



## Electric Water Pump for B Engine Saabs

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This document shows how the original waterpump in a Saab "B" engine can be eliminated and replaced with a reliable, efficient **Electric Water Pump**.

This site is based on a 1978 99 but applies to all 1971-on Saab 99 and 1979 -1980 Saab 900.

This modification can be completed by the backyard mechanic with ordinary tools in a few hours.

The cost of the project closely matches the cost of replacing the original pump.

The EWP is manufactured by Australian manufacturer [Davies-Craig](#) and comes with a 2-year warranty. It weighs two pounds and is very durable and well engineered.

An optional controller unit controls the pump, only running it when necessary to keep the engine cool. The pump can also be wired directly for continuous operation. This website shows how to install an EWP both ways.

### Converting a B-engine to an electric water pump includes:

- Removing the original waterpump
- Sealing the cavities in the engine block where the original pump was installed by installing freeze plugs.
- Fabricating custom cooling hoses by modifying parts of the original system.
- Wiring a relay into the electrical system.
- If using the optional controller, removing the thermostat and replacing it with a temperature sensor.



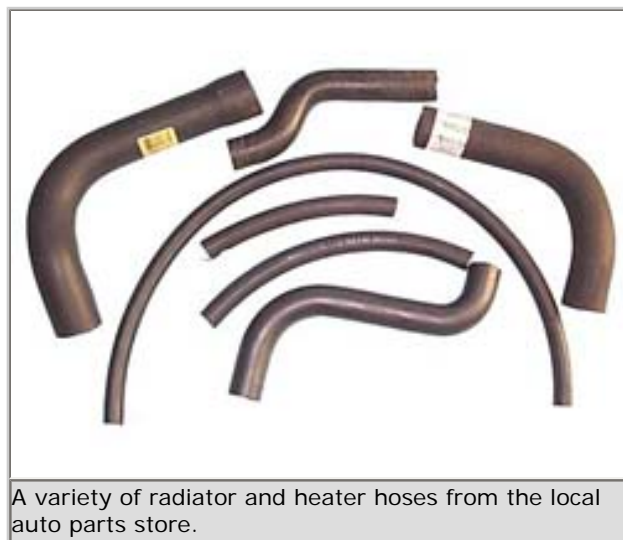
Original equipment water pump assembly showing stripped drive gears.



This daily-driven 99 turbo has been running an EWP for over three years.

## Parts List

1. **Davies-Craig EWP Electric Water Pump**
2. **Davies-Craig EWP Controller** (optional)
3. Modified **Saab 99 b-engine expansion tank hose** that runs from the expansion tank to the waterpump cover and includes a heater hose junction.
4. **Metal freeze plug** for the lower waterpump cavity in the engine block. **Dorman #555-093** is a perfect fit.
5. **Expandable (rubber) freeze plug** for the upper waterpump cavity in the engine block.
6. Two **5/8" plastic T-connectors** for the cooling system/heater hoses. Can be found in good auto parts stores.
7. A **plastic "cap"** to seal off the small port on the original waterpump cover. **Dorman #495-100** "bypass cap" is a perfect fit.
8. Several new **hose clamps** and plastic **wire-ties**.
9. Loctite #518 Gasket Sealant.
10. A variety of replacement heater and radiator hose.



## Installation of the EWP

The original waterpump design is a shaft with two seals that fits in a cavity in the engine block. The lower cavity is part of the oil lubrication system, the upper cavity is part of the coolant circulation system. These two parts are normally sealed off from each other when the original waterpump is in place. To allow the external electric pump to function, the original pump and impeller is removed to allow for good coolant flow through the upper cavity. The upper and lower cavities are sealed through the use of freeze plugs.

**Step 1. The Alternator and Intake manifold are first removed from the engine.**

**Step 2. The waterpump cover is removed.**

**Step 3. The original waterpump is removed.**

The original waterpump is removed by means of a special Saab puller. It resembles a standard gear puller. It threads onto the top of the pump shaft and seats on the water pump cover bolt holes. It may be possible to fabricate a puller.

**Step 4. The waterpump cavity is cleaned.**

The cavity is thoroughly cleaned. A long magnet can be used to retrieve any broken pieces of gear if the pump gears sheared.

**Step 5. Install the metal freeze plug.**

A small amount of Loctite 518 sealant is used when installing the plug. The plug is tapped into place using a hammer and a small block of wood. The plug will eventually seat on the lower ridge of the cavity.



The water pump cavity after removal of the original waterpump.

## Step 6. Install the expandable rubber plug

The rubber freeze plug works by turning the nut at the top which compresses the rubber part forcing it outward. It is sometimes easier to start the nut on a work bench, then squeeze it into the cavity and expand it until it is snug. Once installed, the bottom of the plug should be visible through the weep-hole (see photo).



The lower cavity sealed with the metal freeze plug.



The upper cavity sealed with the expandable rubber freeze plug.



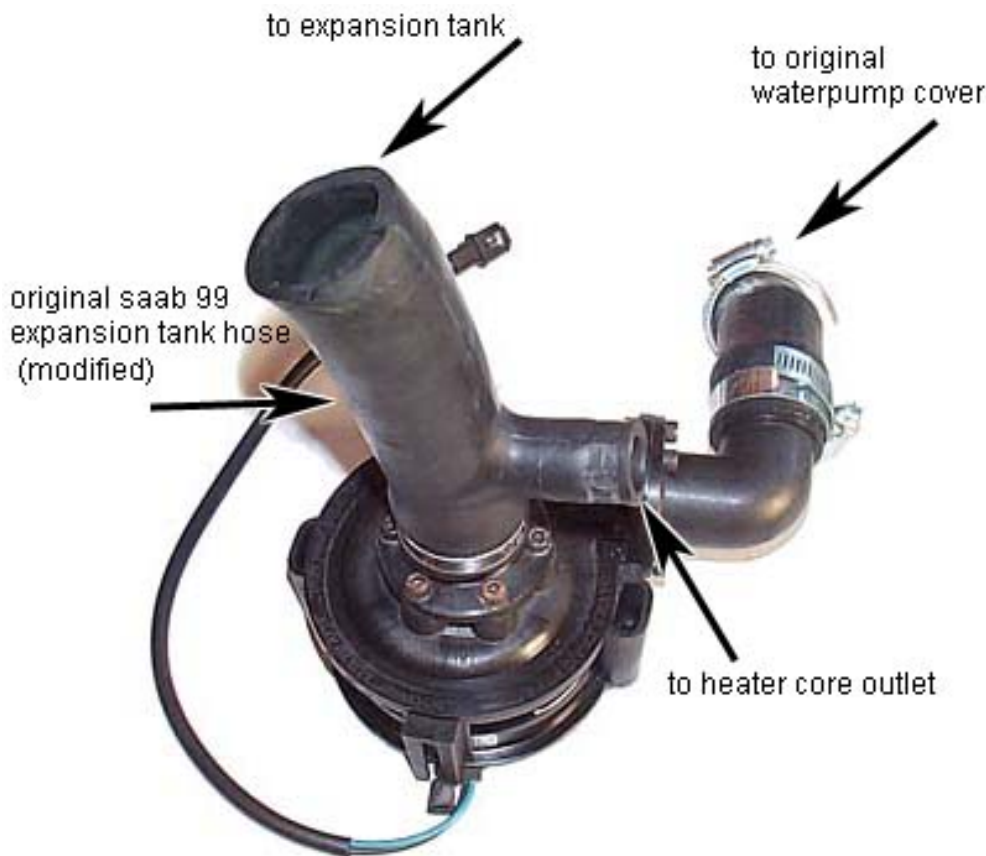
Installed expandable plug visible through the block weep hole.

### Step 7. Installing the waterpump cover.

The waterpump cover is installed using a new gasket. The inlet port on the cover is capped by use of a rubber cap and a hose clamp.



### Step 8. Plumbing the Pump.



Before being installed, the EWP is configured with some attachments and hoses.

This photo shows the EWP configured with an elbow piece on the outlet and a straight piece on the inlet. The elbow and straight pieces come with the EWP.

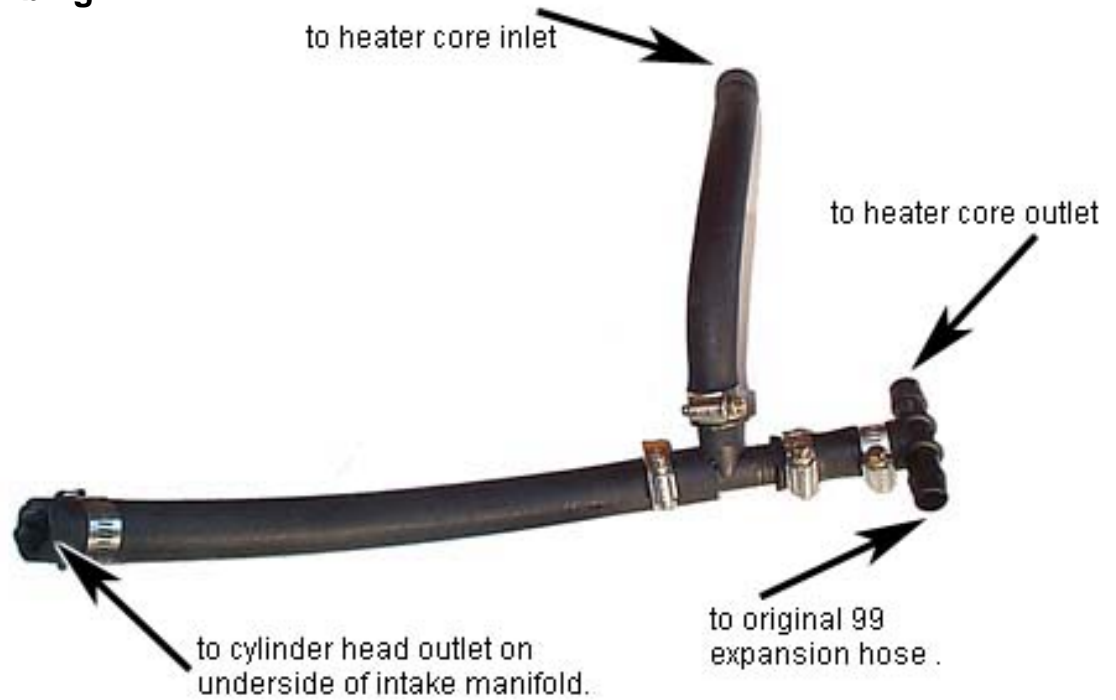
The original 99 hose from the expansion tank is cut and attached to the inlet of the EWP and is oriented as pictured.

A section of standard radiator hose is clamped onto the outlet side of the EWP. This will attach to the original waterpump cover.

## Step 9. Fabricating the Plumbing

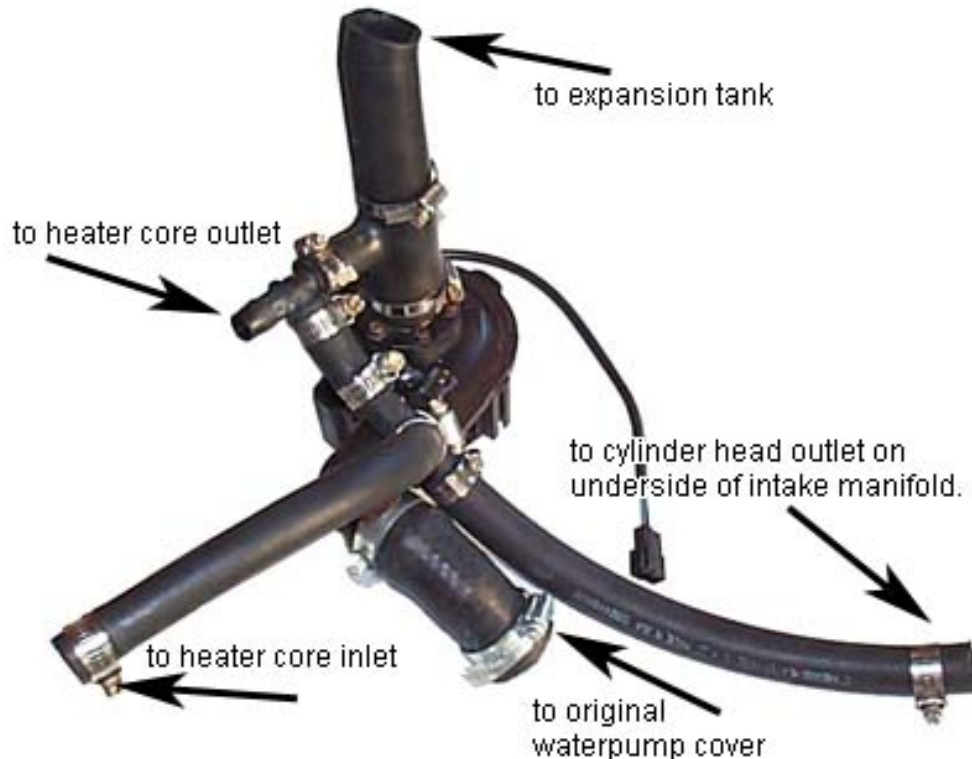
Next, a section of plumbing is created using an 11 inch piece of 3/4" heater hose, a 9 inch piece of heater hose, and a small 2 inch bypass hose coupled with two plastic 'T' connectors.

This section will carry coolant from the cylinder head back to the EWP, allowing some to go through the heater core first.



## Step 10 - Final Plumbing

The assembled plumbing section is connected to the configured EWP as shown in the photo.



The EWP is now ready to be installed.

## Step 11 - Fitting the EWP to the engine

Some of the hose clamps are left loose on the assembled pump and hoses as some fitting is required to get the pump into the right position. Some trimming of hoses may also be required.



Once the pump and plumbing assembly is clamped to the original waterpump cover and heater hoses, the intake manifold and alternator are reinstalled.

This photo shows an early pump mockup. Although the hardware is slightly different, the plumbing is the same as the final version. It shows the EWP in its final position, suspended by its hoses.



This photo shows the EWP partially installed. The intake manifold and alternator are back in place. The two heater hoses are not yet installed.

## Step 11. Wiring the EWP Pump.

The EWP pump comes with a wiring harness and relay to wire the pump for continuous operation. Even if you intend to use the controller unit, it is recommended to connect the pump to run continuously first in order to test the system and work out any bugs. The EWP relay unit can be fitted to the stock Saab 99 fusebox as seen in the photo using an existing screw (arrow).



This location is well-suited as some wiring must be tapped into the adjacent fusebox and battery. The instructions included with the EWP detail how to connect the wiring. The switched ignition lead can be tapped into the wipers fuse in the fusebox. The continuous current lead can be lead through the stock harness and connected directly to the battery positive terminal.



## Step 12. Testing the System



Final Installation.

Once the wiring is complete, the system can be tested. It is important to remember that all tests with the EWP running must be performed while there is coolant in the system. The EWP may be damaged if it is run dry.

It is not necessary to start the engine to perform the first tests.

- The cooling system is filled with coolant.
- The ignition is turned on, but the engine is not started. The EWP motor should be audible.
- All connections are checked for leaks.
- The bleed nipple can be opened until all air has been expelled and the coolant flows clear.
- If no leaks are found, the engine can be started and the temperature gauge observed as the engine warms up.

Once the temperature reaches the middle part of the gauge, the thermostat should open and the upper radiator hose should become hot. The bleeder can again be opened to expel any excess air in the system. Eventually the cooling fans should cycle on and off. If the temperature remains stable, the EWP has been successfully installed.

## Installing the EWP Controller

Installation of the optional EWP control unit includes:

- Modifying the stock thermostat.
- Installing the temperature sensor supplied with the EWP control unit.
- Wiring in and mounting the control box.
- Changing the wiring to the EWP relay.

The stock thermostat is eliminated to allow the EWP Controller to manage the cooling system.

It is not possible to simply remove the thermostat from the b-engine as the thermostat incorporates the seal for the housing cover. So the thermostat is modified by cutting and removing the center section so that coolant always passes through it. It is then reinstalled.

### Step 1 - Remove and Modify the Stock Thermostat

Remove the thermostat housing cover and remove the engine thermostat.

Using a pair of strong clips or a small saw, remove the center section of the thermostat by cutting the 'arms' that go around the spring.

Once removed, only the outer ring and gasket should remain.



Cut the arms where indicated by arrows to remove the center section of the stock thermostat.



The stock thermostat with its center section removed, ready to be reinstalled.

## Step 2 - Install thermostat and EWP temperature sensor

The EWP Controller comes with a temperature sensor that must be installed near the stock thermostat. The sensor will fit inside the Saab 99 thermostat housing.

Thread the sensor and wire that came with the EWP control unit through the thermostat cover then through the modified thermostat, and place the sensor inside the thermostat housing.



The EWP sensor wiring is shown here passing through the thermostat, housing cover and through the radiator hose using the adapter supplied with the EWP Controller. The sensor rests inside the thermostat cover.

Reinstall the thermostat and housing cover with the wiring threaded loosely in place. The sensor simply sits inside the thermostat housing.

Once the cover is bolted down, the radiator hose is reinstalled using the adapter supplied with the EWP controller to thread the sensor wiring out of the hose.



The wiring for the sensor passes through the upper hose by means of an adapter supplied with the EWP Controller.

### Step 3 - Installing and wiring the EWP Controller

The EWP Controller comes with a large wiring harness with a generous length of wire. So the EWP Controller can be mounted in a variety of places in the 99.

Under the dash on the right bulkhead, a large wiring harness passes through the firewall into the fusebox. This is a perfect place to thread in the Controller wiring.

The instructions included with the EWP Controller detail how to wire in the relay, sensor and pump.

It is possible to mount the control unit in the dashboard behind a stock switch opening on the left side. However, this is a tight fit and requires disassembly and modification of the dashboard.

It also may be possible to mount the controller in the glovebox, or under the dash.



A stock look can be achieved by installing the Controller behind some of the extra switch panels on the 99 dashboard.