

# MAINTAINING THE WALLAS 95 DU

11-11-06

My 1999 Wallas had never been serviced. After increasing troubles, I took the time to familiarize myself with the stove by taking it apart, gaining the confidence to make repairs out on the water if needed. In the process I spoke with Scan Marine's (SM) technicians. I have limited mechanical experience, so followed recommendations and made careful documentation with notes and pictures so I'd be able to put the stove back together.

This may be more than most of you will want to know. Sending the stove in for repair and maintenance is a really good idea. But for those who want the ability to do your own maintenance and repairs, these recorded steps may be helpful.

When it was all said and done, the only part I replaced was the bottom mat, damaged in the process of cleaning the combustion chamber and radiation element. That, together with cleaning a partially clogged fuel injector needle, has solved my problem so far. I now have some replacement parts and hopefully the knowledge to deal with future problems.

Tom Eisenbart

## WALLAS REPAIR KIT



1.

Spare parts



2.



3.



4.

1. Thermo element  
#36400

2. Bottom mat  
#602098

3. Combustion fan motor  
#16801

4. Glow plug  
#853513

## CONVERSATIONS WITH SCAN MARINE

11.6 through 12.9.06

Here are notes from talking with technician, Mike, departing owner Karl and new owner Doug.

Wallas is a relatively small company and their stoves are essentially hand made. SM (Scan Marine), he thinks, is the only US distributor. Carl is in the process of selling the business to Doug and (I believe) his brother Chris.

Cost for them to go through everything and clean the stove parts starts at \$105, with additional cost if replacement parts are needed. Cleaning combustion chamber is done by sandblasting inside and out. The base service cost will be increasing.

With regard to the combustion fan assembly and combustion chamber components, SM warned me that if the stove is not reassembled precisely, without understanding the nuances, that it would likely not work correctly.

# WALLAS TOOLS

I keep on board in my Wallas repair kit:



J.B. Weld Epoxy



Silicone sealant for flue connections (dealer used a higher temperature rating)



320 & 600 wet/dry sandpaper



Brass brush



Back up syringe



Plastic, tapered tip syringe for back flushing injector needle (step 9)



Phillips tip



Flat tip that has been filed (step13)



Racheting offset screwdriver



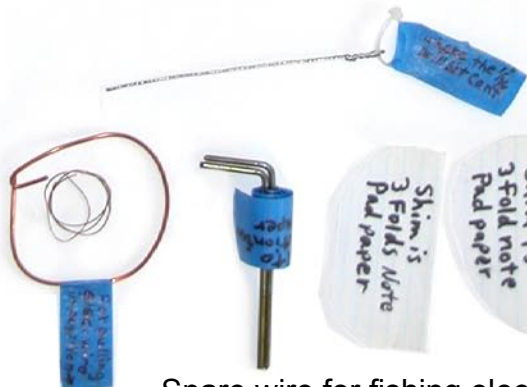
Socket end screwdriver



1/16 inch aircraft drill bit



Piece of picture framing wire to help clean injector needle



Shim materials for combustion fan (2 pieces of clothes hanger and 2 pieces of note pad paper folded 3 times)

Spare wire for fishing electric wire in tight space

Pocket magnifying glass (not shown)

WELLER battery operated soldering iron, model bp645  
For soldering fine gauge wire of combustion fan motor. Have exchanged for (preferred) butane model.



## STEPS FOR DISASSEMBLING

1. Disconnect corrugated flue pipe at both hull and stove ends (be careful, the sharp edge/ burr nicked me). Cut silicone seal

(I used small screwdriver tip of leatherman's tool) and work it off by hand.

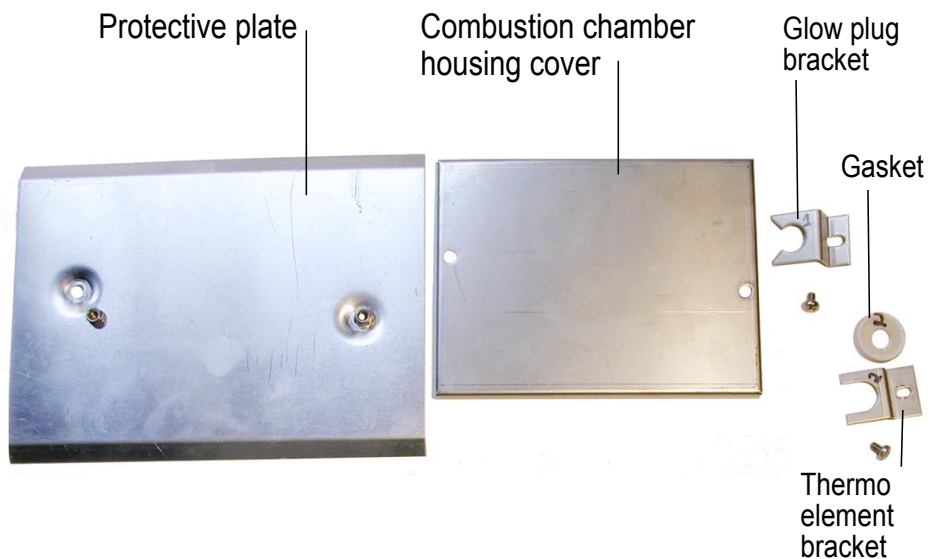
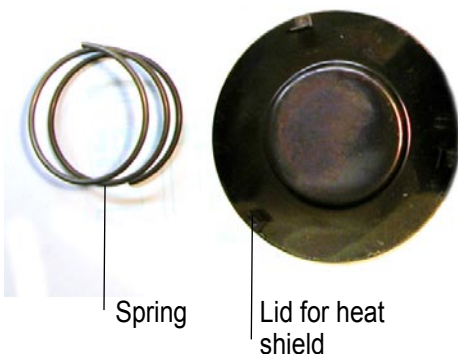
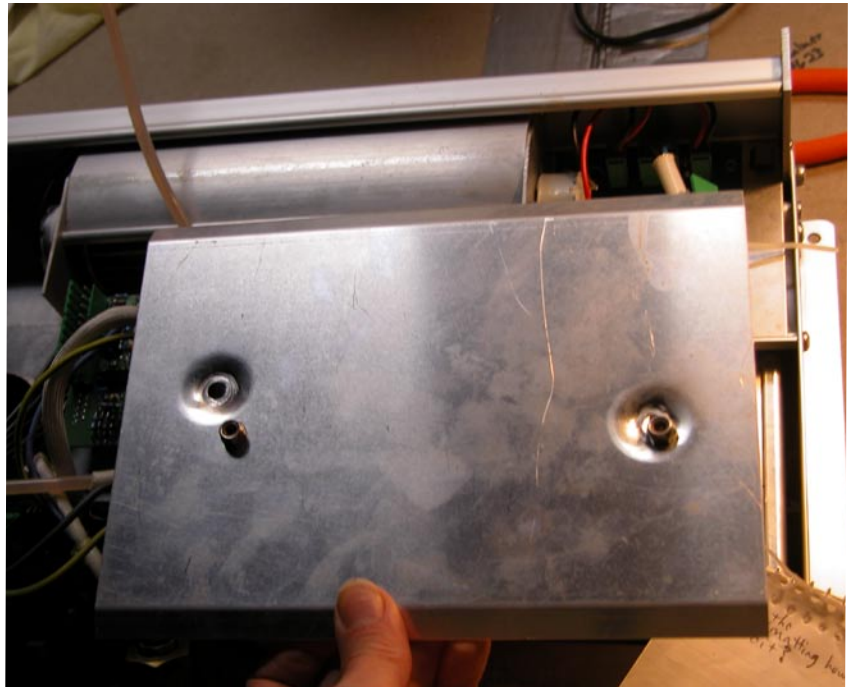
2. Follow wiring from cabinet switch and disconnect green plug at circuit board, wiggle carefully side to side.

3. Follow power supply wire (black and red) and disconnect white plug at circuit board.

4. Take fuel line out of fuel tank and put in bucket small enough to go through stove opening in countertop. Remove top screws holding stove to counter and lift stove, fuel line and bucket.

5. Remove rectangular protective plate from the combustion chamber housing, then remove the housing cover, (has internal gasket), taking care because the cover is under some pressure from the spring inside. Remove the spring.

NOTE: One end of spring sits flat against the disc-shaped heat shield lid.





6. To remove the glow plug (ignitor), take out the bracket screw, (also attaches large ground wire). Remove bracket.

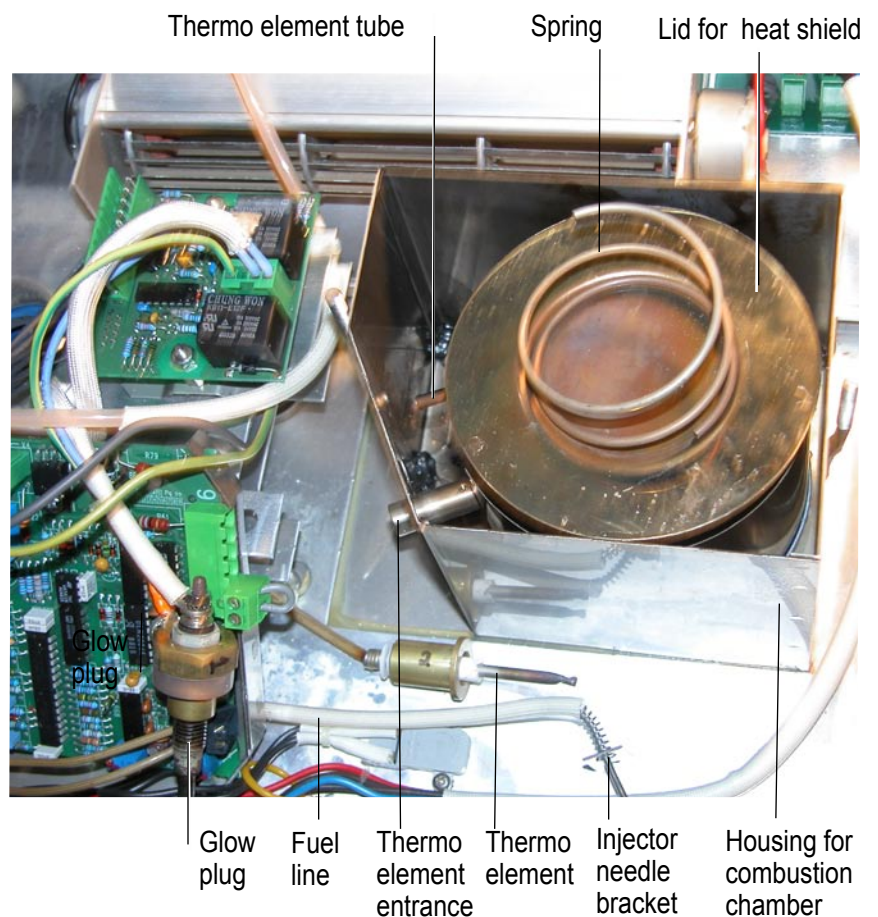
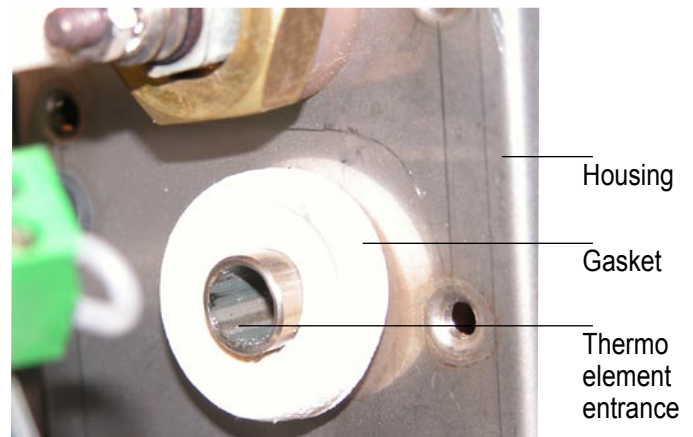
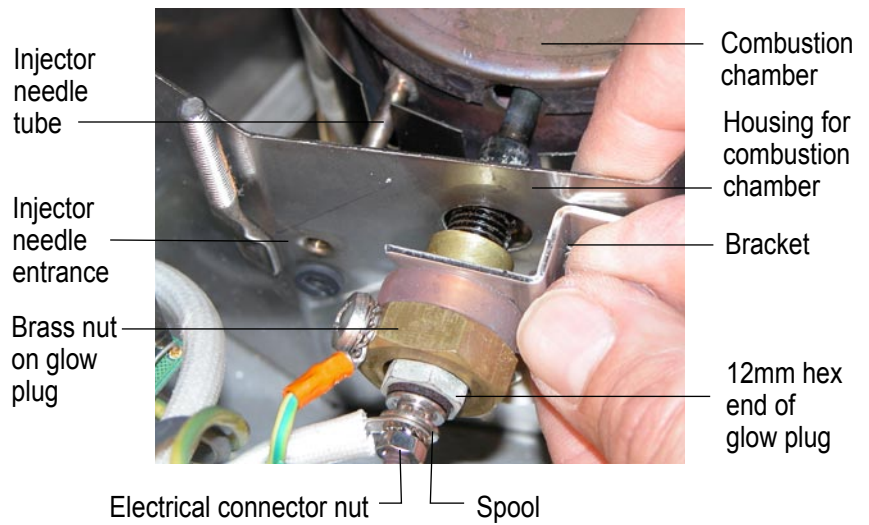
The hexagonal end of the glow plug is recessed inside the large brass nut/sleeve with just enough to grasp. To take apart glow plug, hold brass nut in vise or with crescent wrench and use 12mm wrench to unscrew the hex end from the brass nut. When removing the small electrical connector nut on the end of the glow plug, note a small spool-shaped part. I was told that when re-tightening that nut, do not allow the spool to rotate so you won't tear internal wires. Use needlenose pliers or needlenose vice grips. Another tech said tightening is minimal so don't worry.

Mine didn't seem very dirty. Even so, I cleaned with a fine wire brass brush and 320 grit and or 600 grit wet/dry sand paper, followed with acetone solvent wipe down. (For those not familiar with solvents, use acetone resistant gloves, good ventilation, no chance of spark, and follow other instructions on the can.)

7. Remove bracket screw holding the thermo element (also known as heat sensor) Note a soft spongy gasket fits against the housing. (My thermo element had a cracked porcelain sleeve. SM said they no longer make them with porcelain sleeves and that a broken sleeve should not affect the stove's function if element is OK.

Cleaned as described in step 6. I was told the bracket allows for fine adjustment of the element and not to overtighten. The thermo element should be positioned in the tube so it does not make metal to metal contact.

8. Disconnect injector needle bracket. Note position of the injector needle elbow so bracket will fit flat against the combustion chamber housing when reassembling. My injector needle elbow needed to be pointed downward (about 6 pm if it were a clock face) for the injector bracket to fit.



9. Remove injector needle and clean with a six-inch by 1/16 -inch diameter drill bit, rotating with fingers. SM said using a standard 2-inch bit would likely push more debris further up the injector needle.

NOTE: bought aircraft drill bit at a specialty hardware store.

SM disconnects at the fuel pump, cutting off fuel line near the pump's plastic connection nipple and stripping the piece of plastic from the nipple so the line will be tight when reconnected. SM said newer models use copper line and more precise compression fittings.

They back flush the fuel line before replacing. I flushed with a plastic tipped syringe.

TIP: Even though the six-inch bit is plenty long, it can't get into the elbow portion of the injector. I cut a short piece of picture framing wire (has twisted strands) a little smaller in diameter than the injector opening to clean the elbow.

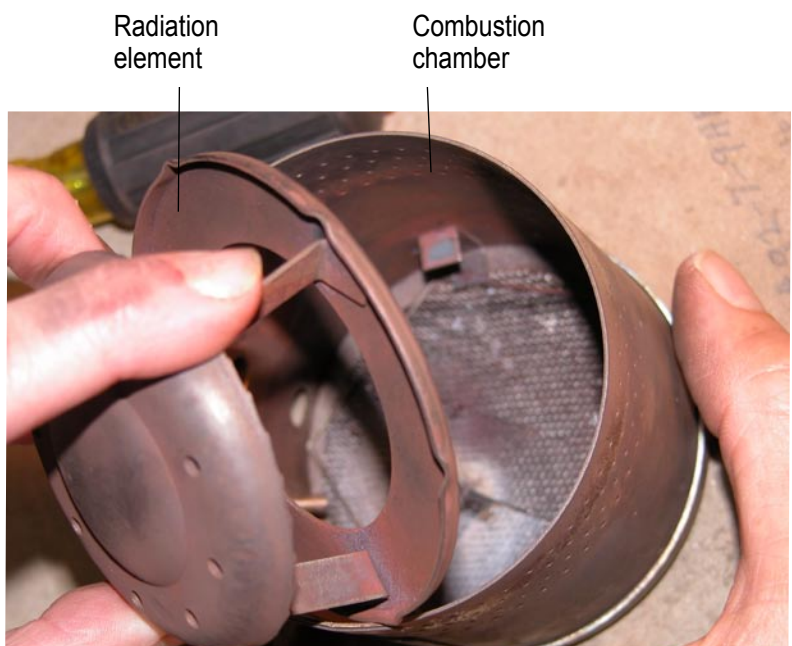
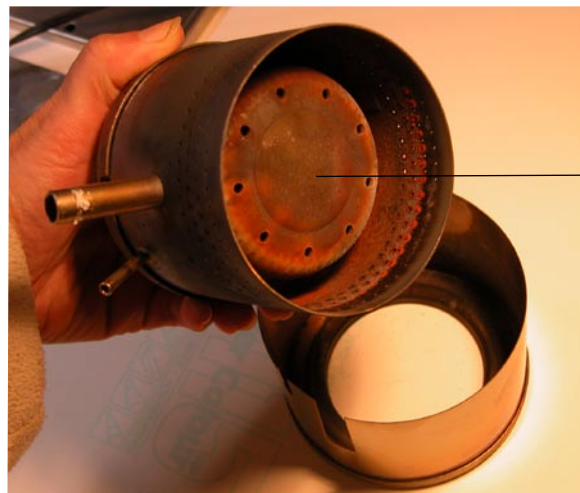
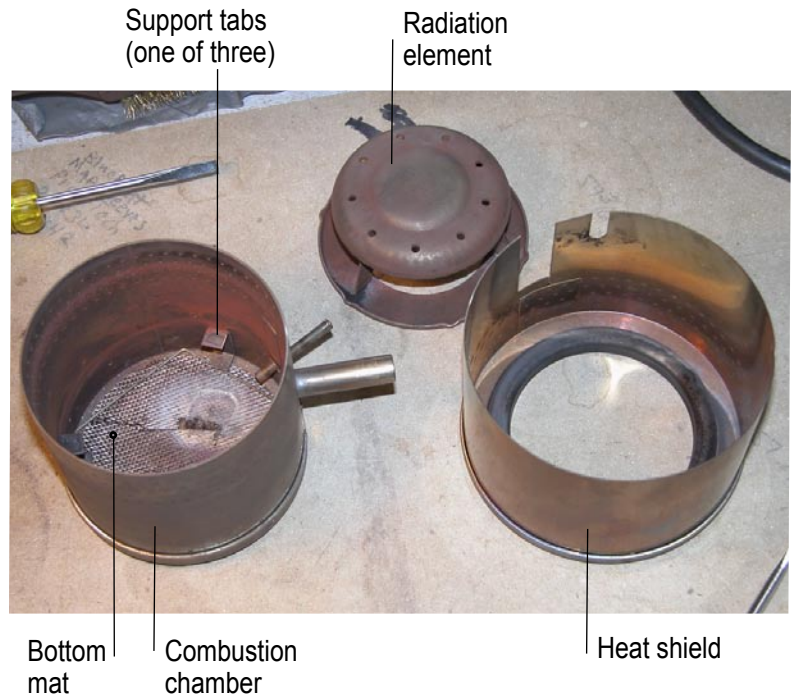


10. Remove as one cylinder the heat shield (containing the combustion chamber) from the housing. Do this by lifting the bottom of the cylinder on the opposite side from the thermo element

tube, tipping tube down through its oblong slot. Don't force, but finesse it out.

11. Wiggle off the lid of the heat shield (the lid has three tabs that hold it in place against the heat shield).

The radiation element is a separate unit which rests inside the combustion chamber on three support tabs. When the lid is removed, the radiation element is visible though locked in place by two retainer tabs. Notice the reddish-orange color inside the combustion chamber. This is a sign it is burning hot, as it should for a complete burning process. If it appears black it is not burning hot enough.





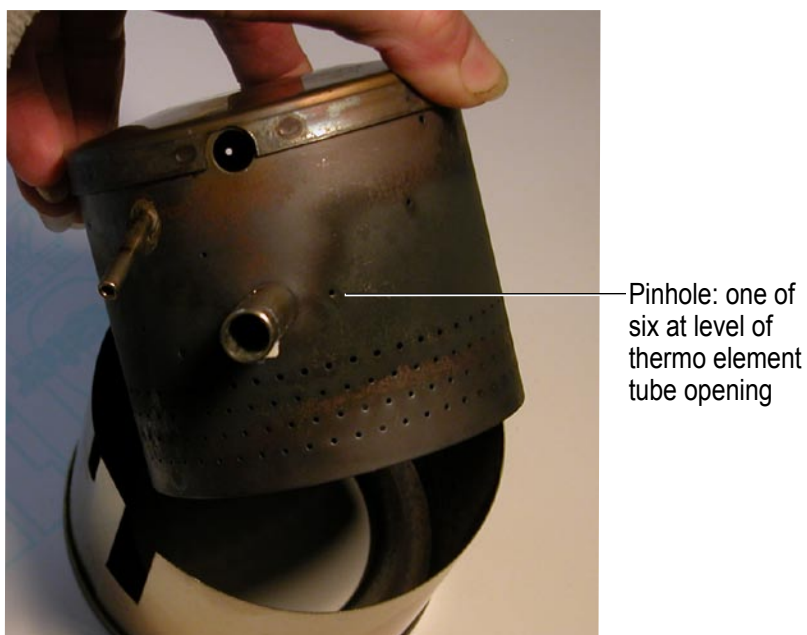
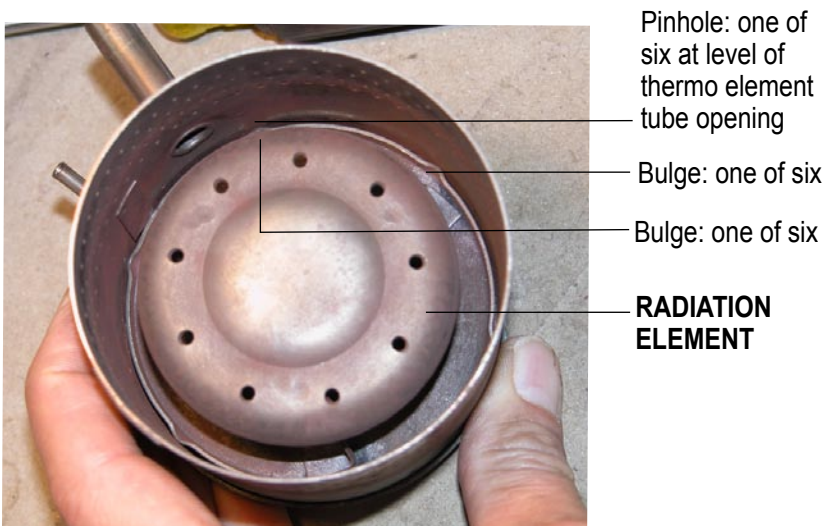
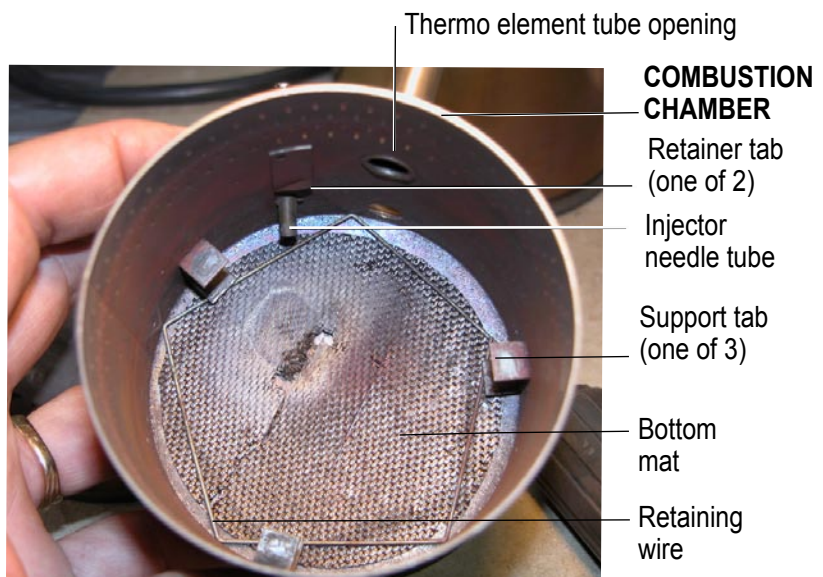
12. Before you remove the radiation element, make very sure to know exactly how it was positioned. SM said it must be replaced exactly as it was or it wouldn't work. To remember exactly how mine was positioned, I noticed 6 BB sized bulges around the perimeter of the radiator element, aligned with 6 mini pin holes around the circumference of combustion chamber. There are several rows of pinholes but these are at the same level as the thermo element tube opening. When looking from the inside, these six pinholes are seen a little above each of the six BB sized bulges.

Also, I made a small scratch/notch with a file at the radiation element edge next to the retainer tab.

13. Remove radiation element from combustion chamber by gently flattening two retainer tabs that have a slight bend at one corner. I used a narrow, flat tipped screwdriver. When the element is replaced, those retainer tabs must be gently bent back to their original position to create a snug fit. If there is any rattle or looseness, the support tabs may also need to be tweaked. For bending the retainer tabs back, I filed a second screwdriver, making the blade thinner to fit under the tab.

Once the radiation element is removed from the combustion chamber the bottom mat is visible in the closed end of the combustion chamber. It has a retaining wire to remove, then the bottom mat can be taken out as well.

I cleaned the combustion chamber and radiation element with fine sandpaper and wiped with acetone.



## COMBUSTION FAN & MOTOR

SM said the combustion fan motor voltage decreases with age, affecting air temperature and causing the stove to try adjusting itself, until it no longer can. They use a tool for checking the fan's air volume that I would not have. Increased fan noise indicates the motor may be going out. Upper and lower spacing tolerances are very particular when replacing the fan. If it is too tight or too loose it rubs against it's housing.

I haven't actually replaced the fan or motor but wrote these notes when doing maintenance disassembly.

### 1. Disconnect electric plugs at large circuit board.

NOTE: Electrical connection plugs that attach to large circuit board are hard to remove. There is probably a tool for this, so talk to someone who knows.

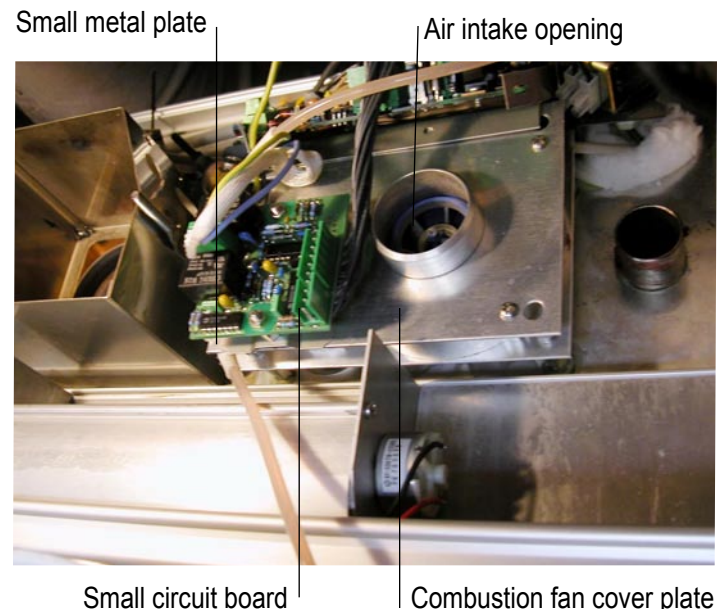
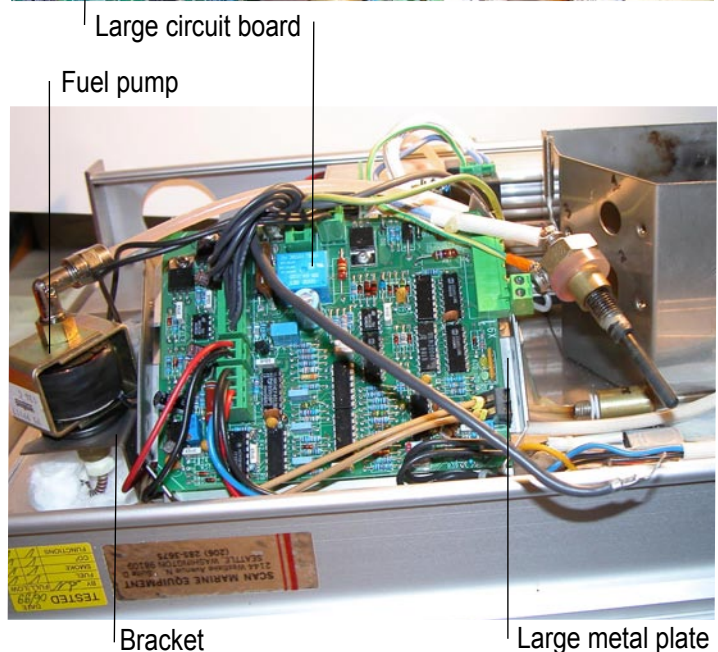
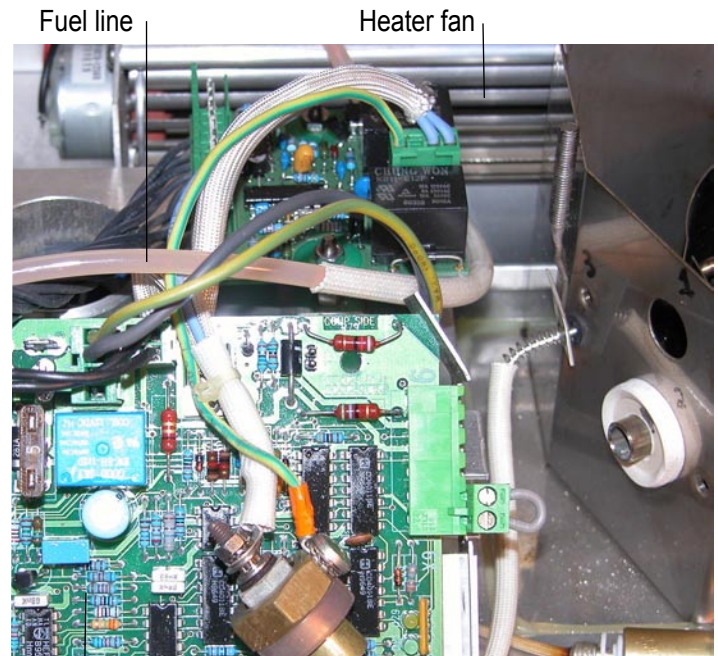
Wiring bundles from small circuit board (the 10 gray wires and the gray/yellow/green combo wires) run under the fuel line. Notice the location of the thermo element wire and the fuel line under the circuit board for reassembling. Heater fan wiring runs along forward frame edge.

### 2. Expand by hand the stainless retainers that hold the corners of the large circuit board. Remove three screws holding large metal plate that holds the large circuit board.

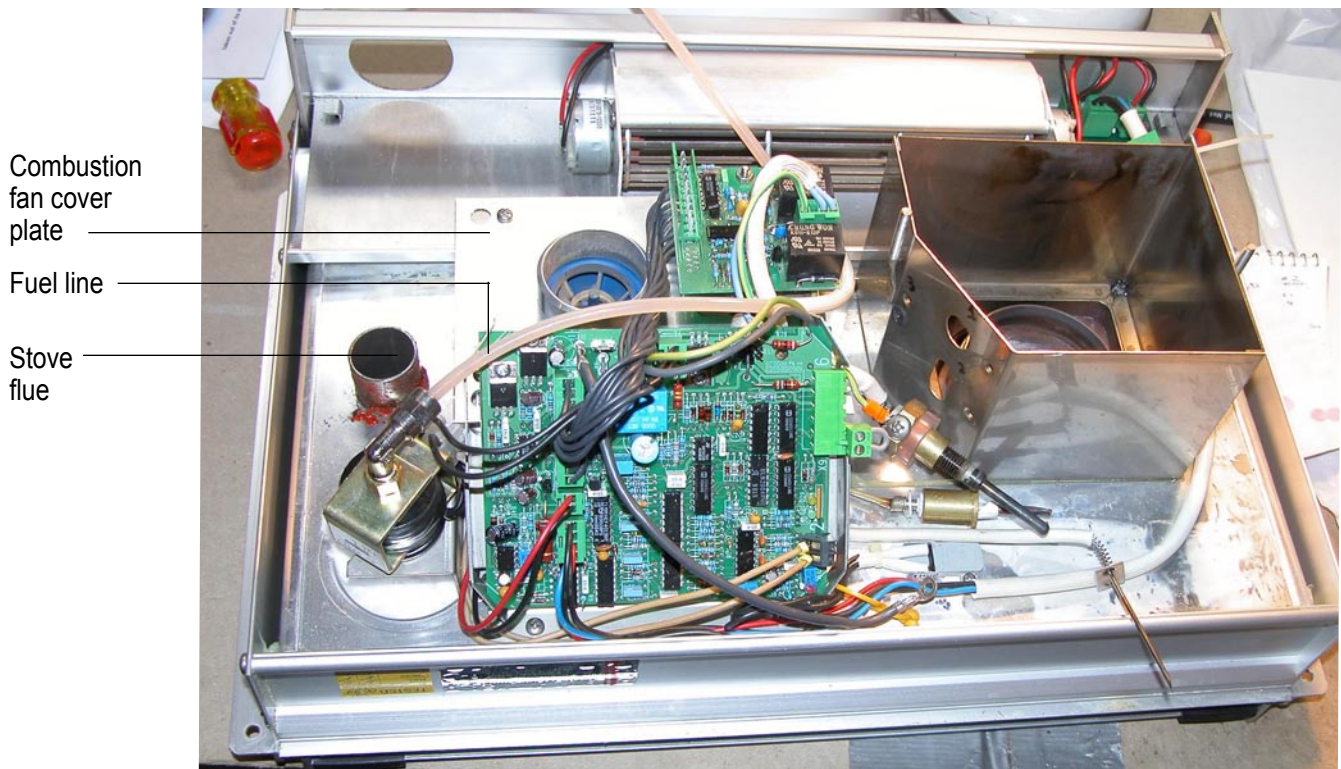
NOTE: use a narrow shaft #8, three inch philips tip screwdriver when loosening the screws at the lower aspect of circuit board. I nearly damaged the circuitry using a ratchet type screwdriver that holds multiple tips because the edge that retains the tip was catching on a tiny component.

### 3. Remove screws from stainless steel bracket that secures the fuel pump and remove the fuel pump.

### 4. Disconnect the small circuit board from combustion fan apparatus. Remove small metal plate that secures the small circuit board.







5. Cut cable tie that secures fuel line to combustion fan cover plate. Fuel line is secured under right upper corner rather than over.

6. To gain access to the motor, remove the four large screws so fan cover plate can be removed to get to the five smaller screws that hold the fan housing together.

NOTE: If the injector needle and thermo element have been disassembled, make sure the fuel line and thermo element wires are returned to their correct places before reassembling. Then install the large circuit board, and last the protective plate (shown on page 3).

With the combustion fan cover plate removed, you can see the entire fan surface.



## COMBUSTION FAN & MOTOR REPLACEMENT

Note: I have not actually taken apart and reassembled the combustion fan motor parts. These are simply instructions I was given in phone conversations with Scan Marine.

### REASSEMBLY TOLLERANCES

Before removing the fan, consider this. The fan has close spacing tolerances to keep from rubbing the upper and lower housing surfaces. As the fan rotates it wobbles a bit relative to the housings surfaces. The first technician told me he just eye balls the clearances when pushing the fan onto the motor shaft, trying to stay equidistant at bottom and top, guessing the distance to be about 1/16 inch.

Another tech uses shims under the fan when pushing fan onto the motor shaft so it can't go on too far. Pushing it on too far is apparently easy to do as the star washer is being pressed in place on the fan hub. Use whatever shims are precise.

I developed shims using coat hanger and two pieces of note pad paper folded three times, to approximate the original fan position for future use.

To prevent a slipping fan, the previous technician lightly roughens the shaft of the motor with sand paper, cleans with solvent, then uses J.B. WELD epoxy to glue on fan, taking care not to get glue on motor housing which would prevent shaft rotation.

If gluing, the fan would also need to be replaced when you put in a new motor. The first technician does not use glue.

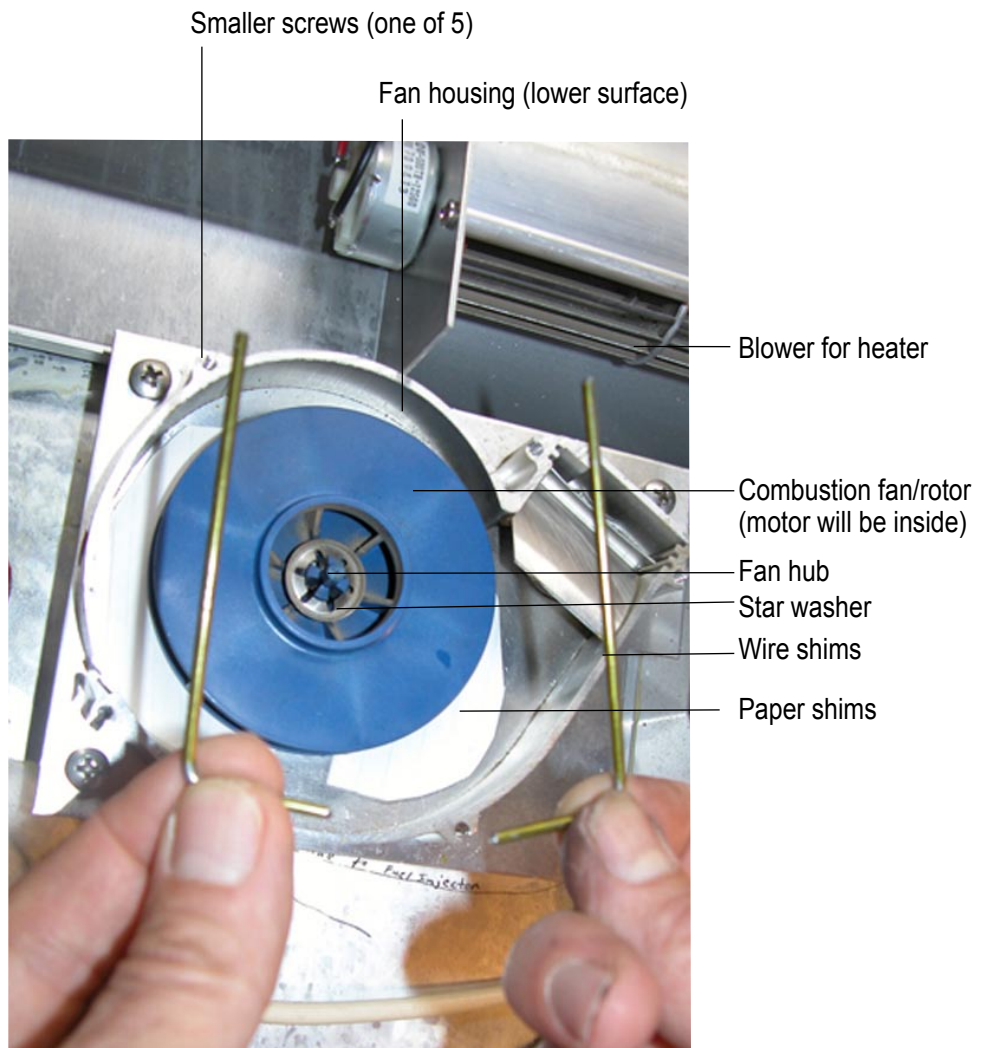
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To remove the fan, gently pry up the star washer with a screwdriver. They often reuse the washer although there have been some failure reports. He said the rotor (fan) will not likely be bored out (too loose) and I can very likely use it again.

With regard to star washer replacement:

At the time of this conversation there were no spares in their shop that could be sent, unless buying a rotor too, as the washers are packaged with the rotor. He did not know the metric sizing of the washers.

He said the fan hub is tapered from 3/8 inch diameter at the top, widening to approximately 7/16 inch towards the middle. He thought a 3/8 inch inside diameter star washer would work as its flanges flex upward to make the opening larger as the washer is pushed on, but 1/2 inch would be too big.



## DETERMINING POLARITY

SM says the combustion fan motor requires correct polarity with red/+ and black/- wires connected to the correct terminals. This is difficult to see because there is not a distinctive +/- marking on the motor.

Note a small (round) circle impression on the plastic portion of the motor housing, closest to what is the + post. This is subtle and difficult to see on my spare motor, but I found it with a pocket magnifying glass that is now part of my repair kit.

The + post is closest to some print/lettering, barely visible without a magnifying glass. It is within the outer circle (not the inner circle) on the plastic surface.

The wires are too large to fit through the tiny post connection holes, so split the wire end to get part of it through then twist the end back together for a good solder connection. This is where a micro-soldering tool is useful.

Written by Tom Eisenbart

Editing, photography &  
design by René Eisenbart