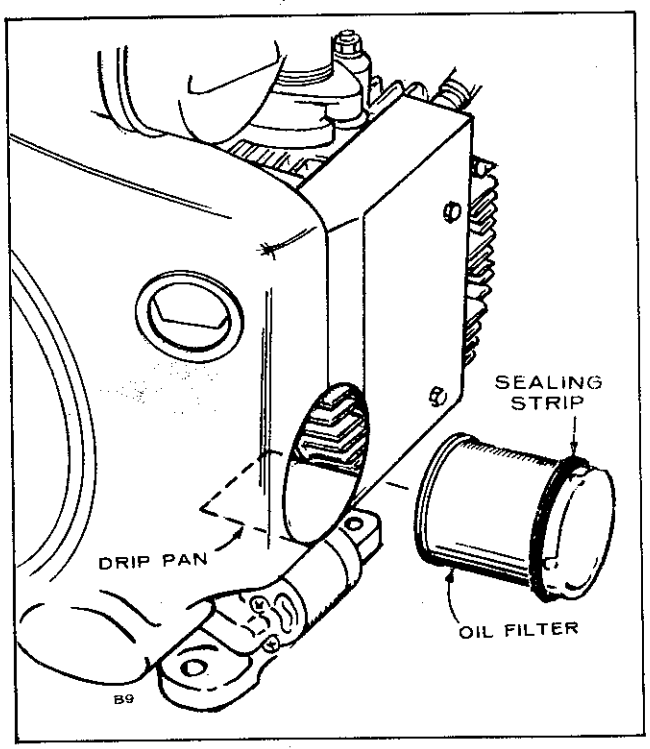
Temperature	Grade
Above 90°F (32°C)	SAE 50
32°F (0°C) to 90°F (32°C)	SAE30
9°F (-17.8°C) to 32°F (0°C)	SAE 10W-40, 5W-30
Below 0°F (-17.8°C)	SAE 5W-30

Check oil level frequently. Change oil every 100 hours under normal operating conditions. When operating in extremely dusty or dirty conditions, change oil every 50 hours or sooner.

OIL FILTER CHANGE

Change the crankcase oil filter, Figure 8-9, every 100 hours of operation. Remove the filter by turning it counterclockwise, using a filter wrench. Add the gasket provided with the filter to prevent air loss in the area indicated. Be sure to wipe dry the drip pan located below the filter. Install the filter finger-tight plus 1/4 to 1/2 turn. if the oil becomes so dirty that the markings on the oil level indicator cannot be seen, change the filter and shorten the filter service period.

Figure 8-9. Generator Oil Filter Replacement



AIR CLEANER MAINTENANCE

Proper maintenance of the air cleaner, Figure 8-10, is extremely important. Allowing the element to become plugged with dirt restricts the intake of air into the engine. Inspect the element for tiny holes or tears which would permit particles of dust or dirt to enter the engine.

Remove the paper element every 100 operating hours and clean by tapping the element against a flat surface to loosen dust and dirt accumulation. Dirt can be blown out from the clean to the dirty side, but be sure to use less than 40 PSI air pressure. The element (and foam wrapper, when used) can be washed in a solution of warm water and mild detergent, if additional cleaning seems necessary.

The element normally requires replacement every 500 operating hours and more often under severe operating conditions.

The crankcase breather, Figure 8-11, prevents pressure from building up in the crankcase but maintains a vacuum in the crankcase to reduce oil leaks. A sticky breather valve can cause oil leaks, high oil consumption, rough idling, reduced engine power and a rapid formation of sludge and varnish within the engine.

To clean the breather, lift off the rubber breather cap. Carefully pry the valve from the cap. Otherwise, press hard with both thumbs on top of the cap to release the valve from the rubber cap. Wash the fabric flapper check valve in a suitable solvent. Dry and reinstall. Position perforated disc toward the engine.

CHECK SPARK PLUGS

Replace spark plugs after each 200 hours of operation. Spark plug gap should be .025 inch (.620 mm) for gasoline-fueled units and .018 inch (.457 mm) for gaseous-fueled units. Check the condition of the old plugs.

- Black deposits indicate a rich mixture.
- Wet plugs indicate misfiring.
- Badly or frequently fouled plugs indicate the need for a major tune up.

Badly leaded plugs will cause misfiring, poor operation or stopping when a load is applied.

Figure 8-10. Generator Air Cleaner Replacement.

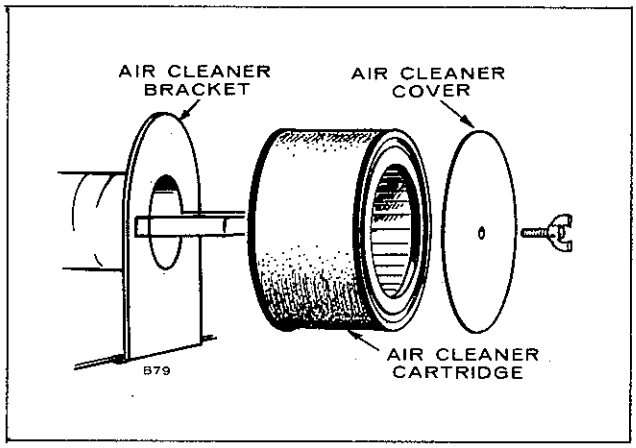
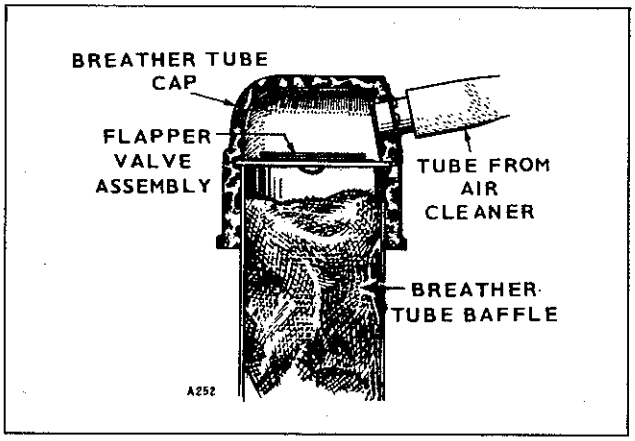


Figure 8-11. Generator Crankcase Breather



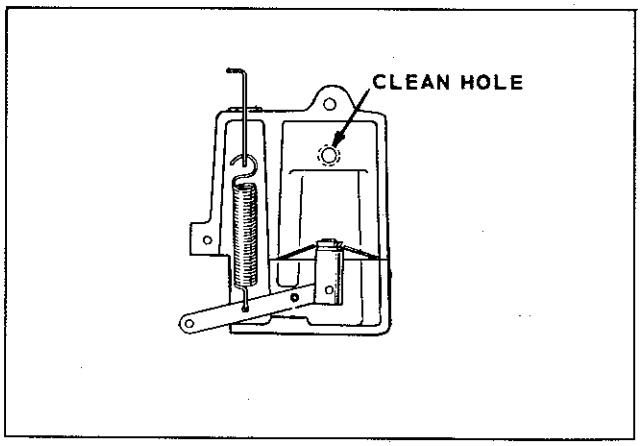
VACUUM SPEED BOOSTER

The vacuum speed booster, Figure 8-12, is a separate auxiliary device that supplements governor action. As the generator load increases, the booster helps the governor by producing a slight increase in engine speed. This results in a nearly constant output voltage.

Use a fine wire to clean the small hole in the short vacuum tube (which fits into the top of the engine intake manifold). Do not enlarge this hole.

If there is tension on the external spring when the plant is operating at no load or light load, it may be caused by an improper adjustment, a restricted hole in the small vacuum tube, or a leak in either the booster diaphragm or the gasket.

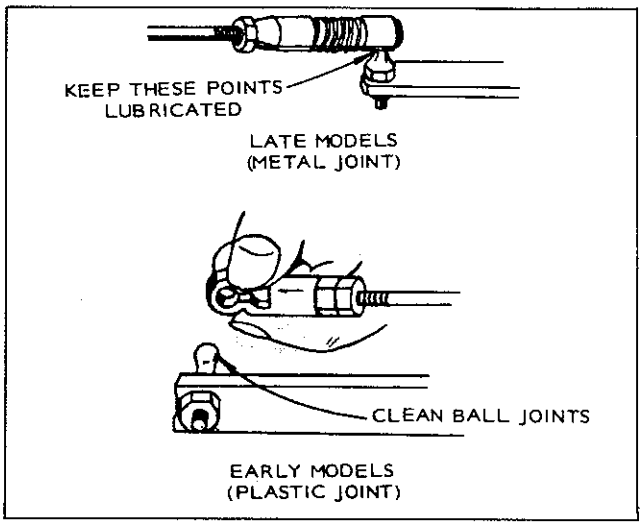
Figure 8-12. Vacuum Speed Booster



GOVERNOR LINKAGE

The linkage must be able to move freely through its entire travel. Every 50 hours of operation, clean the ball joints, Figure 8-13.

Figure 8-13. Governor Linkage

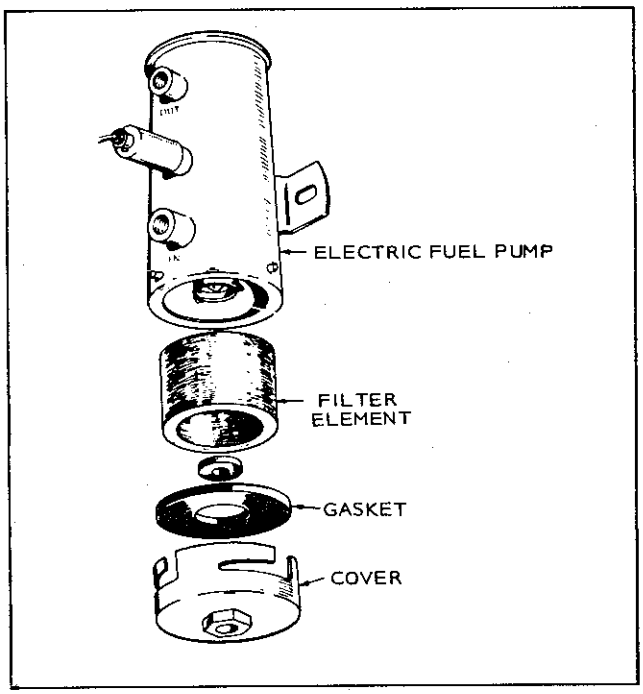


- Later model generator sets have metal ball joints that must be cleaned and lubricated with graphite.
- Earlier models have plastic joints that require cleaning only. Do not lubricate!

FUEL SEDIMENT

Every 100 hours or sooner, drain the fuel pump and check filter element. Turn the hex nut on the base of the electric fuel pump to gain access to the filter element, Figure 8-14. If the element appears dirty, replace it. Be sure to replace gaskets when reassembling.

Figure 8-14. Fuel Filter



GENERATOR MAINTENANCE

The generator normally needs little care other than cleaning the generator and checking the brushes. If major repair is necessary, have the equipment checked by Onan service personnel or a competent electrician who is thoroughly familiar with the operation of electric generating equipment.

CLEAN GENERATOR

Clean the generator every 500 hours of operation or sooner depending on road conditions. Remove the generator end band and blow the accumulated dust and dirt from the brushes and windings with clean, dry compressed air. This assures adequate cooling air and free brush movement.

CAUTION

Do not use compressed air that exceeds 30 PSI [207 kPa].

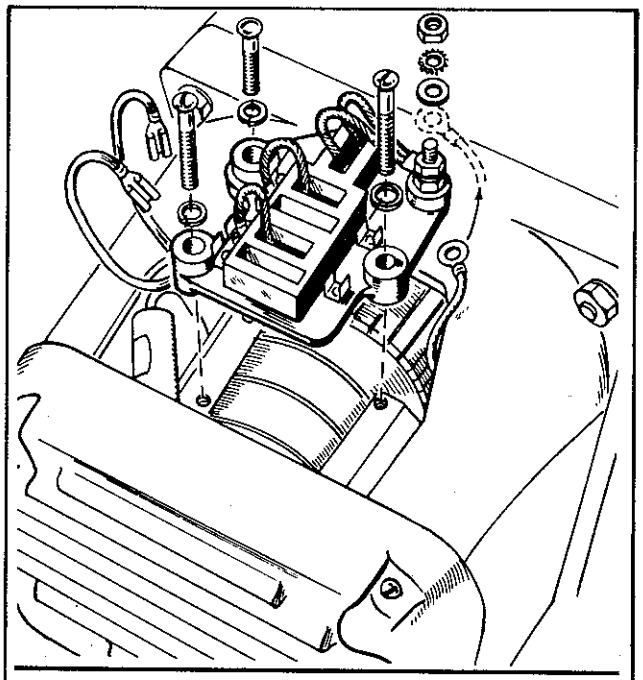
CHECK GENERATOR BRUSHES

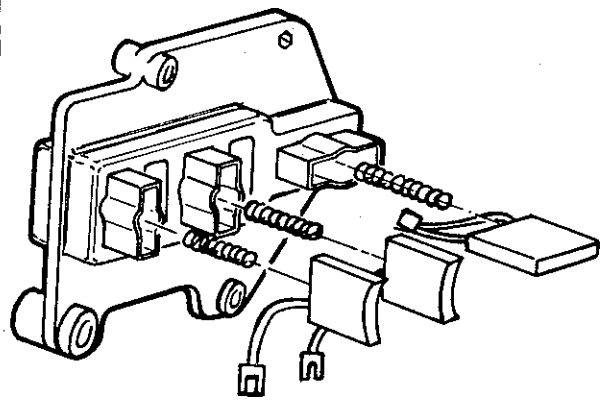
Every 500 hours of operation, check the generator brushes, Figure 8-15. Pull on the brush leads to be sure the brush is free and to remove any accumulated dirt from the brush boxes. Be sure the brush springs are supplying sufficient pressure on the brushes to maintain good brush-to-commulator contact. Brush must have 50 percent contact with the slip rings to be effective. Be sure the brush face is not glazed. Replace generator brushes when worn to the length indicated in Figure 8-15.

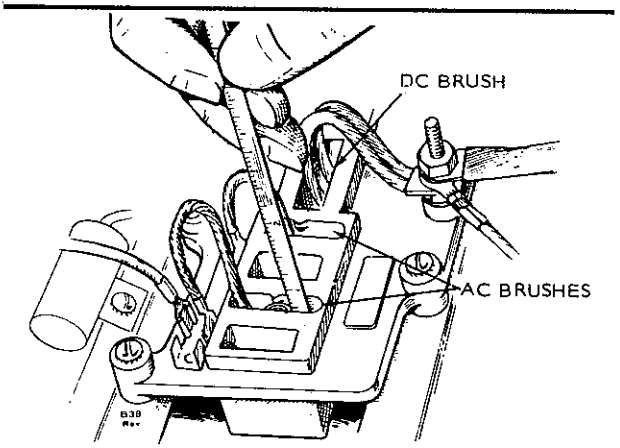
GENERATOR TROUBLESHOOTING

Refer to Table 8-6 for Generator Troubleshooting Procedures.

Figure 8-15. Generator Brushes





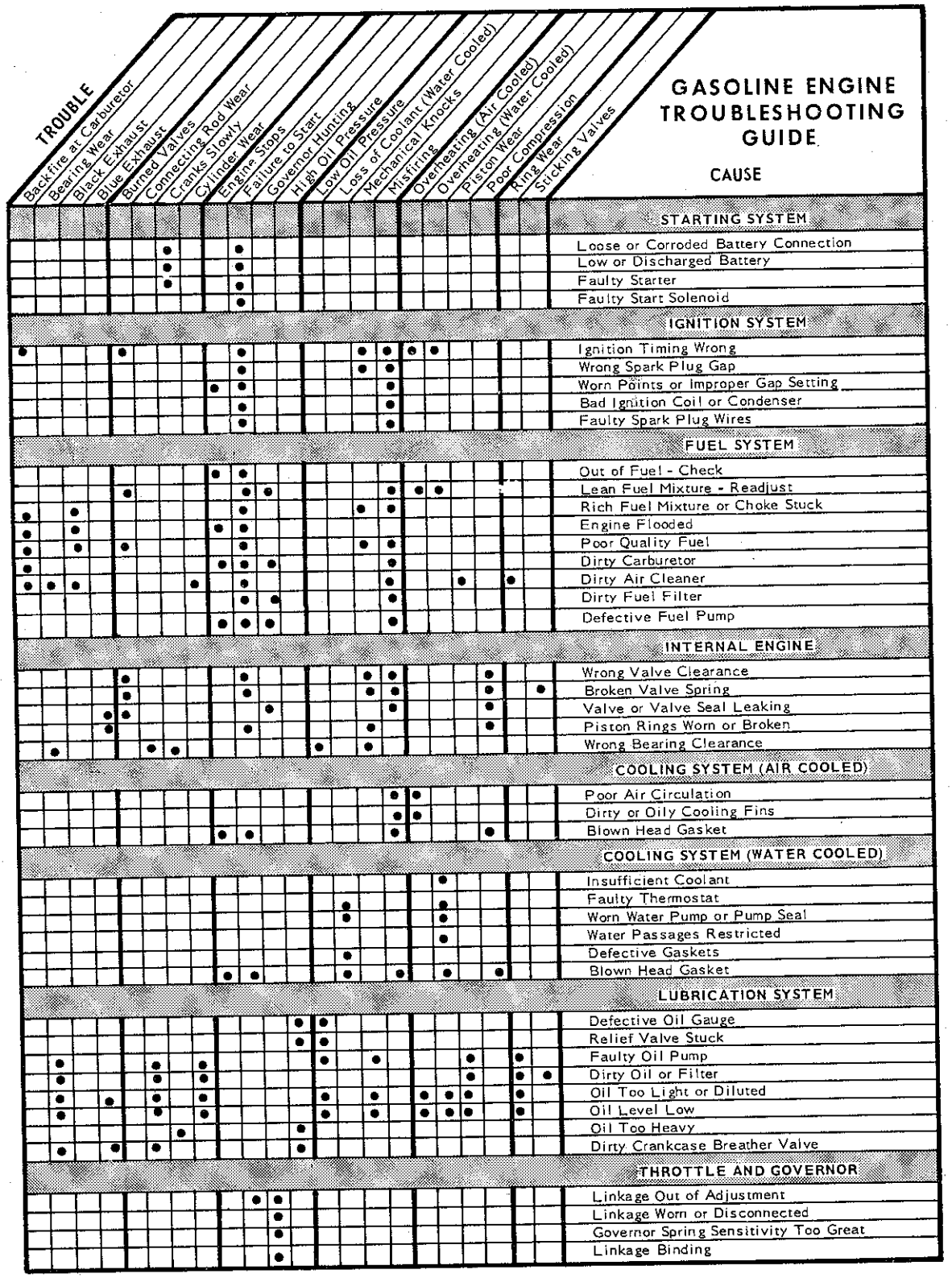


MEASURE FROM TOP FACE OF BRUSH BLOCK TO TOP OF BRUSH

	DC	AC
NEW	5/8" (15.9 mm)	11/16" (17.5 mm)
1/2 WEAR	13/16" (20.6 mm)	7/8" (22.0 mm)
REPLACE	1" (25.4 mm)	11/16" (17.5 mm)

ENGINE TROUBLESHOOTING

Table 8-6



SUBURBAN DYNA-TRAIL FURNACE MAINTENANCE

The Suburban Dyna-Trail unit does not normally require routine maintenance or cleaning. If, for any reason, the main burner has been allowed to operate with a high yellow flame, a soot formation is sometimes deposited inside the combustion chamber. The carbon deposit may be of such quantity that cleaning will be necessary. To clean the combustion chamber, there is an access hole on the front of each radiation chamber. A vacuum cleaner is ideal to clean out any carbon deposit.

The Dyna-Trail is equipped with an oiled, sealed motor and requires no oiling.

Table 8-7. Dyna-Trail Furnace Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
No heat	1. Thermostat off	Check to be sure thermostat is calling for heat. Check for defective thermostat wiring.
	2. Gas supply shutoff	Check that manual gas valve is in open position (lever parallel to gas line).
	3. Poor electrical connections or low battery voltage	Check battery supply voltage. If battery is low, there will be sufficient power to run the blower, but not enough to run the blower at full speed. If blower doesn't run at its prescribed speed, the micro-switch cannot be engaged and gas will not flow to the main burner nor will the spark begin. Be sure the connections of the voltage lines to the terminals are tight.
	4. Malfunctioning microswitch.	Check that microswitch is sailing in far enough to open the solenoid valve and to energize the spark module board. If the switch is not sailing in, clean any dust or dirt from the actuator pin. Other reasons for the switch not sailing in are: a. Insufficient blower speed (slow motor due to low-charged battery, faulty motor, or lint and dust accumulation on blower wheels, or restriction of return air to furnace). Check wiring in accordance with unit's wiring diagram to assure proper polarity of the 12-volt dc power supply is

Symptom	Possible Cause	Corrective Action
		observed. This polarity must be observed so the motor will run in the proper direction of rotation to insure correct air delivery.
		b. Check for faulty microswitch. Replace switch if valve doesn't open when switch is manually engaged. Switch should also be replaced if battery is fully charged and blower motor running at top speed fails to engage switch in 6 to 7 seconds.
		NOTE: To service switch, combustion chamber must be pulled out. If the chamber can be pulled out the rear, it needs to be only pulled out as far as needed to visually and manually check the switch.
	5. Defective gas valve	Use test light to check voltage at gas valve terminals. If voltage is present, but valve is not opening (when microswitch engages), replace gas valve. (To replace the gas valve it is necessary to remove the chamber.)
	6. Blower inoperative	Check for burned-out motor. On dual-voltage model furnaces, the ac/dc switching relay could be faulty; check by shorting across terminals 3 and 4. If relay clicks, but motor fails to start, replace motor. If no click is evident, replace relay.
	7. Short cycling (fan switch)	If burner and fan shut off simultaneously when the thermostat is satisfied it indicates a shorted fan switch. Replace switch. (Chamber must be removed.)
	8. Defective relay	Relay may be faulty if motor fails to start when thermostat calls for heat. This will be evidenced by a click when the thermostat is raised and motor fails to operate.

Symptom	Possible Cause	Corrective Action
	9. Electrode not sparking with blower running and micro-switch engaged.	**a.** Check for 12 volts at spark module board. If no voltage, check back through circuit to determine cause. **b.** Voltage is present but module board is not flashing; replace module board. **c.** Module board is flashing but electrode still not sparking; check electrode wire connections. **d.** Wire connections correct but not sparking through when removed from electrode and grounded; replace electrode wire. **e.** Electrode wire sparking against ground when removed from electrode; replace electrode assembly.
	10. Incorrectly positioned electrodes. (Electrode sparks and gas valve opens but burner will not light.)	Check that electrode is positioned approximately 3/16" above and directly over one of the sawed slots on the main burner.
	11. Defective module board. (Burner ignites but goes off into lockout.)	Replace module board.
Excessive Noise	1. Blower out of balance	Replace blower
	2. Motor hum	Replace motor.
	3. Insufficient primary air	Adjust primary air input.
Erratic Blower Operation (blower cycling off and on rapidly after unit heats up.)	1. Defective automatic blower motor overload switch	Replace blower motor
	2. Loose blower assembly causing squirrel cage wheel to drag	Tighten assembly mounts.
Unit is inoperative.	Faulty wiring	Check all wiring to assure proper connections or detect possible possible shorts. On dual voltage furnaces check following: **a.** Proper wiring connections to ac/dc convertor. **b.** Transformer for burnout or shorts.

Symptom	Possible Cause	Corrective Action
		c. Diodes
		d. Ac/dc switching relay.
		NOTE: On dual voltage units replace the entire convertor under the following conditions:
		e. Source of problem cannot be traced to any one convertor component.
		f. Excessive voltage or loading on the input of convertor.
		g. If furnace thermostat is observed opening and closing rapidly when furnace starts, the gas valve may be shorted or a wire may be shorting out. Replace gas valve if symptom stops when gas valve is disconnected from circuit.

FRIGIKING AIR CONDITIONING SYSTEM MAINTENANCE

Cleaning the return air filters is the only maintenance that the owner needs to perform. Under normal operating conditions, these filters should be cleaned weekly. The following directions should be followed closely to prevent damage to the return air grilles.

1. Turn the unit off.
2. Remove the return air grilles and filters. Use a smooth flat object such as a table knife. Insert this object between the center of the switch or label end of the grilles and, using a twisting action, gently pry the grille until the mounting pins on the grille are free of their mounting holes in the plenum assembly.
3. Wash the filters and grilles in warm soapy water. DO NOT USE SOLVENTS.
4. Rinse the filters and grilles with fresh water and dry.
5. Replace filters and grilles in unit. **NOTE:** When replacing the grilles be sure to install them with their notched (cutout) sides up towards the switch and lable plates. (If they are mounted incorrectly, the mounting pins will not fit their mounting holes and can be accidentally broken.

CAUTION

THE COMPRESSOR MAY BE DAMAGED BY CAUSING IT TO CYCLE OFF AND IMMEDIATELY BACK ON AGAIN. ONCE THE COMPRESSOR HAS BEEN TURNED OFF WAIT SEVERAL MINUTES FOR THE PRESSURE IN THE REFRIGERATION SYSTEM TO EQUALIZE BEFORE STARTING THE SYSTEM AGAIN. TO AVOID CAUSING THE COMPRESSOR TO CYCLE OFF AND IMMEDIATELY BACK ON AGAIN:

1. DO NOT turn Air Control Knob from one of its cool positions to OFF and then immediately back to one of its cool positions.
2. DO NOT turn the Air Control Knob from one of its cool positions to FAN ONLY and then immediately back to one of its cool positions.
3. DO NOT turn the Temperature Control Knob from a colder setting to a warmer setting and then immediately back to a colder setting.

DOMETIC REFRIGERATOR MAINTENANCE

Flame blow out

If trouble is encounted with the flame blowing out under especially windy conditions, try to avoid the wind blowing against the wall where vent outlets are locasted. If the trouble persists, set the thermostat to MAX. (This should be done only as a temporary measure, because after a day or so at this setting the foodstuffs in the cabine will freeze.)

CAUTION

Before performing refrigerator maintenance procedures that require disassembly, make sure that power supply sources are disconnected, and that LPG supply is turned OFF.

Burner Assembly Cleaning and Adjustments

Once or twice a year depending on use, it is necessary to clean and adjust the burner assembly. Shut down LPG supply, then proceed as follows:

1. Disconnect gas pipe from the burner assembly.
2. Remove the burner jacket.
3. Remove the burner housing.
4. Clean the jet with alcohol and compressed air ONLY.
5. Clean the burner tube and especially the gauze with a brush.
6. Blow with compressed air.
7. Reassemble, reconnect power supply and turn on LPG.
8. Check the burner with full flame (turn thermostat to MAX) and with by-pass flame (if the refrigerator has been working for a few hours and the thermostat bulb is colder than about 6°C or 43°F) the transition from full flame to by-pass can be observed if the thermostat knob is turned slowly from MAX to zero.

   At the same time, check that the flue baffle is clean and reasonably free from soot. Heavy soot formation indicates improper functioning of the burner. Clean baffle and flue. Further, clean cooling unit and floor under refrigerato.

   Check entire gas installation periodically for leaks at pipe connections with soapy water.

Piezo Lighter

The refrigerator is fitted with a piezo lighter, which does not normally need any maintenance. If the lighter does not work properly contact an authorized service point.

Table 8-8. Dometic Refrigerator Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Insufficient cooling	1. Jet orifice clogged.	1. Disengage gas pipe from burner. Unscrew nipple with jet and blow clear and wash in alcohol. Do not use wire or pin to clean orifice.
	2. Flame has gone out.	2. Check: a. Leveling of refrigerator. b. Feeler point of flame failure safety device is not heated enough by flame.
	3. Clogged by-pass screw.	3. Clean or exchange it.
	4. Air circulation around unit restricted.	4. Check that refrigerator is properly ventilated.
	5. Evaporator heavily coated with frost.	5. Defrost. a. Flue baffle not inserted into central tube of cooling unit. b. Thermostat incorrectly used. See paragraph on thermostat operation. In hot weather, setting should be one or two numbers "colder" than usual.
	6. Gauze in burner head clogged.	6. Clean.
	7. Burner damaged.	7. Replace.
	8. Burner may be dislocated.	8. Relocate.
	9. Wrong gas pressure at the burner.	9. Have pressure checked at burner and at LPG source. Presure at burner must not fall below 11" W.G. when thermostat is set on MAX.
Odor from fumes	1. Flames touches side of boiler.	1. Relocate.
	2. Burner damaged.	2. Replace.
	3. Flame touches flue baffle.	3. Burner damaged — replace; or flue baffle too low. Correct position of the baffle.

Symptom	Possible Cause	Corrective Action
	4. Flue tube is dirty.	4. clean flue as follows: a. Cover burner and jet. b. Remove flue top and baffle. c. Clean flue with special flue brush. d. Clean baffle before putting back.

IMPROPER OPERATION OF THE THERMOSTAT

Check the position of the capillary tube between the evaporator fins. The end of the capillary tube must be in proper direct contact with the evaporator. (This contact is achieved in two different ways: (1) The capillary tube is inserted into a spring clip which is fastened between two fins. (2) The capillary tube is fastened between two fins with a sheet brace and two screws.). If the position of the capillary tube end is not correct, adjust accordingly. If no improvement is obtained, exchange thermostat.

NORCOLD REFRIGERATOR MAINTENACE

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

The three major component assemblies that will prevent operation are:

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

Refer to Table 8-9 for refrigerator troubleshooting.

CAUTION

Be sure to disconnect refrigerator from power supply when performing maintenance procedures that require disassembly.

Table 8-9. Norcold Refrigerator Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Cinoressir (swing motor) inoperative.	1. Gas leakage	1. Check for pinched or broken capillary tube, bellows leakage.
	2. Defective thermostat	2. a. Turn thermostat from one extreme to the other and listen for "click", and the compressor should start. If no "click" is heard, replace thermostat. b. Check continuity of thermostat contacts. Clear or replace thermostat.
	3. Open or short circuit in swing motor	3. Check for defective compressor motor by measuring the resistance between the motor terminal and the ground: 0.9 plus or minus 10% OHMS denotes normal function.

Symptom	Possible Cause	Corrective Action
	4. Power cutoff	4. a. Blown fuse in wall receptacle outlet, replace fuse.
		b. Broken wire in power supply cord, repair cord.
		c. Bad connections to transformer, repair connection.
		d. On DC: Circuit breaker is tripped or fuse is blown, reset circuit breaker.
	5. Transformer burnout	5. a. Transformer shows burned spots at input or output lead wires.
		b. Transformer has typical "burn-out smell".
		c. Output on secondary voltage is zero or "Dead Short" to ground.
		d. Transformer is cold, even when power is applied.
Swing motor runs, but insufficient cooling.	1. Loss of refrigerant through pipe connections or welded parts.	1. Locate and repair refrigerant leak.
	2. Broken refrigerator lines	2. Defective thermostat
	3. Broken wires on condenser, the seal of the electric terminal on top of the compressor has been broken when the two bottom nuts were tightened up or loosened. (Never move these two nuts when removing or installing wire harness.)	3. a. The compressor runs too hot and constantly (no cycling on cold control).
		b. Compressor draws more than 2.5 amps and less than 20 volts from transformer (Voltage drop).
		c. The condenser top half or the compressor discharge tube stays cold, same as room temperature.
		d. Refrigerator compartment is too warm.
		e. Evaporator plate does not show frosting when unit is running with open door.

Symptom	Possible Cause	Corrective Action
		f. No freezing of ice cubes.
		g. Oily spots tend to appear on tubing, condenser drier, etc. or on the table below the machine compartment.
		Note: Refer repairs to authorized service dealer.
	4. If there is apparently no leak or loss of refrigerant the compressor is running constantly and is very hot, and the refrigerator compartment is too warm and no freezing of ice cubes then a sudden freeze-up or clogging has occured. Indications are:	
	a. The condenser is not warm or hot, stays at room temperature.	4. a. Shut-off compressor, let system cool down, start up, let run for 5 minutes, shut off, start up after 5 minutes. If the condenser does not warm and the evaporator plate inlet does not become cold, then repeat cycling.
	b. The compressor draws less than 1.5 amps at 20 volt from transformer.	b. Return refrigerator under warranty conditions.
	c. Evaporator plate warm.	c. Authorized service personnel can flush, evacuate, change drier, and recharge system.
	5. Insufficient heat radiation of condenser because:	5. Change location of refrigerator; brush or vacuum condenser.
	a. Ambient temperature is over 110°F.	
	b. Refrigerator is placed in direct sunlight.	
	c. The back of the refrigerator is placed directly against a wall or other objects (leave 3" of space all around the refrigerator for air circulation.	

Symptom	Possible Cause	Corrective Action
	d. Refrigerator is placed too close to a heat source (radiator, oven, warm air duct or outlet, etc).	
	e. Condenser is plugged up with lint or dust particles.	
Compressor runs constantly and refrigerator is too cold.	6. a. Thermostat sticking.	6. a. Contact points of cold control are pitted; contact points are welded together, could occur after a transformer burn-out, due to high current draw. Clean points or replace control.
	b. Short circuit.	b. Short circuit across cold control terminals or bare wires in wiring harness touching each other or touching ground. Check with tester and insulate parts.
	c. Sensitive element.	c. Thermostat bulb loose on evaporator plate mounting. Tighten screws.
Abnormally loud noise during operation.	7. a. Loose parts in machine compartment due to vibration.	7. a. Tighten screws.
	b. Contact between tubes and parts.	b. Bend carefully tubes and wiring in different location.
Excess frost build-up on evaporator.	8. a. Overloaded storage of refrigerator compartment.	8. a. Too much food is stored in cabinet blocking cooling air from the evaporator, preventing proper air circulation. Adjust food storage, leave air passage or space.
	b. Excessive humidity.	b. Ice and frost are bad heat conductors. Frost build-up of more than 1/4 inch should be avoided. It decreases over all cooling capacity and increases power consumption. Also, never put hot or steaming food in the refrigerator. Defrost refrigerator (set to "Defrost"), remove water from evaporator and drip pan.

Symptom	Possible Cause	Corrective action
No cooling after first initial installation and first start-up.	9. During shipment and storage refrigerators, compressor oil stays in evaporator. Handling, shipping and storage can cause uneven distribution of lubrication oil.	9. Run compressor for 5 minutes, shut off for 3 minutes, start up for 5 minutes, shut down for 3 minutes, start up again.

ICE MAKER MAINTENANCE

Other than periodic cleaning of grillework, condenser, and interior, no other maintenance procedures are required. Refer to Table 8-10 for ice maker troubleshooting.

Table 8-10. Ice Maker Troubleshooting Guide

Trouble Symptom	Possible Cause	Corrective Action
Water in bucket	1. Machine is not level, and water runs out of freezing mold into storage compartment, or bucket.	1. Level icemaker.
	2. Poor gasket seal, or something holding the door open, such as bucket not being pushed in far enough.	2. Correct gasket seal; remove obstruction.
	3. Defective water valve switch.	3. Replace switch
Ice sticks together	1. Unit is not level.	1. Level icemaker.
	2. Faulty door seal.	2. Correct gasket seal.
Defrosting occurs too frequently or cubes frosty on surface	1. Poor door seal.	1. Correct door seal.
	2. Chemical content of water is different in each locality therefore the freezing temperature of ice differs.	2. Lower freezing temperature by turning the control, located through rear of cabinet, one-quarter to one-half turn to the right, clockwise. Reverse procedure for a warmer setting.
Ice maker freezes up	1. Poor door seal.	1. Correct door seal.
	2. Water splashing out of icemaker mold into storage compartment or bucket.	2. Excess water should be removed.

Symptom	Possible Cause	Corrective Action
	3. Slow leakage through the electric solenoid valve.	3. Replace solenoid valve.
	1. Ejector blades are frozen in and cannot eject cubes.	1. Defrost unit thoroughly.
	2. Switch in unit compartment may be turned to "off" position. Also, check for poor supply connections.	2. Check switch; check electrical connections.
Ice maker does not make ice	3. Water supply to the machine has been turned off.	3. Restore water supply.
	4. Unit is not installed level, but is tipped backwards, which creates a frost build-up on the suction line.	4. Level unit.
Ice is too soft and wet	1. Control setting is too warm.	1. Adjust control one-quarter to one-half turn to the right.
	2. Door is not closing completely.	2. Adjust door; gasket.
	3. Bucket is too far out.	3. Reposition bucket.
	4. Air is being blocked from entering the grille.	4. Remove obstruction.
Ice maker keeps making ice and won't stop	1. Shut-off arm switch is not working properly.	1. Replace switch.
	2. Shut-off arm is frozen in the ice.	2. Remove cubes and defrost machine until arm is free.
Insufficient cubes	1. Temperature control is set too cold.	1. Back off control one-half turn to the left.
	2. Ice maker is not level.	2. Level unit.
	3. Fan motor is not running.	3. Repair or replace, as necessary.
	4. Condenser coil behind the grille is dirty.	4. Clean coil.
Ice cubes cloudy	This is due to air being trapped in the water due to fast freezing. They are not harmful.	None

Symptom	Possible Cause	Corrective Action
Too much water entering system	1. Water valve switch needs adjusting.	1. Remove front cover and adjust screw.
Ejector blades frozen in the ice cubes	1. Too much water entering.	1. Adjust water valve switch. Remove front cover and adjust screws.
	2. Machine received a double "shot" of water; or cubes piled too high melted back into freezing tray.	2. Shut off machine for one hour.
Ice maker won't eject cubes	1. Ejector blades are frozen into the ice maker mold.	1. Defrost and remove some water from freezing tray.
	2. A faulty limit switch.	2. Replace limit switch.
	3. Too much water entering.	3. Adjust water valve switch.
Compressor inoperative	1. No supply voltage.	1. Check wall outlet/wiring for supply voltage.
	2. Unit is switched off.	2. Check that switch behind front grille is ON.
	3. Defective overload relay.	3. Replace overload relay.
Intermittent Operation	1. Defective switches.	1. Check action of Water Valve Switch, Holding Switch, Shut-off Arm Switch, by depressing the little black button and listening for a click; if there is no click switch needs replacing.
	2. Improper door seal.	2. Adjust hinges, bend door into shape, or shim door gasket where needed.
Compressor is noisy	1. Machine is not level.	1. Level unit.
	2. Faulty compressor.	2. Replace compressor.
	3. Fan motor not running.	3. Check for defective fan motor, binding, etc. Repair or replace as necessary.
High pitch or ringing noise	1. Fan blade is at wrong pitch.	1. **Stop unit.** Reach in and bend each blade one-quarter or one-half inch to the rear. This cuts the air at a different angle and eliminates the ring.

Symptom	Possible Cause	Corrective Action
	2. Copper refrigeration tube is touching cabinet and is vibrating.	2. Reposition components.
Compressor runs constantly	1. Control is set too cold.	1. Readjust temperature control.
	2. Something is blocking front grille preventing air from entering.	2. Remove obstruction.
	3. Condenser should be clean of lint.	3. Clean condenser.
Ice maker ejector motor runs, but ejector blades don't run	Coupling is broken; or stripped gear in the ejector motor.	Replace defective part.
Ice maker ejector motor and ejector blades turn continuously	1. Defective cold control.	1. Replace control.
	2. Defective holding switch.	2. Replace switch.

AQUA MAGIC TOILET MAINTENANCE

No routine maintenance is required. Refer to Table 8-11 for troubleshooting guide. If the bowl sealing blade does not operate freely after extended use, it may be restored to its original, smooth operating condition by applying a light film of Silicone spray to the blade.

To clean the Aqua Magic, use Thetford Aqua Bowl or any other high grade, non-abrasive cleaner. Do not use highly concentrated or high acid content household cleaners. They may damage the rubber seals.

Table 8-11. Aqua Magic Toilet Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Water keeps running into bowl.	Blade in bottom of bowl is not closing completely, which in turn keeps the water control valve partially open. The groove into which the blade seats when closed is clogged with foreign material.	Insert end of a coat hanger or similar object into sealing groove and remove the foreign material. Avoid damaging rubber seal while cleaning.
Toilet leaks water on floor.	Leak originates from:	
	1. Defective vacuum breaker.	1. If vacuum breaker leaks when flushing the toilet, replace vacuum breaker.
	2. Defective water control valve.	2. If vacuum breaker leaks when toilet is not in operation, replace water control valve.

Symptom	Possible Cause	Corrective Action
	3. Poor bowl-to-mechanism seal (if this is the problem, water would not stay in bowl).	3. Remove mechanism, and replace mechanism seal.
	4. Poor closet flange base seal.	4. Check front and rear closet flange nuts for tightness. If leak continues, remove toilet, check closet flange height. The height should be between 1/4" and 7/16" above the floor. Adjust closet flange height accordingly and replace closet flange seal.
Foot pedal operates harder than normal or the blade sticks.	Inadequate lubrication.	Apply a light film of Silicone spray to blade.

ELECTRA MAGIC TOILET MAINTENANCE

EVACUATION PRIOR TO CONTINUING USE

Proceed as follows:

a. Completely evacuate unit.

b. Pour approximately three (3) gallons of water in bowl (until water reaches the charge level (C) on indicator lens). Three gallons are required for operation.

c. Add one (1) eight-ounce bottle of Aqua Kem Concentrate.

EVACUATION PRIOR TO TEMPORARY STORAGE

Proceed as follows:

a. Completely evacuate unit.

b. Refill unit to within three inches of bowl top with fresh water.

c. Add two inches (from the bottle) of Aqua bowl Cleaner.

d. Cycle three (3) times.

e. Let stand for a few minutes for cleaning action.

f. Completely evacuate unit again.

g. The unit is now ready for storage. Repeat items b and c above to activate the unit for use again after storage.

Table 8-12. Electra Magic Toilet
Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Toilet wobbles	1. Closet bolt nuts not tight.	1. Tighten closet bolt nuts.
	2. Mounting brackets not seated to floor.	2. Tighten closet bolt nuts.
	3. Closet flange too high.	3. Check closet flange height by laying straight edge across flange and measuring gap between straight edge and floor at (4) leg locations (1/4 to 7/16 inch is recommended).
	4. Mounting surface uneven.	4. Same as 3.
Toilet cycles when seat cover is raised.	Actuator button protrudes too far from motor cover.	Alternately press one side of the button, then the other, to work button back further into housing. If button still protrudes too far, replace timer assembly.
Toilet does not cycle properly (5 to 9 seconds) when button is pressed.	1. Reversed wiring polarity.	1. Check that black wire is positive (hot) and the white wire is negative (ground).
	2. Battery run down.	2. Replace battery.
	3. Damaged timer.	3. Replace timer assembly.
Flushing action is weak or noisy	1. Pump is running backwards (reversed wiring polarity).	1.Check that the black wire is positive (hot) and the white wire is negative (ground).
	2. Cycling unit without enough charge water.	2. Charge to proper level (three gallons). Fill to charge level (C) on indicator lens.
	3. Pump damaged by continuous dry operation.	3. Replace pump assembly.
Lack of capacity	Too much charge water.	Use three gallons only to charge. Fill to charge level on indicator lens.