



Technical Service BULLETIN

Title:

450/400 Pump Retrofit

Date: 17 Sep 2015
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Revision: N/A

Circulated to:

Factory Authorized Service Centers	<input checked="" type="checkbox"/>
Dealers	<input checked="" type="checkbox"/>
OEM Partners	<input checked="" type="checkbox"/>

Affected Product Range:

<u>Model</u>	<u>Serial Numbers Identified</u>
450 Series Diesel	ALL
400 Series Propane	ALL
400 Series Diesel	ALL

This Technical Service Bulletin replaces any other issued on this topic. Please destroy all other versions.

CONDITION SUMMARY

Situation:

This bulletin provides technical information regarding the replacement of circulation pumps on certain Aqua-Hot models. Only those heater models identified in the Affected Product Range section are serviced by this bulletin.

Cause:

Many older model circulation pumps are discontinued. In the case of a pump failure with no direct replacement, use this bulletin to retrofit the heater to use the new style pump.

AQUA-HOT ACTIONS

Aqua-Hot has created a service kit that contains the components required to perform this retrofit. The required parts are listed in the Required Materials section. This bulletin covers the replacement of **one** the following:

- Engine Preheat Pump
- Circulation Pumps - Zone #1 or Zone #2.
- Stir Pump

REQUIRED MATERIALS

To replace **one pump**, order kit part number: **PLE-100-905-FRU**

BILL OF MATERIALS

Each kit contains the following items:

Part Number	Part Description	Quantity
PLX-100-900	Pump, Buehler C20	1
PLX-100-836	Bracket, Pump Mount	1
PLX-100-837	Isolator, Pump Bracket	1
ELE-400-900	Harness, Buehler C20 Pump	1
PLE-450-150	Hose, 3/4 in x 1/2 in Adapter, Straight	2
PLX-CTB-250	Clamp, Hose Constant Tension 23/32 in.	2
PLX-CTB-270	Clamp, Hose Constant Tension 3/4 in.	2
PLX-CTB-290	Clamp, hose, Band 1-1/16 in.	2
PLX-000-433	Hose, Heater 3/4 in. Green Stripe	26
ELX-252-010	Terminal, Red, Male Quick Disc, 1/4, 1	1
ELX-252-018	Terminal, Red, Female Quick Disc, 1/4, 1	1
ELX-200-150	Connectors, Butt 18-22 ga	1
PLX-000-825	Fitting, Coupler 3/4 in Black Nylon	1
PLX-000-835	Fitting, Reducer 3/4 in to 5/8 in Black Nylon	1
EB9X027SS(00C)	Clamp, Worm Gear, 16-27MM	4
SME-850-850	Bracket, 450 Cooper to GRI Zone	1
SR-5075B	Plastic Rivet	4
MSX-210-985	Tie, Cable 12 in	2

Note: Cable ties are included as an alternate method of securing the pump if drilling is not desired.

Note: This is a universal kit for several different applications. There may be leftover parts.

NOTE

Buehler pumps are reverse polarity protected. Improper wiring will render the pump inoperative, but will not damage the pump.

DANGER

Failure to disconnect power from unit or allow unit to properly cool may result in personal injury.

CAUTION

Failure to allow adequate cooling time may result in injury due to contact with hot antifreeze.

REPLACEMENT OF CIRCULATION PUMPS - ZONE #1 OR ZONE #2

Removal

1. Disconnect AC and DC power to the Aqua-Hot unit.
2. Allow adequate time for the unit to cool to a safe temperature before proceeding to the next step.
3. Remove the Aqua-Hot access cover by removing three retaining bolts (see fig 1.0).
4. Use hose pinch-off pliers to clamp both of the pump hoses to prevent loss of coach-side antifreeze during pump removal (see fig 1.3).
5. Using the red-handled drain valve, drain all tank antifreeze solution into a clean container. Retain antifreeze for reuse (see fig 1.4).
6. Disconnect the wires of the circulation pump by doing one of the following depending on which pump is being replaced:

- Circulation Pump ZONE #1:** Disconnect the male Faston connector of the pump from harness wire #6. Remove the butt connector from the harness by cutting harness wire #5 and the red lead wire on either side of the butt connector (see figure 1.1).

- Circulation Pump ZONE #2:** Disconnect the female Faston connector from the harness wire #4. Remove the butt connector from the harness by cutting harness wire #3 and the red lead wire on either side of the butt connector (see figure 1.2).

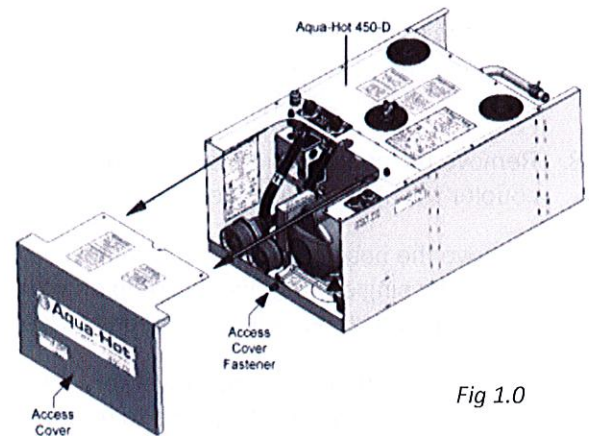


Fig 1.0

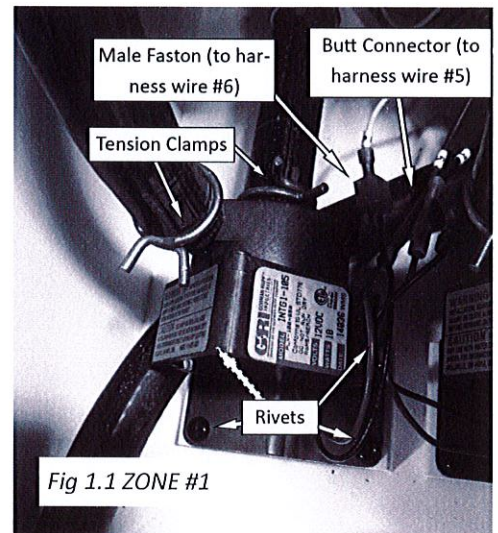


Fig 1.1 ZONE #1

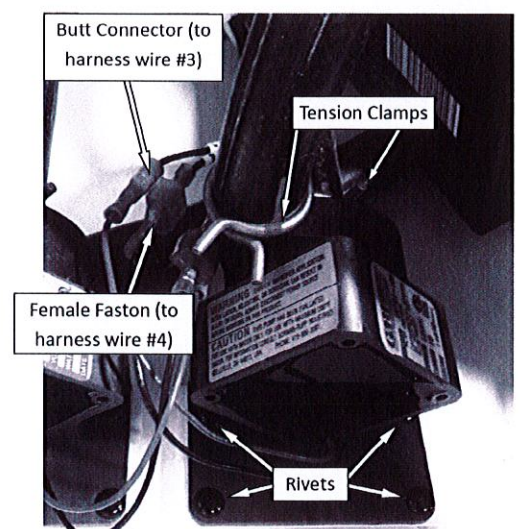


Fig 1.2 ZONE #2

7. Slide the upper constant tension band clamp up and off of the 3/4" to 1/2" hose coupler. Retain clamp for reinstallation (see fig 1.4).
8. Remove the coupler and the hose. The hose and coupler will not be reused (see fig 1.4).
9. Remove the hose from the check valve barb by sliding the single wire tension clamp off of the barb. This hose and clamp will not be reused (see fig 1.4).
10. Using a small flathead screwdriver, pry the snap rivets from the base of the pump to remove the pump (see figure 1.1 and 1.2).

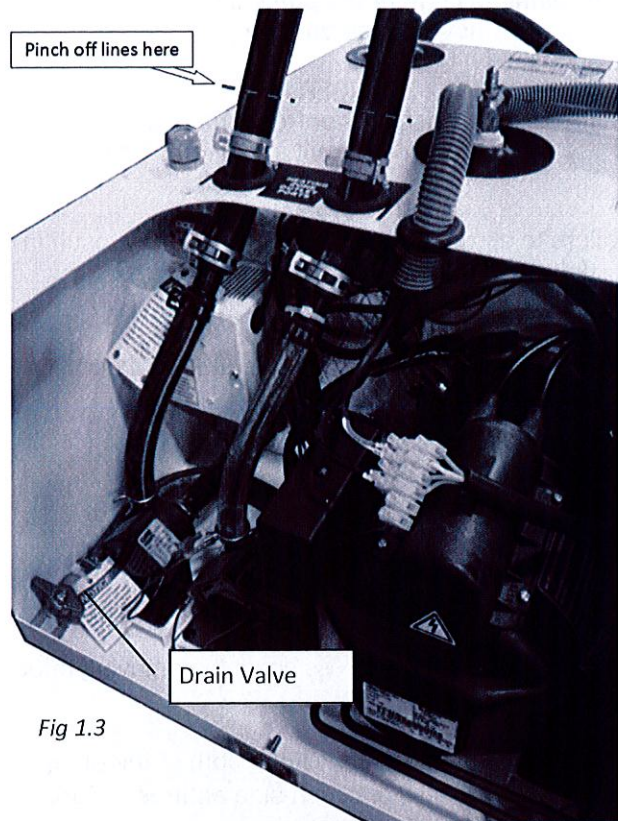


Fig 1.3

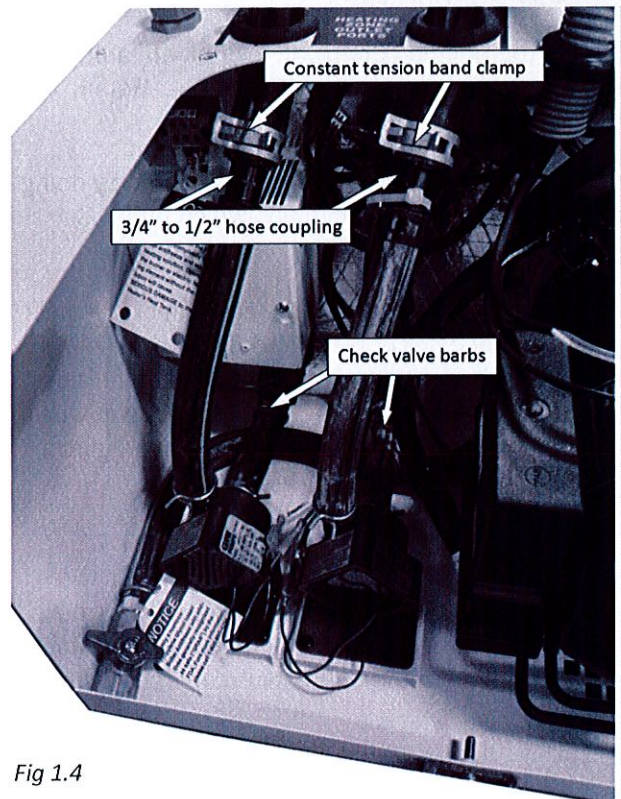


Fig 1.4

Installation:

1. Using the provided template, mark the drilling locations for the pump bracket. Drill two holes using a 21/64" drill bit (see figure 1.5).
2. Snap the pump bracket in the newly drilled holes (see fig 1.6).
3. Place the pump into the bracket but do not fasten the bracket. The pump will be used to measure the adapter hose length from the pump to the check valve hose barb.
4. Using the 3/4" to 1/2" adapter hose, measure and mark the length from the check valve hose barb to the pump barb. The hose and clamp should extend past the hose barb as shown in figure 1.7.

CAUTION

Only trim material from the smaller, 1/2" side of the hose. Trimming the 3/4" side of the hose will render the hose useless.

5. Once the proper length has been measured, use a hose cutter to cut the excess from the 1/2" end of the adapter hose.
6. Place the PLX-CTB-270 constant tension clamp on the 3/4" side of the adapter hose. Place the PLX-CTB-250 constant tension clamp on the 1/2" side of the adapter hose.
7. Install the 3/4" side of the hose adapter to the pump inlet. Install the 1/2" side of the hose adapter to the check valve hose barb.
8. Secure the hoses by moving the two constant tension band clamps into place. Ensure that the clamps are seated behind the first barb (see fig 1.7).

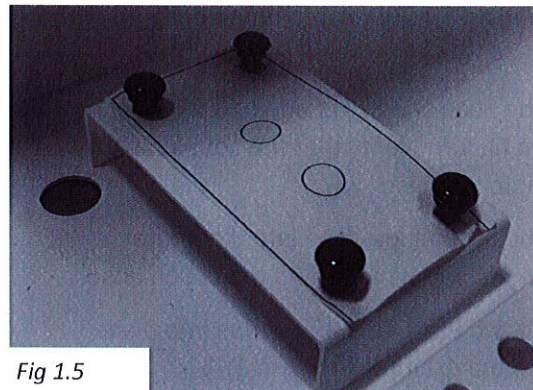


Fig 1.5



Fig 1.6

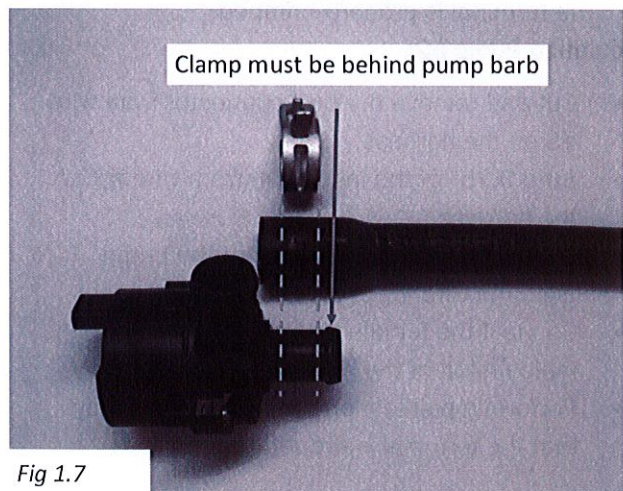


Fig 1.7

9. Install a PLX-CTB-290 clamp onto each end of the 8 inch, 3/4" diameter hose (see fig 1.8).
10. Install the hose coupler in one end of the hose as shown in fig 1.8. Verify that the coupler is fully seated into the hose .
11. Install the assembled hose into the heater between the pump outlet and the coach hose.
12. Slide the two PLX-CTB-290 clamps into place similar to the example in figure 1.7.
13. Slide the constant tension clamp down and over the hose coupler (this clamp was retained from step 7 of the removal). Verify the clamp is in place similar to the example in figure 1.7.
14. Depending on which zone pump is being replaced, do one of the following:

- Circulation Pump #1:

- Cut and remove the butt connector from wire #5 of the harness.
- Strip 0.25" of the insulation from wire #5 of the harness.
- Crimp the butt connector from the pump pigtail to wire #5 of the harness.
- Connect the male faston of the pump to the female faston of the harness.
- Perform a pull test on the terminal to verify that the terminal is properly crimped.

- Circulation Pump #2:

- Cut and remove the butt connector from wire #3 on the harness.
- Strip 0.25" of the insulation from wire #3 of the harness.
- Crimp the butt connector from the pump pigtail to wire #3 of the harness.
- Connect the female faston of the pump to the male faston of the harness.
- Perform a pull test on the terminal to verify that the terminal is properly crimped.

15. Plug the pump pigtail into the pump and secure pump clamp.

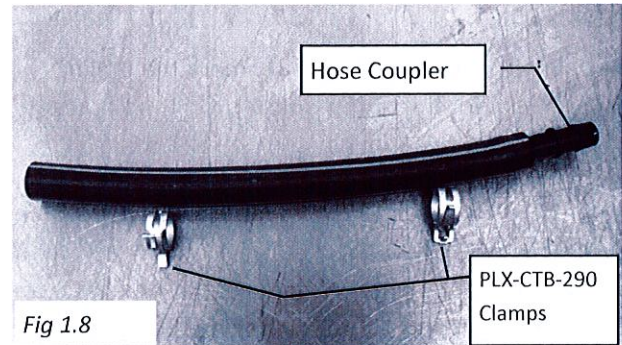


Fig 1.8

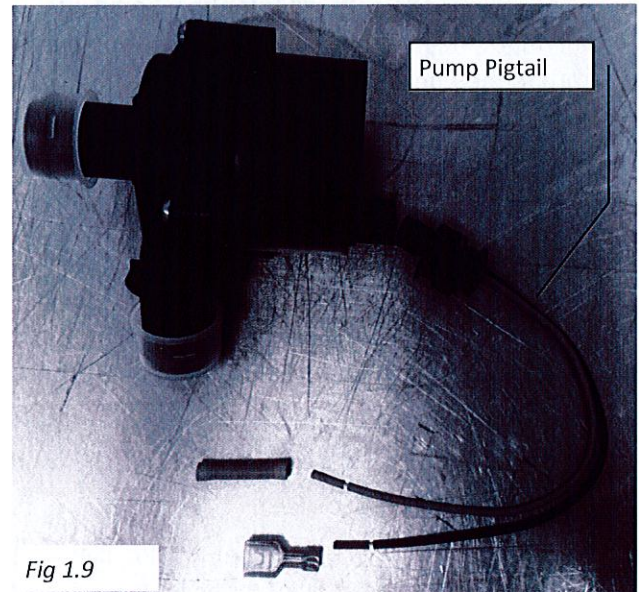


Fig 1.9

Pump	Pump Wire	Heater Wire	Type
ZONE #1	Red Wire	Purple #5	Butt Connector
ZONE #1	Black Wire	White #6	Male Faston
ZONE #2	Red Wire	Brown #3	Butt Connector
ZONE #2	Black Wire	Green #4	Female Faston

Fig 1.10

Engine Preheat Pump Replacement

TSB No: S-169

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CAUTION

Failure to allow adequate cooling time may result in injury due to contact with hot antifreeze.

DANGER

Failure to disconnect power from unit or allow heater or engine to properly cool may result in personal injury.

NOTE

Buehler pumps are reverse polarity protected. Improper wiring will render the pump inoperative, but will not damage the pump.

1. Disconnect AC and DC power to the Aqua-Hot unit.
2. Allow adequate time for the unit to cool to a safe temperature before proceeding to the next step.
3. Install pinch-off pliers on the engine side of the input and return engine antifreeze hoses.
4. Disconnect the pump wires.
5. Using a flathead screwdriver, pry the snap rivets from the base of the pump to remove the pump.
6. Remove the engine preheat hoses, hose coupler and the clamps between the pump and the Aqua-Hot. Discard these items (see fig 2.1).
7. Insert the pump bracket into the bracket (see fig 2.2).
8. Install the bracket adapter on to the cabinet using the four snap rivets (see fig 2.2).
9. Loosely insert the pump into the bracket. With the pump in bracket, measure out the length of the 1/2" - 3/4" straight adapter hose to the Aqua-Hot engine preheat inlet port. Leave enough slack to keep the hose from kinking.

CAUTION

Only trim material from the smaller, 1/2" side of the hose. Trimming the 3/4" side of the hose will render the hose useless.

10. Cut the adapter hose to the measured length.
11. Place two worm gear clamps on each hose before installing the hoses on the pump.
12. Install the adapter hose on the pump and on the Aqua-Hot inlet port.

13. Install the straight 3/4" hose to the vehicle hose 3/4" adapter retained in step 5.
14. Secure the pump bracket and connect the pump wires
15. Slide the worm gear clamps into place. Make sure that clamps are behind the barb of the copper port and the barb of the pump (see the example in figure 1.7).
16. Tighten clamps to 30 in-lbs (4 places) and remove pinch-off pliers.

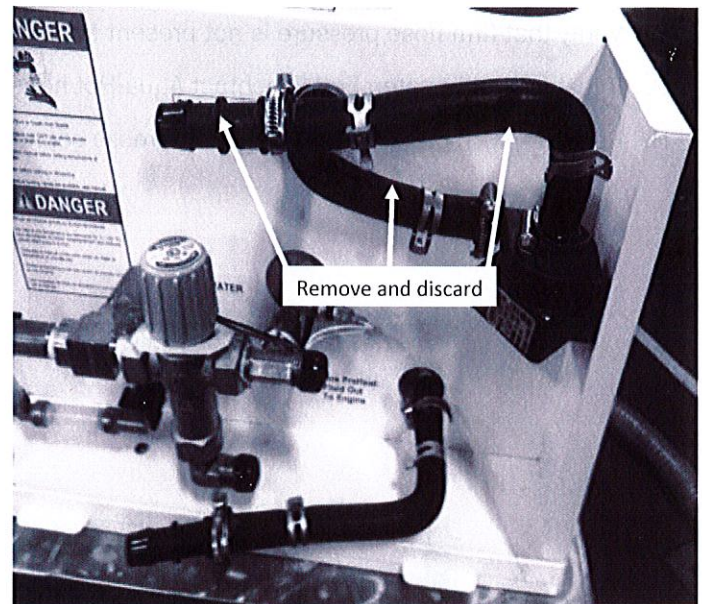


Fig 2.1

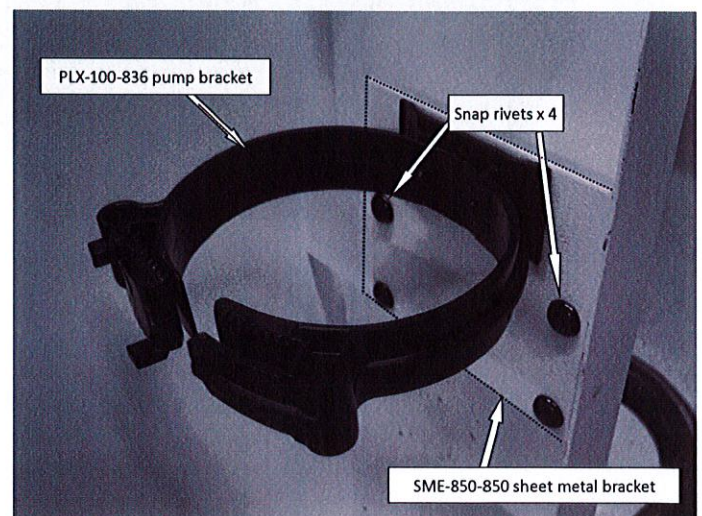


Fig 2.2

Engine Antifreeze Directional Flow Test

- A. Locate upper engine antifreeze hose connected to the top of the engine preheat pump as shown in figure 2.3.
 - B. Clamp hose with hose pinch-off pliers or equivalent, approximately as shown in figure 2.3.
 - C. Start vehicle engine and allow to idle.
 - D. Check pressure to hose by squeezing hose on the left and right side of the pliers.
- NOTE:** Pressure is indicated in figure 2.3 by the letter P with a circle around it.
- E. Verify that firm hose pressure is detected on the left of the pliers. See figure 2.3.
 - F. Verify that firm hose pressure is **not** present to the right of the pliers (hose is easy to collapse by hand).
 - G. If test fails either step E or F, contact Aqua-Hot heating systems for corrective action.
 - H. Remove pinch-off pliers and check antifreeze connections for leaks.

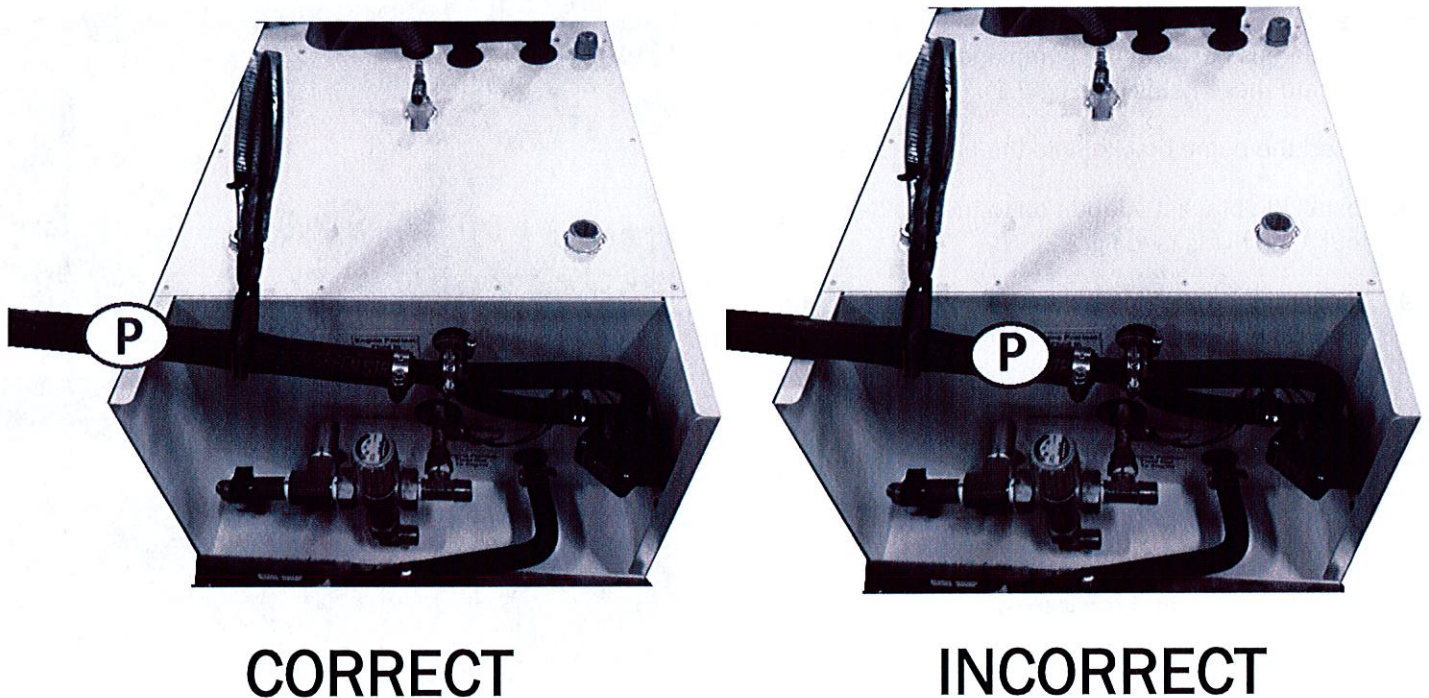


Fig 2.3

Stir Pump Replacement

WARNING

Set the diesel burner switch to the OFF position and disconnect diesel burner power supply before removing the diesel burner. Failure to remove power could result in serious injury.

Burner removal

Disconnect AC and DC power to the Aqua-Hot unit.

Locate the burner controller on the side of the diesel burner.

Disconnect both plugs from the controller.

Fig 3.1

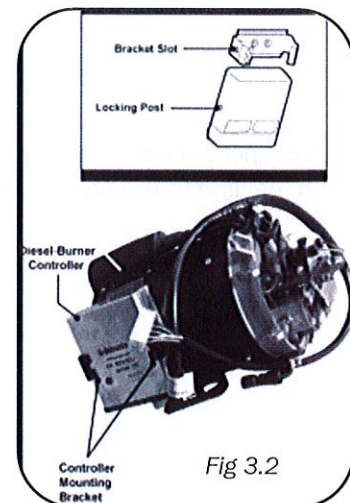
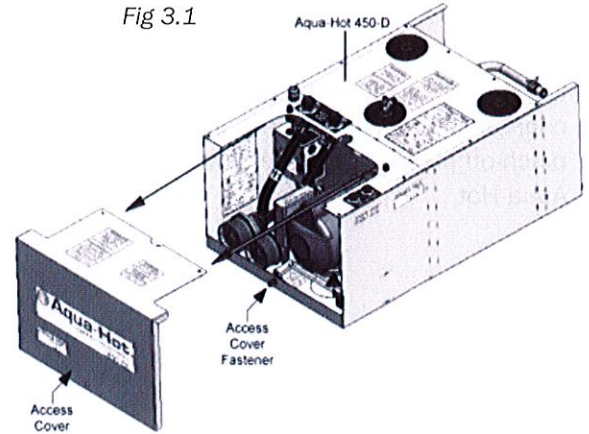


Fig 3.2

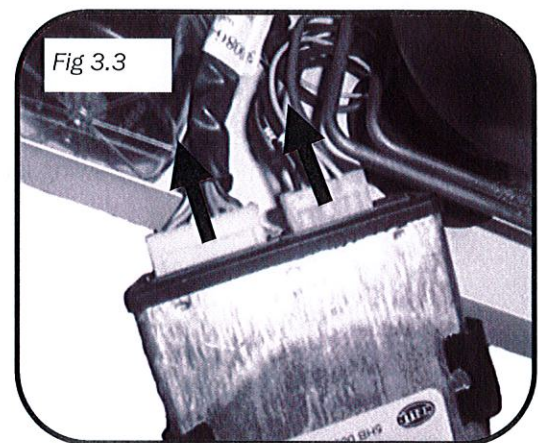
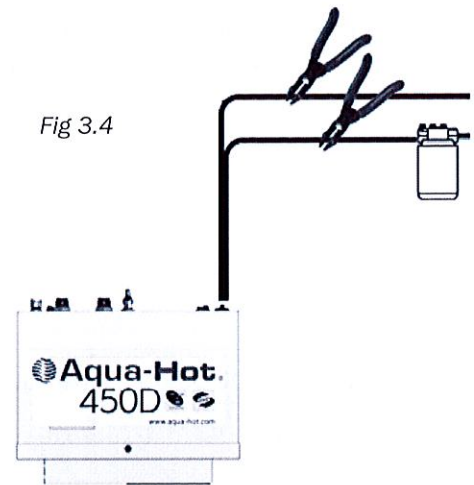


Fig 3.3

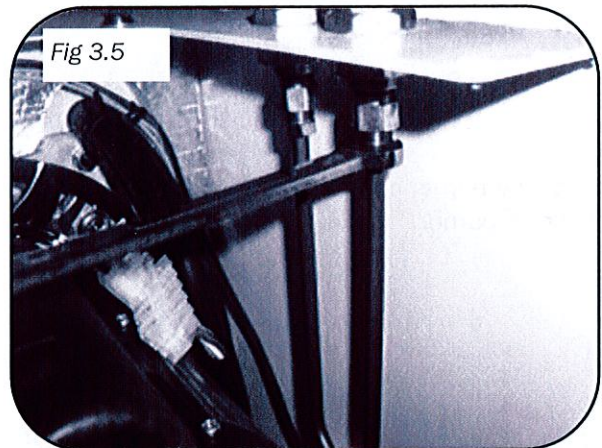
Locate the supply and return fuel hoses that connect to the Aqua-Hot assembly and install pinch-off pliers to stop the flow of fuel to the Aqua-Hot.

Fig 3.4



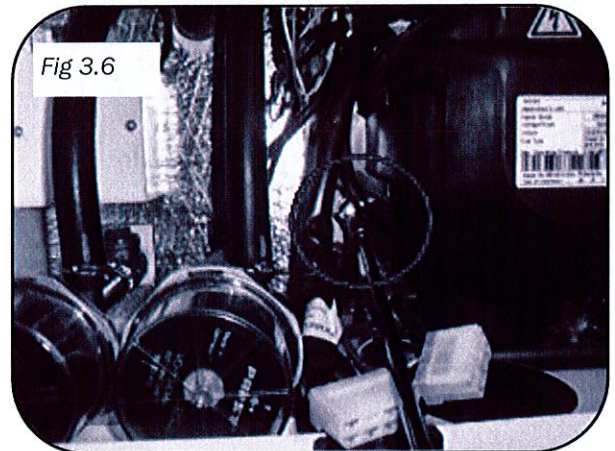
Using a 7/16 wrench, loosen the nuts securing each fuel line to the Aqua-Hot.

Fig 3.5

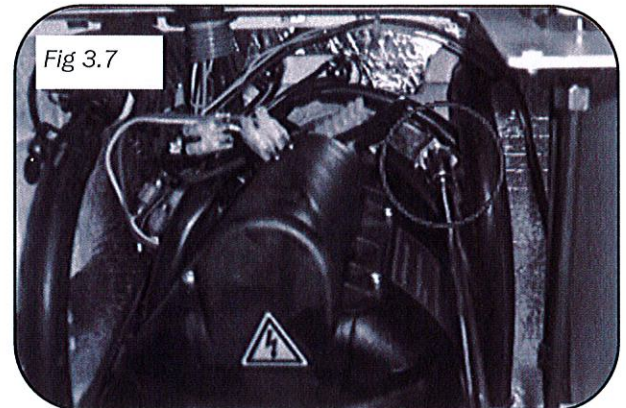


Using a 10mm socket wrench with a 10 inch extension, loosen bottom left retaining nut and swing it out of the way.

Fig 3.6

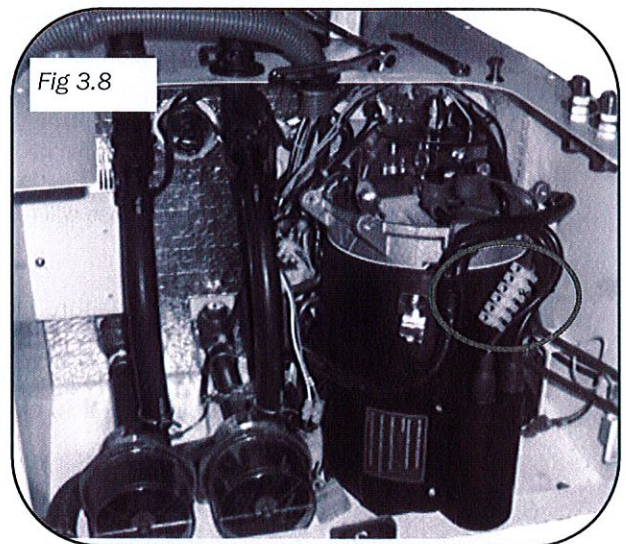


Support the weight of the diesel burner. Using a 10mm socket wrench with a 10 inch extension, loosen upper right retaining nut and swing it out of the way.



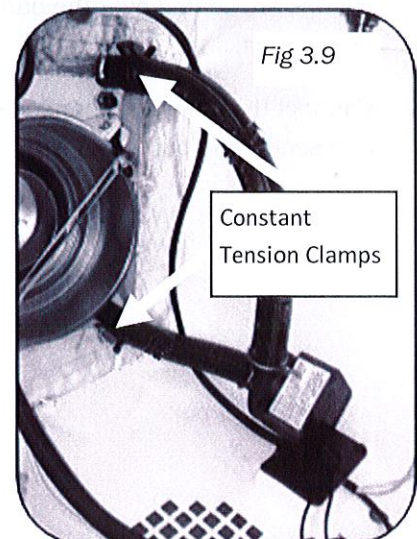
Carefully pull the diesel burner 4 to 5 inches away from the Aqua-Hot unit.

Disconnect the white thermostat connector and remove diesel burner.



Pump removal

1. Verify antifreeze is drained from the system. See step 5 of zone pump removal.
2. Loosen and slide back constant-tension clamps and disconnect the hoses from the heater.
3. Discard hoses and clamps.
4. Disconnect pump wires by gently pulling on the male and female faston connectors
5. Using a small flathead screwdriver, pry the snap rivets from the base of the pump to remove the pump.



Pump installation

1. Insert the pump bracket into the bracket adapter (SME-850-850).
2. Install the bracket adapter on to the cabinet using the four snap rivets (see fig 3.10).
3. Loosely insert the pump into the bracket. With the pump in bracket, measure the length of **BOTH** 1/2" - 3/4" straight adapter hose to the Aqua-Hot stir pump ports. Leave enough slack to keep the hose from kinking.

CAUTION

Only trim material from the smaller, 1/2" side of the hose. Trimming the 3/4" side of the hose will render the hose useless.

4. Cut the adapter hoses to the measured length.
5. Slide one PLX-CTB-250 clamp onto the heater side of each hose. Slide one PLX-CTB-270 clamp onto the pump side of each hose.
6. Slide the hoses onto the stir pump and onto the heater nipples. Ensure that the hoses and the clamps are seated over the barbs of the pump to prevent leaks.
7. Connect the male and female faston connectors and secure the pump bracket.

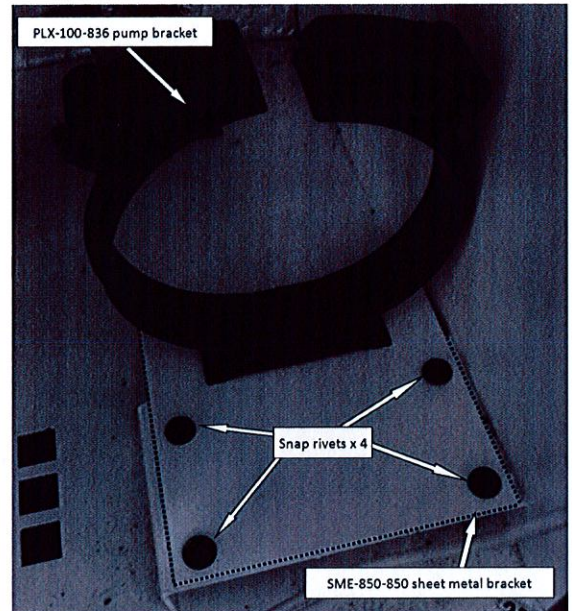


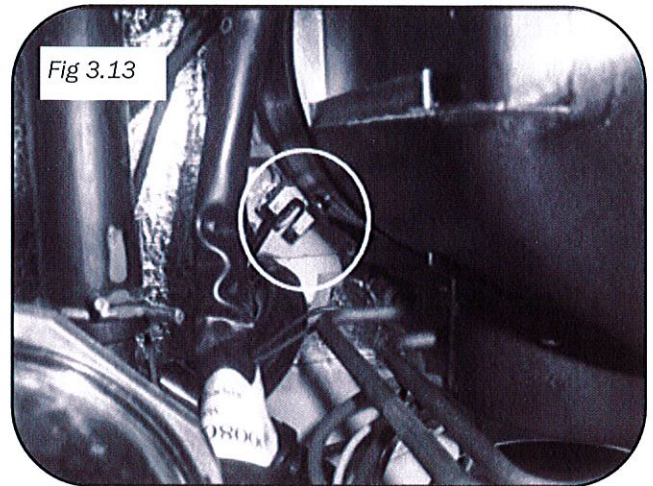
Fig 3.10

CAUTION

When reattaching the diesel-burner be sure to properly align the diesel-burner before tightening the eye-bolt nuts. DO NOT over tighten the eye-bolt nuts. Improper alignment and/or over tightening of the eye-bolt nuts can cause damage to the diesel-burner's cast aluminum blower casing.

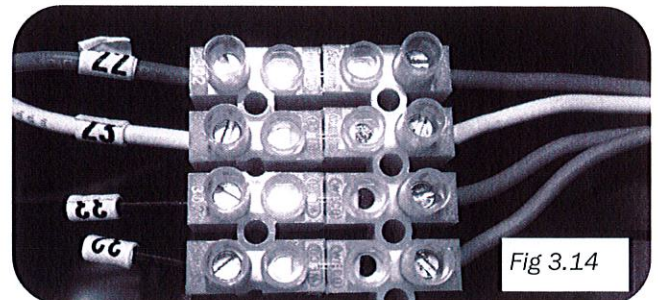
Burner installation

Align the burner head and swing the lower mounting bolt into place. Finger tighten the mounting bolt but do not torque at this time. Swing the upper mounting bolt into place. Finger tighten the upper mounting bolt. Alternating between bolts in small increments, **torque both bolts 20-40 in. lbs.**



Connect both plugs on the diesel burner controller (Fig 3.3)

Use figure 3.14 to reconnect white thermostat connector.



CAUTION

Remove the fuel supply and return pinch-off pliers prior to starting the diesel burner. Failure to remove clamps will result in damage to the diesel burner fuel pump.

Fig 3.15

Align the diesel burner fuel lines to the Aqua-Hot connections. Using a 7/16 inch wrench, tighten both fuel lines.

Torque lines to 130 in. lbs.

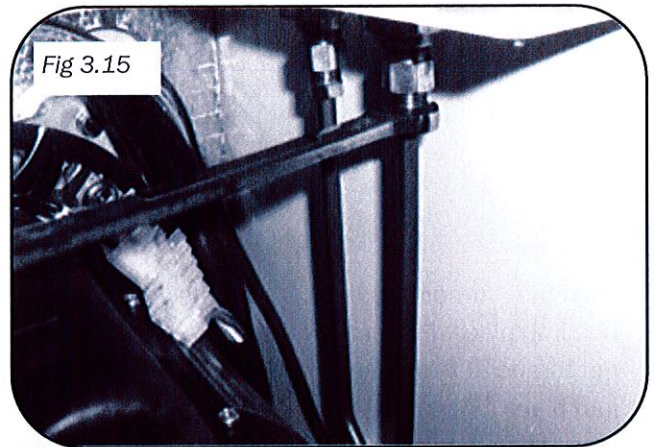
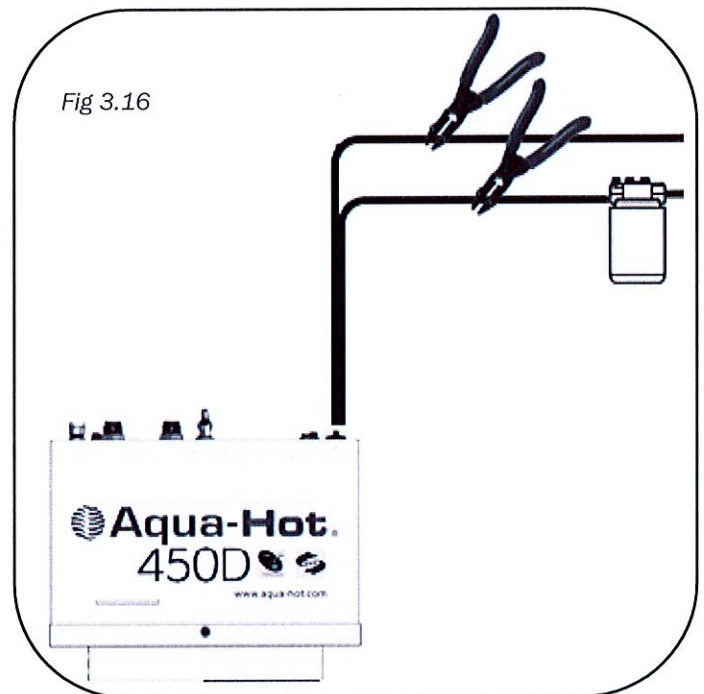


Fig 3.16

Remove the pinch-off pliers from the supply and return fuel lines.



Conclusion

Fill the heater with the retained antifreeze and verify proper fluid level.

Operate the diesel burner and check the following connections for leaks:

- Fuel lines
- Zone pump #1 antifreeze hose connections
- Zone pump #2 antifreeze hose connections
- Stir pump antifreeze hose connections

Reinstall the access cover and return the unit to service.

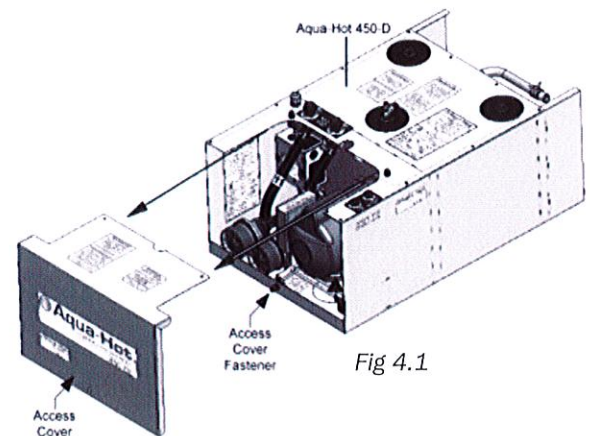


Fig 4.1



Aqua-Hot Heating Systems Inc.
7501 Miller Dr. Frederick, CO 80504
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FAX: 303-651-5699
www.aquahot.com

Faint, illegible markings or bleed-through from the reverse side of the page.

DRILLING TEMPLATE FOR PLX-100-836. FOR USE WITH PLE-100-890-FRU AND PLE-100-891-FRU KIT. WHEN PRINTING THE TEMPLATE IN A PDF VIEWER, PLEASE MAKE SURE TO PRINT TO "ACTUAL SIZE".

--- LINES THESE HOLES WITH THE CURRENT PUMP MOUNTING HOLES ON THE 400/450 CABINET.



--- USE THESE HOLES TO LOCATE THE DRILLING LOCATIONS FOR THE BUEHLER PUMP BRACKET. USE A 19/64" DRILL BIT TO MAKE THESE HOLES.

