



Atwood Mobile Products
 1120 North Main Street • Elkhart, IN 46514-3203
 PHONE: 574•262•2655 FAX: 574•266•5410
 INTERNET: http://www.atwoodmobile.com



LITERATURE NUMBER **MPD 31232**

hydro flame™

8900-III-LD Series Furnace
MODELS 8935, 8940

Technical Installation Manual

ENGLISH, FRANCAIS (et Canada)

•Installation

Effective 3/08

THIS INSTRUCTION MANUAL IS FOR USE BY AN AUTHORIZED SERVICE TECHNICIAN TO INSTALL AN ATWOOD - *hydro flame™* FURNACE.

INSTALLER: LEAVE THIS MANUAL WITH APPLIANCE.
CONSUMER: RETAIN THESE MANUAL FOR FURTHER REFERENCE.

This furnace design has been certified for installation in recreation vehicles as a MSP Category III furnace. Follow this installation instruction to insure safe operation of the furnace. Failure to install furnace according to this installation instruction nullifies the furnace warranty.

SAFETY ALERT SYMBOLS

Safety Symbols alerting you to potential personal safety hazards. Obey all safety messages following these symbols.



WARNING
 avoid possible injury or death



CAUTION
 avoid possible injury and/or property damage

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
 - Evacuate all persons from vehicle.
 - Shut off gas supply at gas container or source.
 - Do not touch any electrical switch, or use any phone or radio in vehicle.
 - Do not start vehicle's engine or electric generator.
 - Contact nearest gas supplier or qualified Service Technician for repairs.
 - If you cannot reach a gas supplier or qualified Service Technician, contact the nearest fire department.
 - Do not turn on gas supply until gas leak(s) has been repaired.
- Installation and service must be performed by a qualified Service Technician, Service Center or gas supplier.

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SPECIFICATIONS				*(W.C. = Water Column)	
MODEL #	8935 DCLP-III	8940 DCLP-III	8935 ACLC-III	8940 ACLC-III	
BTU Input	35,000	40,000	35,000	40,000	
Output BTU/HR	27,300	31,200	27,300	31,200	
Type Gas	LP	LP	LP/NAT	LP/NAT	
Duct Static Pressure -	.10" W.C.*	.10" W.C.*	.10" W.C.*	.10" W.C.*	
Power Supply (VOLTS)	12-DC	12-DC	120-AC	120-AC	
Watts - WITH OUT DOOR	151	151	360	360	
Amperage	12.6	12.6	3	3	
MINIMUM RETURN AIR	80 in²	80 in²	80 in²	80 in²	
DIMENSIONS				WEIGHT	
ALL MODELS WITH DOOR					
	WIDTH	HEIGHT	DEPTH		
Casing	16-1/2"	9-1/8"	23-1/2" - 26"	FURNACE 38 lbs.	
Vent	5"	5-3/8"		SHIPPING 45 lbs.	

**MINIMUM CLEARANCE TO
FLOORBOARDS, WALLS & SIMILAR COMBUSTIBLE BUILDING MATERIALS***

MUST BE PROVIDED THE FULL LENGTH AND WIDTH OF UNIT				
HORIZONTAL	TOP ----1/2"	BOTTOM 3/16"	SIDES ----1"	REAR --1/2"
VERTICAL	TOP ----1/2"	BOTTOM ----0"	SIDES ----1"	REAR --1/2"

Spacing of 1/4" to ducting within 3 feet of furnace must be provided unless UL listed wire bound vinyl ducts are used. All ducting material should be rated for continuous use at 200°F.

NOTE: Clearances are specifically for plywood or similar building materials surrounding furnace (i.e. furnace should NOT be located under furniture or in a closet space where clothing or other material could be located.)

NOTE: Efficiency rating is a thermal rating determined under continuous operating conditions, independent of any installation. Efficiency rate is given at 77% minimum, actual efficiency rating may be higher.



**WARNING
CARBON MONOXIDE POISONING**

- Furnace must be installed and vented to these instructions.
- Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.
- Improper installation location may cause furnace to produce negative pressure, affecting combustion air or venting of other appliances.



CRITICAL INSTALLATION WARNINGS

- DO NOT install furnace on material that restricts return air, like carpet or any soft material such as vinyl.
- DO NOT install furnace where clearance to combustibles cannot be maintained.
- DO NOT modify furnace in any way.
- DO NOT alter furnace for a positive grounding system.
- DO NOT HI-POT furnace unless electronic ignition system (circuit board) has been disconnected.
- DO NOT use battery charger to supply power to DC model furnace even when testing.
- DO NOT use 120 volt AC current with DC models.
- DO NOT use furnace cabinet area as a storage compartment.
- DO NOT vent furnace with venting system serving another appliance.
- DO NOT vent furnace to an outside enclosed porch area.
- DO NOT use for temporary heating of buildings or structures under construction.
- Protect building materials from degrading from flue gas exhaust.
- Protect furnace electrical components from water. **USA AND CANADA - FOLLOW ALL APPLICABLE STATE AND LOCAL CODES -**

IN THE ABSENCE OF LOCAL CODES OR REGULATIONS, REFER TO CURRENT STANDARDS OF:

- Recreation Vehicles ANSI A119.2/NFPA 501C.
- National Fuel Gas Code ANSI Z223.1 and/or CAN/CGA B149 Installation Codes
- Federal Mobile Home Construction & Safety Standard, Title 24 CFR, part 3280, or when this Standard is not applicable, the Standard for Manufactured Home Installations (Manufactured Home Sites, Communities and Set-Ups), ANSI A255.1 and/or CAN/CSA-Z240 MH Series, Mobile Homes.
- Ground - National Electrical Code ANSI/NFPA No. 70 and/or CSA C22.1
- Park Trailers ANSI 119.5

NOTE: The direct high voltage spark ignition generates a radio frequency that could cause interference with other microprocessor based equipment. Locate equipment at least five feet (5') from furnace location. If this distance cannot be maintained, purchase MPD 37773 (a shielded high voltage lead).



**WARNING
CARBON MONOXIDE POISONING**

- Properly seal vent assembly to prevent carbon monoxide from entering coach.
- DO NOT draw combustion air from living area. DO NOT vent exhaust air into the living area or an enclosed porch.

Return air is supplied through openings in furnace casing. All return air passages must be kept clear for furnace to function properly. Refer to **MINIMUM CLEARANCE TO FLOORBOARDS, WALLS & SIMILAR COMBUSTIBLE BUILDING MATERIAL**. The total unobstructed return air opening size(s) must NOT BE LESS than specified in **SPECIFICATIONS-MINIMUM RETURN AIR**. Failure to meet minimum return air requirements nullifies furnace warranty.

STANDARD FURNACE INSTALLATION

General Installation - LOCATION

- Install furnace through an exterior wall.
- DO NOT install furnace near tilt-out rooms, slide-outs, doors or other projections that could obstruct furnace exhaust.
- Locate furnace near midpoint of coach for single furnace applications.
- Installation must provide accessibility if any repairs are necessary to the furnace. Failure to meet this requirement will create additional labor costs that will be the responsibility of the installer.
- DO NOT install vent in areas where projections or door openings come within 6" of vent tube opening.
- DO NOT install furnace in an area where wires, pipes, or other objects will interfere with the installation or operation of furnace.
- DO NOT directly install furnace on material that restricts return air, such as directly on carpet, or soft material (like vinyl).
- If you must install furnace on carpet or soft material, install furnace on cleats, or on a wood or metal panel extending the full width and depth of furnace plus minimum clearances to combustibles.
- DO NOT use petroleum or citrus type cleaners on plastic parts, as damage may occur.
- The furnace must always be installed level (front to back, side to side) to prevent water intrusion into the interior.

WALL CUTOUT OPTIONS

RECOMMENDED WALL THICKNESS 0" to 2-1/2"

Do not oversize hole - oversizing can result in water leakage.

EXTERIOR WALL CUTOUT (FIG 1)	A	B	C
HORIZONTAL & VERTICAL	3-1/8"	2-3/8"	3-1/2" DIA HOLE

VENT INSTALLATION (FIG 1)

HORIZONTAL & VERTICAL INSTALLATION

1. Locate vent hole cutout as called out in (FIG 1).
2. Drill 3-1/2" diameter hole through side wall of coach.
3. Remove vent and vent ring from furnace.

4. Insert furnace from backside of wall. Line up hole in wall and furnace.
5. Apply sealant to back of vent ring and vent cap base.
6. Install vent assembly with HOT at top for horizontal and on right side for vertical installation (FIG 1-1A). Slip vent into combustion air intake tube. Secure to wall with four (4) screws.
7. Vent must have a minimum 1-1/4" over lap on exhaust tube and a minimum 1/2" overlap on combustion airtube.
8. Horizontal units - secure to floor with two (2) screws through legs on back of casing. Vertical units use vertical mounting brackets and self-tapping screws to hold furnace to floor (tabs on control box can be used also to secure furnace).

DUCTING - HORIZONTAL & VERTICAL (FIG 3-4A)

HORIZONTAL

PROPER DUCT INSTALLATION IS CRITICAL TO THE OPERATION OF THIS FURNACE

	CONTINUOUS USE MATERIALS RATING
DUCTS 9" IN LENGTH OR MORE	200°F.
4" DUCTS LESS THAN 9" IN LENGTH	250°F.
METAL BOOTS LESS THAN 9" IN LENGTH	250°F.

Ducting systems can include any combination of discharge openings, as long as static pressure and minimum discharge area requirements are met.

ALL MODELS - (also see STATIC PRESSURE TEST)

REQUIRED MINIMUM DISCHARGE	48 in ²
REQUIRED MINIMUM RETURN AIR	80 in ²

- See MINIMUM CLEARANCE TO FLOORBOARDS, WALLS & SIMILAR COMBUSTIBLE BUILDING MATERIALS.
- Each 4-inch duct opening provides 12 in² of discharge area. Provide an extra 12 in² of non closeable duct discharge area for each closeable register used.
- Use of 2" ducts does not count toward achieving min. discharge req. Ducting in dead air space with no return air, such as holding tank areas, does not count toward achieving min. discharge requirements.
- Adjust ducting installation to obtain air rise of 100°F - 130°F.

Flexible Ducting System

When designing Flexible Duct Systems:

- avoid sharp bends or crushed ducts
- stretch all ducts and run them directly to outlets, keeping quantity and angles of bends to a minimum

1. Remove knockout plates from desired outlets.
2. Attach duct adapter to each opening, by inserting flange over casing, locking tab into casing slot and turning adapter 90°.
3. Attach and secure FOUR-INCH flexible ducts to adapters.
4. Run ducts to desired location within RV, secure to registers.
5. Additional ducting may be needed to maintain static pressure.

Hard Ducting Floor System

When designing Hard Duct Systems:

- undersize ducting will cause high temperature limiting
- oversize ducting will cause inadequate air flow from registers
- when hard ducting is 1-1/2" in depth, an additional flex duct may be needed to maintain installation static requirements
- DO NOT install floor registers within 2 feet of return air openings.

OPTIONAL INSTALLATION - BOTTOM DISCHARGE (FIG 4-4)

1. Remove bottom discharge cover plate. This ducting option must be connected to a ducting system. FIG 3 (parts breakdown) #40 - GASKET AND PLENUM PLATE KIT is available when attaching furnace.

	FLOOR CUTOUT			
BOTTOM DISCHARGE	A	B	C	D
HORIZONTAL-WITHOUT DOOR (FIG 4)	18-20 1/2"	5-1/2"	10-1/2"	3/4"

3. Fasten plenum plate (4-E) over floor cutout. If a gasket and plenum plate are not used, seal furnace to hard duct system making sure seal is air-tight, continue with STEP 5.
4. Position gasket (4-F) on plenum plate.
5. Set furnace on gasket, gasket must remain in position. Use additional ducting to maintain correct static pressure.

VERTICAL

The only ducting option, when using vertical installation, are the top two ducts and two ducts off the back of the casing. **This is the only configuration allowed with vertical installation** (FIG 3A).

GAS CONNECTION

1. Connect gas line to fitting on top rear of furnace. Be sure all male pipe threads, other than flare fittings, are treated with a sealing compound resistant to the action of propane (LP) gas. DO NOT put sealing compound on flare fittings.
2. A 3/8" flared fitting connection is provided for supply connection to furnace. The gas supply line of the furnace must be of adequate size to provide 11" W.C. gas pressure. This pressure must be maintained under maximum flow conditions with all gas appliances in operation.
3. Use two wrenches to hold fitting and flare nut when tightening gas line to fitting. (FIG. 2)

ELECTRICAL CONNECTION (FIG 5)

⚠ WARNING
INJURY OR PROPERTY DAMAGE

- Label all wires before disconnecting for service. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.
- Disconnect electrical power before servicing.

Conductor Sizing Table - MAX. 10% VOLTAGE DROP - (12 VDC)

GAGE	CURRENT DRAW (AMPS)				
	8	9	10	15	20
18	21	19	17	11	9
16	33	29	26	17	13
14	52	46	41	28	21

⚠ CAUTION
PROPERTY DAMAGE

- This connection is for low-voltage battery or direct current only. Do not connect to 120- or 240- volts AC.

This unit is designed for negative ground 12 volt DC ONLY. Polarity must be observed so furnace motor will run in proper rotation. DO NOT attempt to alter to a positive ground system.

12 VOLT DC MODELS

Route 12 volt DC and thermostat leads to left side of control box. Use a minimum of 18 GA wire to minimize voltage drop. The furnace must be installed so electrical components are protected from water. To make electrical connections: see **WIRING DIAGRAM FIG 5**

1. Route wiring to left side of furnace.
2. Connect red wire to positive side of power supply.
3. Connect yellow wire to grounded side of power supply.
4. Connect blue wire marked positive thermostat to + side wire of thermostat using 22-18 GA stranded wire.
5. Connect the other blue wire to the other thermostat lead using minimum 22-18 GA stranded wire.

See instruction with thermostat for complete wiring directions.

For best furnace performance when power supply is from a converter equipped with a charging port, wire the converter to furnace parallel with battery. This provides consistent voltage to furnace, increasing component life, filtering power surges and AC spikes

120 VOLT AC MODELS

Route 120 volt AC and thermostat leads to wires located on the left side of control box using a minimum of 18 GA wire. The furnace must be installed so electrical components are protected from water. To make electrical connections see **WIRING DIAGRAM FIG 5**.

1. Route wiring to left side of furnace.
2. Remove junction box cover.
3. Connect 120 white wire to furnace 120 white wire.
4. Connect 120 black wire to furnace 120 black wire.
5. Connect ground wire to furnace green ground wire.
After field hookups have been made, put wire connections into furnace junction box and replace cover.
6. Connect thermostat leads to the two blue furnace thermostat leads.

NOTE: Furnace is equipped with a 120 volt AC motor. All other electrical component parts are supplied with power from a transformer inside the furnace at 24 volts AC.

NOTE: A 120 volt model can also be supplied with a 30 inch power cord attached from the factory supplied with a molded plug with ground pin.

NOTE: DC units are supplied with a power switch which when turned **OFF** for servicing will remove power through the furnace wiring. Switch must be in **ON** position for furnace to operate. See FIG 3-G. AC units switch is in valve circuit only.

POWER SUPPLY

Atwood Mobile Products highly recommends the use of an electronic (solid state) converter with clean, clear power output. This will assure the life of the electronic controls and motor life could be extended as much as 500% beyond typical linear converter applications.

THERMOSTAT INSTALLATION

The thermostat is very sensitive. **HANDLE WITH CARE AT ALL TIMES.**

Locate thermostat 48" to 54" above floor on an INTERIOR wall away from areas of abnormal heat or cold. EXTERIOR wall location must have a 3/4" spacer between thermostat and exterior wall.

Follow manufacturer's installation instructions provided with thermostat. When a thermostat is not supplied use a thermostat rated for 12 VDC or 24 VAC minimum lamp.

CONVERTIBLE GAS CONTROL FIG 6

LC MODEL UNITS come equipped with a convertible gas control. Each unit is supplied with two main burner orifices. One will be in place, the other will be attached to blower housing cover. Each orifice will be clearly marked with a drill size as shown below.

GAS TYPE	BTU/HR	LINE PRESSURE	VALVE REGULATOR	DRILL SIZE
PROPANE (LP)	40,000	11" W.C.	10.5" W.C.	49P
NATURAL (NAT)	40,000	7" W.C.	3.5" W.C.	30N
PROPANE (LP)	35,000	11" W.C.	10.5" W.C.	51P
NATURAL (NAT)	35,000	7" W.C.	3.5" W.C.	32N

The pressure settings of the convertible valve are set for natural gas NAT 3.5" W.C. or LP 10.5" W.C. and are not adjustable. Use Loctite #RC609 on orifice threads when installing a new orifice. 1/8" NPT plug is provided upstream of gas connections for checking gas pressure.

VALVE CONVERSION (FIG. 6)

1. Check exposed section on side of adjustment plug to determine whether it is set for natural or propane. NAT is stamped on one end and LP is stamped on the other end of plug. The types of gas in use will be showing right side up.
2. Unscrew plug and remove from valve tower. DO NOT remove rod from tower or make any adjustments.
3. A. When set for LP and NAT is required:
Rotate plug and replace into valve tower.
NAT SHOULD NOW BE VISIBLE FIG 6
B. When set for NAT and LP is required:
Rotate plug and replace into valve tower.
LP SHOULD NOW BE VISIBLE FIG 6
4. Check rod for proper positioning while tightening plug into tower. The plug, which has been factory calibrated for this valve only, should be reinstalled finger tight. **DO NOT USE PLUG ON ANY OTHER VALVE. INSTALL ONLY THE CORRECT MAIN BURNER ORIFICE FOR TYPE OF GAS BEING USED.**

ORIFICE REPLACEMENT

1. Unit will need to be removed if installed, if not start with step #2.
2. Remove burner cover and extended manifold.
3. Remove burner assembly from control box.
4. Remove two screws holding burner head in place.
5. Use a 7/16" socket to remove orifice and replace correct orifice corresponding to type of gas required, which corresponds to regulator plug setting FIG 6.
6. Replace burner head with two screws.
7. Reinstall burner assembly. Burner assembly must seal tight against control box.
8. Install extended manifold and apply thread sealant to threads going into gas valve.
9. After converting furnace, IN PLAIN SIGHT, put "CONVERTED" sticker (provided in your conversion packet) on rating label.

SYSTEM CHECKS

 WARNING FIRE OR EXPLOSION
<ul style="list-style-type: none"> • Never check for leaks with an open flame.

DIAGNOSTIC CHART	
FAULT	LED INDICATION
Internal Circuit Board Failure	Steady on, no flashing
Limit switch/Airflow problems	1 flash with 3-second pause
Flame Sense Fault	2 flashes with 3-second pause
Ignition Lockout Fault	3 flashes with 3-second pause

PROPANE GAS PRESSURE TEST

The furnace and any individual shut-off valve must be disconnected from gas supply piping system during any pressure testing of system at test pressures of more than 1/2 PSI.

Before furnace is connected, piping systems must be tested to be leak free. The test must maintain air pressure of at least 6" of mercury or 3 PSI for at least 10 minutes.

The entire piping system must be maintained within a range of 10-14" W.C. when all appliances are in operation. Test the gas connections for leakage with a leak test solution.

STATIC PRESSURE TEST

CASING STATIC PRESSURE TABLE

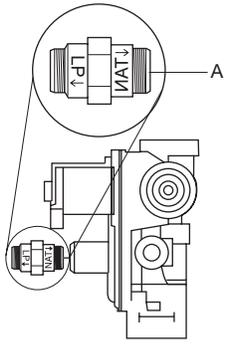
If duct static pressure cannot be set, casing static pressure should not exceed the values listed below when taken cold.

DUCTING SYSTEM	OPERATING VOLTS	FLEXIBLE	HARD
DC MODELS	12	0.25" W.C.	0.35" W.C.
AC MODELS	120	0.25" W.C.	0.35" W.C.

NOTE: For maximum performance and reliability refer to Installation Addendum for manufacturer's recommendations and specifications.

Voltage greater than indicated will cause higher static readings. Reducing the number of duct turns and stretching ducts will increase air flow and reduce static pressure. Adding ducts or increasing discharge system (hard ducting) will also reduce static pressure.

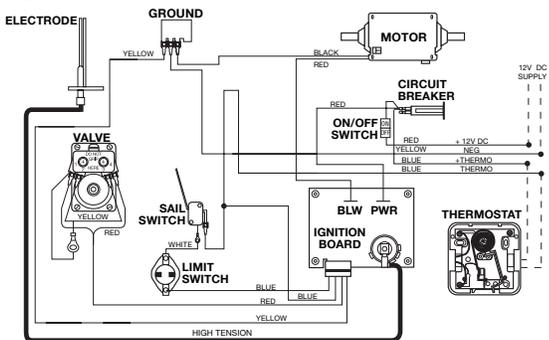
NOTE: Special tool required to take casing static pressure. Location for Static Pressure Tap for casing is located on back of casing (top left corner) FIG 3.



Valve Assembly
(Vanne)
Valve Conversion
(Vanne de conversion)

6

5 8900-III DC WIRING

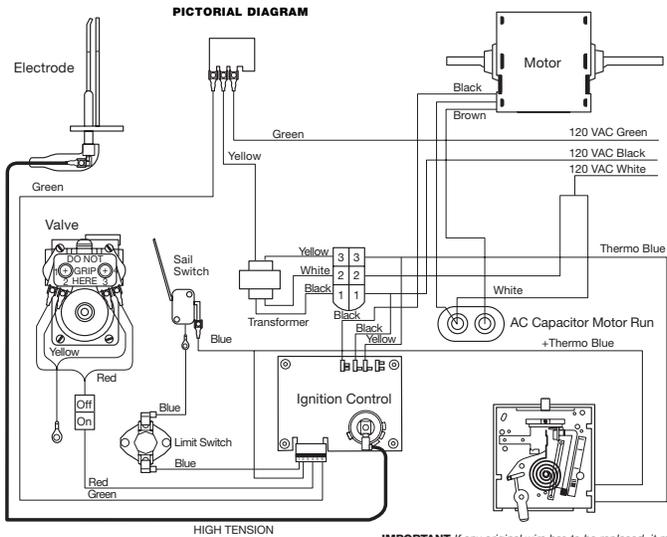


NOTE: DC Models only
ON/OFF Switch may be separate or combined in Circuit Breaker.

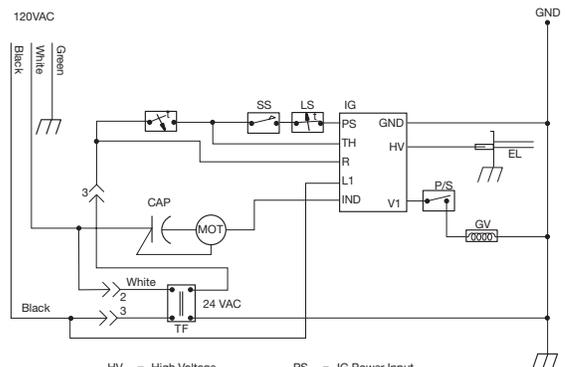
IMPORTANT: If any original wire has to be replaced, it must be replaced with type 105 C or its equivalent. Terminal Block on 85 Models only.

CUSTOMER SUPPLIED WIRE

5 8900-III AC WIRING



SCHEMATIC DIAGRAM



- | | |
|------------------------------|---------------------------|
| HV = High Voltage | PS = IG Power Input |
| GND = Ground | SS = Sail Switch |
| GV = Gas Valve | TH = Thermostat |
| EL = Electrode | LS = Limit Switch |
| IG = Ignition Control | CAP = Capacitor |
| MOT = Blower Motor | P/S = Power Switch On/Off |
| IND = IG Blower Motor Output | TF = Transformer |
| | V1 = Valve Control |

IMPORTANT If any original wire has to be replaced, it must be replaced with the type 105 C or its equivalent.

