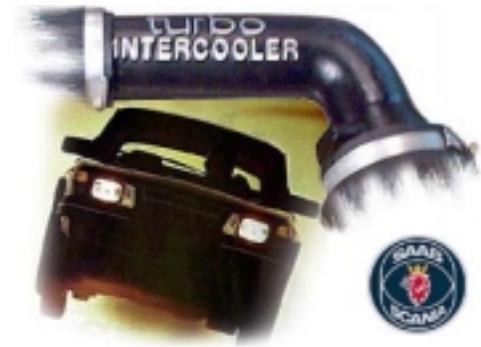


# 900 Turbo 8 Valve Intercooler Installation

(print version)

*by Mark Jeter*

The addition of a 16V intercooler is a proven method of increasing the performance of the 900 Turbo 8-valve engine. The enthusiast with intermediate mechanical skills can complete the installation using ordinary hand tools, ~ \$200 in parts and these instructions as a guide.





# 900 Turbo 8-Valve Intercooler Installation

## Getting Started

The following will be necessary to complete this project:

- A flat well-lit work area.
- A hydraulic floor jack and 2 jack stands.
- An assortment of metric open and close ended wrenches
- Metric socket wrench set.
- Standard and Philips screwdrivers.
- An electric drill with an assortment of bits
- Containers for collecting engine coolant.

## Project description

**Skill level: Intermediate**

**Time to complete: ~20 hours**

**Special tools: None.**



*Before and After: Top photo shows stock 8V Turbo engine. Bottom photo shows same engine after intercooler conversion. 1984 900 Turbo shown.*

Much of the turbo plumbing and intake system is disassembled during this project. Some engine components are relocated and the coolant must be partially drained. New brackets and ductwork is installed which may require some drilling. Here is a break-down of the major issues:

**Eliminate decel bypass system** (manual transmission models only)

The deceleration system is a valve that bleeds vacuum from the intake system when the car is in gear with the throttle closed. This causes the fuel injectors to close during deceleration and reduces exhaust emissions. Eliminating the decel. system will not effect the drivability or performance of the engine however it will effect it's deceleration emissions.



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*The oil cooler in its stock location. Note that the oil supply lines cross directly over the area where the Intercooler will be installed.*



*The oil cooler removed exposing direct path to fresh air from the front of the car and allowing room for the intercooler installation.*

### **Eliminate preheat system**

The preheater system is a simple airbox and hose that allows warm air from the exhaust area of the engine to enter the intake to assist in cold-weather starting/running. There is no data on what effect removing this system may have in very cold-weather startup conditions. This author has never experienced a cold-start issue due to the loss of the preheater.

**Move Oil Cooler** The stock oil cooler must be removed from its position under the left headlight and moved under the right headlight. There are two choices here: The stock oil cooler can be relocated (it's lines must be lengthened) or a 16V oil cooler with 16V lines and fittings can be installed. The stock oil cooler was fitted with longer lines and relocated for this project.

Moving the oil cooler does two things. First, it allows the 900 Turbo 16-valve intercooler to fit in its stock location using stock brackets and ductwork. Second, it allows fresh, cold air from the front of the car to reach the intercooler without having to pass through the oil cooler first.

**Horn** The horn must also be relocated to make room for the repositioned oil cooler.

**Lower radiator hose** It is also necessary to replace the lower radiator hose with one from an early 16-valve 900 Turbo. The stock 8-valve hose will not allow the clearance necessary to fit the intercooler. This will require a partial draining of the coolant system.



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## Parts Checklist



**16Valve Intercooler** 16V intercoolers were available in either aluminum (pictured) or hard plastic. Intercoolers from any model year 900 Turbo, 1985-1993 can be installed. The pieces can be bought used for ~\$200. There were minor differences between years, but in general, intercooler parts from different years are compatible.

**Top Airdam** Two styles of stock airdam: plastic or metal for either the aluminum or plastic version of the intercooler.



### 1985-1987 16VT lower radiator hose

The stock 8V lower radiator hose interferes with the 16V intercooler. An early 16VT hose must be substituted. The 16VT hose has an s-curve where it connects to the radiator. It is important to specify a hose from a 1985-1987 900 16V Turbo, as later years have a junction in this hose for the turbocharger water cooling circuit. A new hose is recommended, about \$40.



**Inlet Pipe** The original 8V inlet pipe is plastic and has a bend in it. Once the intercooler is in place, this pipe will no longer fit. An inlet pipe from a "B engine" turbo, such as a Saab 99T or an early 900T (1979-1981), fits perfectly. It's aluminum, and can be polished to a near mirror finish. Also note the difference in grommets between the two styles. If such a pipe is not available, there are other alternatives, such as using a custom



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## Assembly



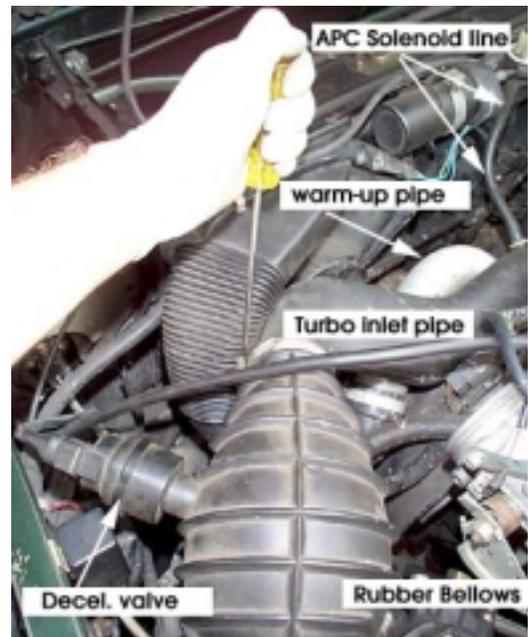
Disconnect the battery cables and remove the battery completely from the car. Remove the turbo-to-intake pipe by loosening the hose clamps screws at the intake manifold and turbocharger. The strap on the intake manifold can be removed and discarded. Stick-shift cars only: Disconnect the wire and vacuum line that runs to the deceleration valve. Trace the vacuum line back to the pressure sensor (bolted to the fuel filter next to the fuel distributor) and remove the "T" fitting from the line, such that the single vacuum line from the intake manifold runs only to the pressure sensor.

Leave the decel. valve wire tucked in the inner fender well. The excess vacuum line can be discarded.



*Circle shows pressure sensor with single vacuum line attached after the T fitting has been removed.*

Loosen all of the hoseclamps on the rubber bellows and turbo inlet pipe. Remove the APC solenoid vacuum line. Pull the deceleration valve from the rubber bellows. Remove the rubber bellows, turbo inlet pipe and turbo grommet. Cover the openings to the throttle body and turbo with plastic to keep dirt from entering. Remove the air snorkel by loosening its hoseclamp and pulling it from the front sheet. Remove the flexible, warm-up pipe by loosening its clamp on the airbox and pulling it from its clamp on the exhaust downpipe. Remove the "flapper box" that is clamped onto the airbox and discard. This is a preheater unit that will interfere with the intercooler installation.





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## Assembly



*Removing the deceleration valve from the airbox. The flapper box has already been removed (Stick shift cars only)*

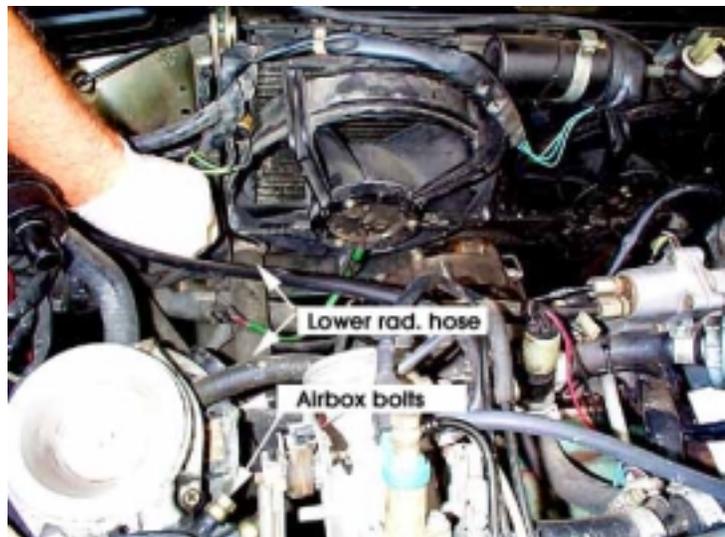
### Stick shift cars only

Pull the deceleration valve from the airbox as seen in the photo, disconnect the wire leading to it, and discard. Find a suitable plug for the hole left in the airbox by the deceleration valve. The hole must be sealed airtight. A plastic plug with RV silicone sealant works well.



*Disconnecting the top of the lower radiator hose from the water pump.*

Jack up the front of the car and place on jackstands. Place a suitable container under the car. Disconnect the lower radiator hose from the radiator by loosening the lower hoseclamp. About 3 gallons of coolant will drain out. Disconnect the top of the radiator hose from the water pump on top of the engine and remove the hose completely by pulling it towards the radiator. Install the 16V lower radiator hose. Use new clamps if necessary. Top up the coolant with fresh antifreeze and distilled water, check for leaks. Remove the jackstands and lower the car to the ground.





## 900 Turbo 8-Valve Intercooler Installation

### Assembly



Remove all of the philips head screws securing the Mixture Control Unit to the airbox as seen in the photo. Now is a good time to replace the air filter!

Loosen the screw on the airbox holding clamp. Get it very loose, so that the airbox can be rotated. Rotate the airbox clockwise about 60 degrees so that the inlet port is facing the engine and will not interfere with the intercooler.



*Loosening the airbox clamp*



# 900 Turbo 8-Valve Intercooler Installation

## Assembly

### Oil cooler removal



Arrows show upper OC screws

Begin removing the oil cooler by loosening the top screws using a combination of extensions and a Philips head as seen in the second photo.

Remove the lower screws from underneath the car. Cars with front spoilers may require some disassembly to reach these screws.



Removing the upper Oil cooler screws



Removing the lower Oil cooler screws

Working underneath the intake manifold, disconnect the wire leading to the oil pressure sensor and remove the sensor to gain better access to the oil cooler lines. Using an open end wrench, remove both oil lines starting with the left most line. Some oil will drip from the lines so keep some rags handy. Remove the oil cooler.



Removing the left oil line. Oil sensor has already been removed.



remove the cooler by manouvering it from the wires under hte left headlight.



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Once the oil cooler has been removed, drain it completely of any oil and clean it out using Toluene (lacquer thinner).

The two lines on the oil cooler must be lengthened. One line must be lengthened to 48" total length and the other to 47" total length. This will allow the oil cooler to be relocated behind the right headlight out of the way of the new intercooler. A local repair shop or auto parts facility should have the equipment necessary to crimp longer oil lines to the existing fittings. The new lines on this project were fabricated by Scanwest Autosport in Seattle, Washington.



While waiting for the oil lines to be lengthened, the horn can be relocated to make room for the oil cooler.



*Horn in its stock location behind right headlight. Arrow shows mounting bolt.*



Mounting the horn in the cavity behind the right parking/turn light cluster using an existing bolt on the fender.

The stock horn is located under the right headlight in front of the battery. Remove the bolt securing it to the radiator frame and remove it and its bracket. There is a single wire leading to the horn. Remove the large bracket on the horn assembly and discard it. Install the horn behind the parking light assembly in the inner fender opening as seen in the photo. Use one of the headlight frame mount bolts to secure the horn to the inner fender.



## 900 Turbo 8-Valve Intercooler Installation



*Lower intercooler bracket holes.*

### Install Intercooler Brackets.

Some 8 valve 900Ts, like the '84 example pictured, are predrilled for the lower intercooler bracket.



*Fitting the lower bracket*

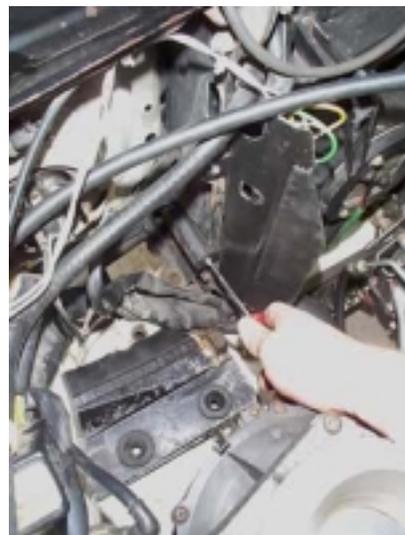


*Showing the side duct mount holes.*

Mount the lower bracket using self-tapping screws.

Remove the metal clip securing the wiring harness to the radiator support and move the harness to the side. Some 900Ts have a radiator support predrilled for the intercooler side duct. Cars without the predrilled holes will require drilling to mount the side duct.

Install the side duct using small bolts or screws. Secure the wiring harness using the clip on the side duct.



*Installing the side duct*



## 900 Turbo 8-Valve Intercooler Installation



*Arrows show direction to bend tabs,*

### **Install Oil cooler**

Clean the inside of the oil cooler using toluene (lacquer thinner). This will remove any built up sludge and increase it's operating efficiency.

The bottom tabs on the oil cooler prevent a clean installation under the right headlight. By bending the tabs down, enough clearance can be achieved to fit it between the radiator support and the inner fender.



*Oil cooler installed between inner fender and radiator support.*

Bend the bottom tabs down. Fit the oil cooler without the lines attached to facilitate installation. This is a very tight fit. Unclamping the wiring harness and moving it to the side helps.

Determining the exact placement of the oil cooler is up to the individual installer. This author chose a "flat" installation orientation which, while easier and neater, does not promote good airflow through the cooler. Mounting the cooler vertically will allow better airflow through the cooler, but may require trimming of the battery heat shield and other custom fitting work.

Thread the new oil lines in a path similar to the one seen in the photo. Loosely fit the oil line connections to the engine and oil cooler. Tighten each one starting with the rightmost engine line. Replace the oil sensor and attach it's wire.



*Installed oil cooler*



*Lengthened oil cooler lines in place*



## 900 Turbo 8-Valve Intercooler Installation

### Install Intercooler and pipes.

On plastic-type Intercoolers, secure the top air dam to the intercooler before installing.



Seat the intercooler into the holes in the bottom bracket. Secure the top air dam into place on the front sheet. Plastic air dams will clip-on, metal air ducts bolt on.



*Installing the intercooler*

Assemble the rubber bellows, Turbo inlet pipe and turbo grommet. Leave the clamps loose.



*Rubber bellows and intake pipe assembled*



Install the Rubber bellows and Inlet pipe assembly. Fit the turbo-to-intercooler pipe and IC to intake pipe as seen in the photo sequence.

Tighten clamps one by one being careful to make each connection as solid and tight as possible.

Replace the battery and the turbo heat-shield.



## 900 Turbo 8-Valve Intercooler Installation

The original 8-valve air snorkel can be bolted to the side fender and attached to the airbox using a piece of the flexible heater hose removed earlier in the project.

Alternatively, the snorkel from a 16V can be employed as seen in the second photo. Double check oil and coolant levels and ensure that all connections are proper before starting the engine.



Test the horn operation.

Warm up the engine fully while checking for leaks. The engine is warmed up when the cooling fans have cycled on and off once. On the initial test drive, accelerate moderately when first using the turbo. Bring some tools such as a flat head screwdriver in case a turbo hose unseats itself. Gradually work up to some full boost runs. The oil cooler thermostat opens at 167 degrees Fahrenheit.

In order to check the operation of the oil cooler, the engine oil should be brought to this temperature. A run at highway speed is in order. This will also allow an opportunity to gauge any performance differences with the new intercooler.

Make some full boost runs at highway speed in fourth and fifth gear for about 1/2 hour. Check the oil cooler lines and attachments carefully for leaks after the run. Also check oil and coolant levels after cool-down.

A drop in maximum turbo pressure may be apparent during this test drive. This is due to a ~2 p.s.i pressure drop through the intercooler compared to the stock aluminum pipe. It may be necessary to adjust boost pressure on the turbocharger if this is the case. APC-equipped turbos, instructions on setting up base boost can be found [Here](#). Non-APC equipped turbos, the maximum charging pressure may need to be adjusted.

Consult the haynes manual for this information. A drop in maximum turbo pressure may be apparent during this test drive. This is due to a ~2 p.s.i pressure drop through the intercooler compared to the stock aluminum pipe. It may be necessary to adjust boost pressure on the turbocharger if this is the case.

Consult the haynes manual or a website such as [www.townsendimports.com](http://www.townsendimports.com) for boost information.

