



Porsche Oil Coolers, Form & Function  
(First of Two Parts)  
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This article, originally written in 1989 has been redone as a retrospective look at the form and function of Porsche oil coolers. Since the original article, I have had additional personal experience and gathered further information about Porsche oil coolers.

The purpose of the article is to provide a basic understanding of oil coolers offered in recent Porsche history, and assist you in coming to the best possible decision, should you decide to add or upgrade a Porsche oil cooler.

My original ventures into exploring oil cooler options proved to be an expensive process for me; it didn't have to be. My overly enthusiastic approach was to gather my data first hand, purchasing and installing the various coolers in a staged process and evaluating their utility on street and track. I don't recommend this approach: Too costly. Do your research thoroughly; you will make the appropriate decision to best meet your needs.

Perhaps you recall the moment you first became aware of shortcomings in your present oil cooling system. For me it occurred on a warm summer day, driving my 911 at a Time Trial. Routine checking of gauges is part of the driving process. While doing my checks, I observed the oil temperature indicator needle had risen well past the middle of the gauge, indicating a very warm engine on the way to becoming extremely warm. For those without numerical indicators on their 911 oil temperature gauge, midway in the scale is approximately 230 deg F.

I wanted that oil temperature to drop, immediately! As an immediate corrective measure, I got out of the throttle, took a cool down lap and brought the car in. Decreasing engine demands did bring the temperature down, but also made serious in-roads into my Time Trial practice.

Should you experience a warm, to hot, 911 engine in heavy traffic, step one, turn off your air conditioner; this may remedy the situation temporarily. However, should oil temperature remain very warm, or continue to rise, consider getting off the well traveled road and find a less crowded surface street where increased speed will help optimize air circulation around your fender mounted cooler, assuming you have a 78 or later 911 SC. Recall that from 1969 through 1977, oil coolers were optional on many Porsche models. They only became standard upon the introduction of the 1978 SC's.

So why the concern with 911 engine oil temperature? How important can it be? After all, the Porsche factory oil temperature gauge in 911 cars delivered after 1975 no longer indicates the oil temperature in degrees. This would seem to indicate that knowing engine oil temperature is not all that important. Can this be true? Not!

Here is what we know for certain: Heat is the major enemy of the air cooled (oil cooled) 911 engine. Excessive engine heat resulting from inadequate oil cooling robs the engine of horsepower and may serve to drastically shorten engine life.

As a possible first step, consider modification of your oil temperature gauge to indicate temperature in degrees, the way it was done on the earlier 911's. Obviously this fix won't cool your oil, but it will let you know your actual engine oil temperature, contrasted to the vague estimate provided by the standard Porsche non-numerical oil temperature gauge.

A calibrated replacement gauge is available from various aftermarket sources for approximately \$60.00 (Performance Products) and is easily installed with a screwdriver once the oil temperature/oil pressure gauge is removed from the dash.

With 1978 to 1989 911's, gauge removal is accomplished by firmly grasping the outer lip of the gauge and rocking it side to side while applying steady pulling pressure breaking it loose from the large rubber grommet holding it in place in the dash. First apply this technique to the tachometer. It has a large surface area and is generally easiest to remove. Once the tachometer is out and set temporarily off to the right, reach in behind the combination oil temperature/pressure gauge and gently press it out of the dashboard. Disconnect the gauge, noting where the wires are to be reconnected. Unscrew the old temperature portion of the gauge and replace with the calibrated temperature gauge. Reconnect the wiring and press the gauge back into position. Replacement of the tachometer completes the job. From this time forward, you will have an accurate indication of your car's engine oil temperature.

What has Porsche done to address potentially excessive engine oil operating temperature? Since the first 911's, they have supplied the 911 engine with an internal oil cooler. Trust me, it is there; you just can't readily view the cooler.

Over the years, Porsche has recognized that excessive engine oil heat must be addressed and produced an evolution of cooling devices. For U.S. cars delivered since 1969 and through the 1989 Carrera, Porsche has offered four different styles of oil coolers, either installed as an option, or included as standard equipment. The open aluminum radiator available from 1969 to 1972, the loop cooler (Often referred to as the trombone cooler because of it's trombone like shape.) from 1973 through 1983, the 28 tube brass cooler first introduced to the U.S on the 1984 Carrera, and the shrouded aluminum cooler delivered on the 1985 Carrera, with an "active" fan added to these coolers in the 1987 through the 1989 Carrera model run.

The first aluminum radiator coolers, available from 1969 through 1972, are located in the right wheel well, exposed to the elements. As a result, the radiator is subject to corrosion and could potentially be damaged by road debris coming off the right front wheel. These factors led to the demise of the open aluminum radiator and the birth of its replacement, the loop cooler first appearing on the 1973 911S.

U.S. delivered 911 SC's, from 1978 through 1983 have the loop cooler. This system consists of the initial flexible hose connections from the engine connected to tubing running forward to a thermostatically controlled valve located in the right rear, wheel well. When the proper oil temperature is reached (approximately 182 deg F.) the valve opens, and the pressurized warm oil is routed forward through tubing to the loop cooler mounted in the right front fender well, ahead of the wheel. Once at the loop cooler, the oil is pumped vertically to the top of the cooler, making a 180 degree turn, falling to complete another 180 degree turn upward, around and down to complete the cycle.

Once the loop cooler cycle is complete, the cooled oil is redirected rearward through a brass lines to the engine, passing again through the thermostatically controlled valve, and making the final connection to the engine using flexible tubing.

Both the aluminum radiator and the loop cooler are "passive" in the sense that the coolers perform their function by passively transferring heat from the oil pumped through them into circulating air. There is no fan directing air to optimize the process. Passive coolers denied circulating air, such as when sitting in traffic on a hot day, lose their efficiency.

The 1984 U.S. Carreras were delivered with a "passive" 28 tube brass radiator first seen on

the 1980 R.o.W.(Rest of World/non-US) SC's. 1985 and 1986 911 U.S. models were delivered with a "passive" shrouded aluminum radiator, as well as front bumpers incorporating a notch in the right lower corner, added for the purpose of providing increased air flow to the radiator.

1987 to 1989 U.S. cars come with an aluminum style radiator, complimented with a powerful electric fan placed at the front end of the radiator. The fan, transforming the "passive" radiator into an "active" unit, is energized when a thermocouple device built into the top of the radiator senses oil temperatures reaching 118 deg C. (244 deg F). Bruce Anderson suspects the thermocouple triggering device is set high as the fan generates it's optimal cooling with the oil in the radiator at these higher temperatures.

Next time I'll discuss options and alternatives to the stock Porsche factory oil coolers. Until then, stay cool.

### Porsche Oil Coolers, Form & Function Part 2: Cooling Alternatives Martin Schacht

Potentially damaging Porsche 911 oil temperatures (Greater than 230 degrees F.) are especially noticeable if you drive in heavy traffic, or are a regular Club Racer, Time Trial or Slalom participant, especially in the summer months! What are your options if you have a 1974 through 1989 911 and you want to seriously address excessive engine oil temperature? It may depend on whether you subscribe to the dictum that factory parts are the only alternative, and aftermarket products suspect.

For those pre-1985 911 owners feeling that Porsche factory parts are their only option, you have an alternative from the Porsche factory that will optimize oil cooling on your car over your present set up, the 1987 to 1989 Carrera oil cooling radiator system. Out on the road (And track) there are thousands of 1987-1989 Carreras and their oil coolers out there. The "active" cooler, with fan and a protective shroud enclosing the radiator, work well. But does it work well enough across the varied applications we drivers put our cars through, street, autocross, Time Trial, Club Racing? It depends.

Let's first look is involved in an installation of the 87 to 89 Carrera oil cooling system to an earlier car. The Carrera "active" radiator, as you would expect, is mounted directly behind the headlight in the right front fender of your 1974 or later 911. For 85 and 86 Carrera owners, with some minor modification involving factory brackets and a wiring loom, your oil radiators may be retrofitted and converted to "active" by incorporating the high output oil radiator fan introduced with the 87 Carreras.

For owners of 1974 through 1983 911's wishing to install the 87 Carrera cooler and maintain the "old style" spoiler with the exposed fog lights, simply have the 1987 Carrera oil cooler mounting tab fabricated and installed on the upper right side of the spoiler. Depending on the year of the car, a radiator mounting bracket may need to be fabricated and attached to the back of the right headlight tub; it was necessary on my 1980 SC installation.

Also, if the Carrera radiator to function to it's full potential, it needs maximum airflow. On 1984 and earlier cars, "notching" the right underside of the front bumper is recommended resulting an increased airflow to the radiator. In addition, the horn must be relocated to accommodate the Carrera cooler; factory brackets are available.

Should you wish to update your 1978-83 SC to the 1984-89 Carrera front end "look", replace the 1974-1983 valance with the 1987 Carrera valance. This valance has the recessed fog lights introduced in 1984 and the necessary mounting tab for the cooler. You will have to fabricate the tab if you stay with a 1986 or earlier valance. Also, a 1984 or later Carrera style windshield washer container will be needed. The pre-84 bottle is too large and won't fit.

A caution for Porsche 1974-77 Porsche 911 owners contemplating converting a car delivered without a factory loop cooler. You will also need to purchase the hardware to get the oil from the engine to the cooler in the right front fender. This includes multiple sections of brass pipe as well as a right rear wheel well mounted thermostat that activates the cooler circuit when oil temperature reaches approximately 182 deg F. Note, a significant amount of heat transfer (cooling) is provided by the pipe which is lost if rubber lines are substituted.

Once the Carrera cooler is installed, another option to consider involves the wiring of a dash mounted override switch for the oil radiator fan. It now becomes your decision to activate the cooler fan rather than having to wait for the factory thermocouple to activate the fan after oil temperature reaches 244 deg F. (Ouch, that's hot!). With manual override, you must not forget to turn the fan on, that would be very un-cool.

Parts for the conversion to the "active" Carrera cooler are all factory. In my experience, the oil radiator with fan and shroud will cost from \$500 to \$1,000 depending on whether you buy new or used. The Carrera 1984-86 valance is available used for about \$200 and you must add a mounting tab to the right side. New, the 87 Carrera valance is about \$275. Budget another \$200 to paint the valance. The fog lights can be obtained for about \$250 a pair, or you can wait and install them later.

The remaining mounting brackets, hardware, relays, fan control harness, etc. will cost approximately \$325 including about \$80 for the new Carrera windshield washer bottle. Bottom line, your looking at a minimum of \$1,500 in factory parts assuming you do all the labor yourself. The cost of the Carrera factory oil cooler conversion is similar to what you could expect to pay for a high quality aftermarket "Ruf" spoiler with hardware, cooler and paint.

Concerning the labor: I had the conversion work on my 1980 SC, including addition of the override switch and wiring of the fog lights, fabrication of the upper cooler bracket on the rear of the headlight tub as well as installation of the 87 Carrera valance and needed windshield washer bottle done at a local Porsche repair shop. It took approximately eight hours. You can save a substantial amount on the conversion job if you choose to stay with your 74-83 valance.

Some questions you may wish to consider, is it worth the expense just for some peace of mind? And, does the 1987 Carrera cooler perform to the point where the investment is worthy of consideration?

To some, me included, the peace of mind factor is substantial. A cooler running engine will last longer and perform better, period! Plus, the upgrade may add to the value of your car should you ever sell it!

Does the active Carrera cooler perform significantly better than the loop or an aftermarket (Turbatrol) fender mounted cooler? In my personal experience on a long summer road trip, as outside the temperature hovered at 95 deg F., driving my 1980 SC on the highway as well over steep grades, with the air conditioning on, the Carrera oil cooler conversion resulted in a dramatic improvement. At no time did the oil temperature exceed 205 deg F.

Previously, in similar situations, first with the loop cooler, and later with an aftermarket (Turbatrol) fender well mounted cooler, the oil temperature gauge crept past the 220 deg F. mark.

In heavy city traffic, the "active" Carrera cooler has demonstrated it can do the job. I especially enjoy having the option to activate the "non-factory" fan override switch whenever I the oil temperature gauge indicates temperatures in excess of 205 degrees F.

What about performance of the "active" Carrera cooler in Slaloms and Time Trials?

On a hot summer day with a one run PCA Slalom course, installation of the Carrera oil radiator with fan will just about guarantee that you'll run out of brakes before you get the oil temperature too high.

Regarding Time Trial performance of the Carrera cooler, I ran a Time Trial at the Firebird International Raceway located outside Phoenix, AZ. Here track temperatures was approximately 90 degrees F. At no time at the event did oil temperature ever exceeded 220 deg. F. Note: at this event, I did have my right front parking light removed for additional air circulation.

Next, consider these conditions encountered in a Southern California summer Time Trial. Track temperatures were between 95 and 100 degrees. I took the car out for the full 20 minutes, and for a few moments toward the end of the session, the oil temperature was up to nearly 250 degrees F., admittedly too hot. Other 911s and Carreras were getting as hot, some hotter, but much sooner and were pulling in the pits to cool down after as few as three laps around the course. At this point, I had made up my mind to replace the Carrera cooler with something better.

By now I had gone through my "purist" phase. I had no reservation about changing the stock outward appearance of the car. I wanted wanting maximum oil cooling for Time Trials and would make no further compromises.

In my experience, the Carrera "active" cooler provides significant, but not the ultimate, reductions in engine oil temperatures. The Carrera coolers work well in heavy traffic and moderately well in Time Trials and Slaloms. However because of my primary interest in participating at speed events, I ultimately went to the next step and installed a "Ruf" type spoiler and cooler.

Before purchasing the "Ruf" spoiler and cooler for my SC, I observed these units in action at several Time Trials. Car with the "Ruf" set up, after 20 minutes of continuous track time, were running cool, seldom exceeding 200 deg F., usually lower. Non "Ruf" cars ran 20 to 30 degrees higher.

For those interested in Time Trials and Club Racing, strongly consider installation of "Ruf" style spoiler with the center mounted oil radiator. Not only will you run cool, you also pick up front air scoops for your brakes. If you have a shop do all the work for you, you could spend approximately \$1,800.

To summarize, my history with oil coolers on my 1980 SC started with the factory loop cooler. With this set up, the car ran too hot for me and I wanted more cooling. Next, I installed Turbatrol aftermarket cooler, which was an improvement but did not provide enough cool under adverse Time Trial conditions.

Subsequently, I installed the 87 Carrera valance with the "active" cooler: Still not cool

enough for my taste. Finally, I installed the "Ruf" spoiler with center-mounted cooler. I had attained the cool I wanted. The trial and error had cost me but finally, I was cool.

Bottom line, if you plan to Time Trial or Club Race your car, take the "Ruf" approach. I must add that the "Ruf" cooler was more than adequate for street driving as well. The only downside is the possibility of having the spoiler mounted cooler punctured in a parking incident. I have never experienced this as I make it a rule to never parallel park a Porsche.

Decide upon your budget and your short term and long term goals for the car. Do it, and do it right the first time.