

Tundra Transmission Cooler Installation

BACKGROUND

Installing a transmission cooler is a good idea, especially if you tow anything. In general, lower transmission fluid temperatures are correlated with longer fluid life and longer transmission life. It is possible to *overcool* your fluid, so cooler selection is very important. There are several different types of coolers, like tube and fin and the stacked-plate design. In general, the stacked-plate design is more efficient, but also more expensive. Will adding a cooler extend the life of your transmission? Probably, especially if you tow stuff around or you aren't changing your fluid every 15K miles or so. If you are towing heavy stuff around, you **NEED** a cooler.

COOLER SELECTION

Generally, coolers are rated according to Gross Combined Vehicle Weight, with larger coolers having a larger GCVW rating. I selected a very large cooler, the Tru-Cool LPD 4590 cooler. It's 12" x 11" x 1 1/2" and it's rated as a 28,000# GCVW. That's big...by comparison, the stock cooler is probably about 5" x 10" or so (my truck doesn't have a stock external cooler, so I'm guessing here).

So, you're thinking that this may be too much cooler for the Tundra, especially when you're not towing anything. The beauty of this particular unit is that when the fluid is cool it bypasses the bulk of the cooling fins through 2 by-pass tubes. As the fluid warms, it thins out and flows through the smaller tubes. You can purchase external thermostat control valves that will bypass the external cooler all together when the fluid is cool. According to Tru-Cool, an external by-pass valve is **NOT** needed with this cooler so long as the cooler is plumbed in *after* the in-tank radiator cooler. The radiator cooler, which is present in all automatic vehicles, will actually pre-heat the trans fluid on cold days.

FILTER

I also elected to install a Magnafine filter. This is an in-line filter with a service interval of 15,000 miles. The stock transmission literally uses a fine mesh screen as a filter. Other makes of transmissions use gauze-type filters. The benefit of the mesh screen is that it can be cleaned as opposed to requiring replacement. The downside is that it isn't designed to pull out the fine clutch disc particles that naturally collect in the transmission over time. I decided to plumb the filter *after* the radiator cooler and *before* the new auxiliary cooler. The logic here is that any debris/contamination in my radiator tank will be filtered out before fluid hits the new auxiliary cooler. But, my guess is that this is really a moot point unless you have had a major transmission failure. In that case, you should flush all lines thoroughly when replacing/rebuilding the transmission.



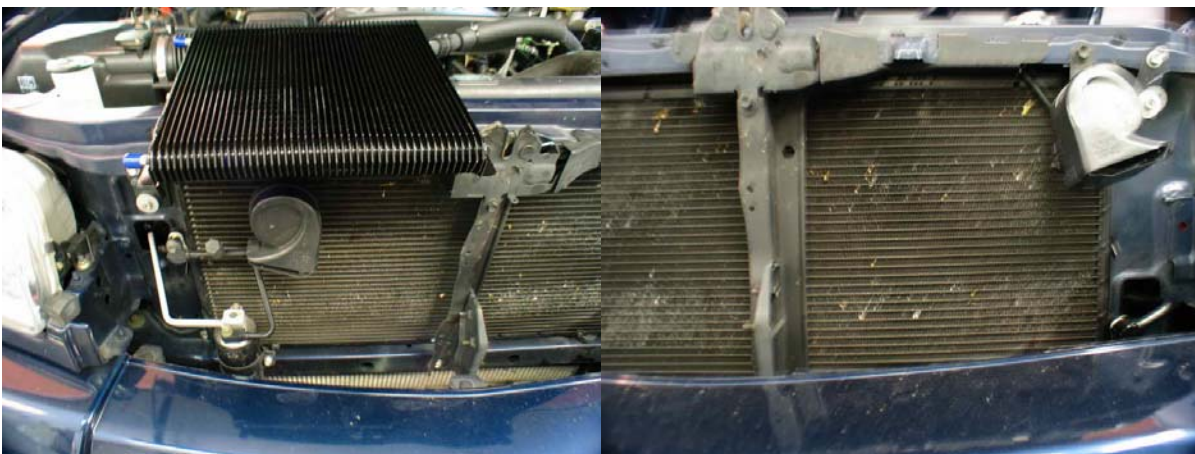
Picture 1: Basic kit components. Note that filter is extra.

INSTALLATION

Installation of a cooler is fairly straight-forward and can be broken down into three key components: mounting, line identification, and line routing.

Mounting

Most coolers will come with an installation kit of some sort. Typically, the kit includes some barb fittings, hose, hose clamps, mounting brackets, mounting screws, and nylon mounting straps. The size of this cooler relative to the size and configuration of the Tundra front end really makes using the nylon mounting straps the easiest and most attractive option. Note that there is a latch support bracket that runs right down the middle of the radiator and the A/C drier and associated plumbing is located on the left side. While I wanted to mount the cooler on the left side (the factory external cooler is mounted on the left side of the center support bracket. Pictures 2 and 3 show the size of this cooler relative to the front-end layout, showing that mounting this cooler on the right side is the only viable option. Also remember that we want the cooler mounted up as high as possible to get the most airflow possible.



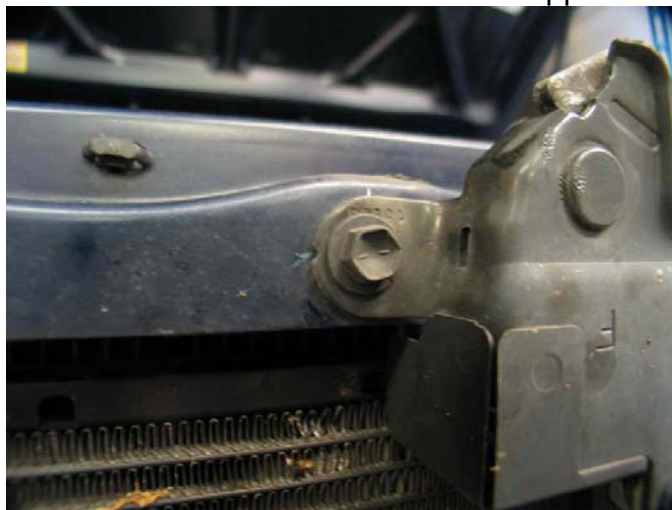
Pictures 2 & 3: Layout of the Tundra front end. Cooler is way too big to fit to the left of the center brace; horn has to be relocated to make mounting on the right side possible.

I really wanted to use the mounting brackets to mount the cooler. That would allow me to keep more room between the auxiliary cooler and the A/C condenser. I contemplated my options and thought about fabricating a mount arrangement, but nothing looked promising so I investigated the nylon strap option. The nylon straps are like big zip strips that go through the A/C condenser fins, through the mounting holes on the cooler, and uses a pad type device to clamp the cooler to the condenser. The disadvantage of this setup is that the nylon straps are one time use only, meaning that if you have to replace either the cooler or the condenser, you have to cut the straps. The good news is that these nylon strap mount kits are available at most auto parts stores.

The nylon straps need to be run through the condenser from the backside of the condenser, which means that we have to unbolt the condenser and tilt the condenser forward. We will also need to mark on the front side of the condenser where the strips need to protrude. Here are the steps.

The cooler has a pair of mounting holes at each corner of the cooler mounting brackets. I put the cooler level with the top of the condenser and pushed a pick through the cooler mounting holes to push the condenser fins off to the side. When I did this for all four corners, I pulled the cooler out and looked for where the condenser fins were disturbed.

1. Unbolt both horns (12mm) and place horns aside.
2. There are two metal covers mounted to the core support using nylon screws (you can see them in Picture 2: one long black piece to the right of center and a much smaller black piece to the left of center).
3. The cooler has a pair of mounting holes at each corner of the cooler mounting brackets. I put the cooler level with the top of the condenser and pushed a pick through the cooler mounting holes to push the condenser fins off to the side. When I did this for all four corners, I pulled the cooler out and looked for where the condenser fins were disturbed.
4. Mark the location of the hood latch release mechanism. Note the two scribe marks in Picture 3. Do this for both bolts on the core support.



Picture 3. Hood latch release mounting bolts on core support. Note scribe marks to allow for proper re-installation.

5. Unbolt the three latch bolts and remove latch (10mm). Do not disconnect the release cable...you don't need to.
6. Remove the 4 bolts holding the center brace to the core support and remove the center brace.
7. Remove the two 10mm condenser mounting bolts located approximately level with the top of the condenser to the outside of the condenser edges (look for a silver bolt with a large washer mounted to a rubber mount).

We can now tilt the condenser forward to get access to the backside (Picture 4). Insert the nylon straps from the backside, making sure that they line up with the marks in the condenser fins made earlier (Picture 5). The installation kit includes 4 foam pads designed to insulate the cooler from the condenser. Slide one pad onto each of the nylon strips. The pads will also help keep the strips in place. Once that's done, reinstall all the stuff you took apart (except the horn on the right side of the core support).



Picture 4. Condenser pulled forward to get access to the backside.



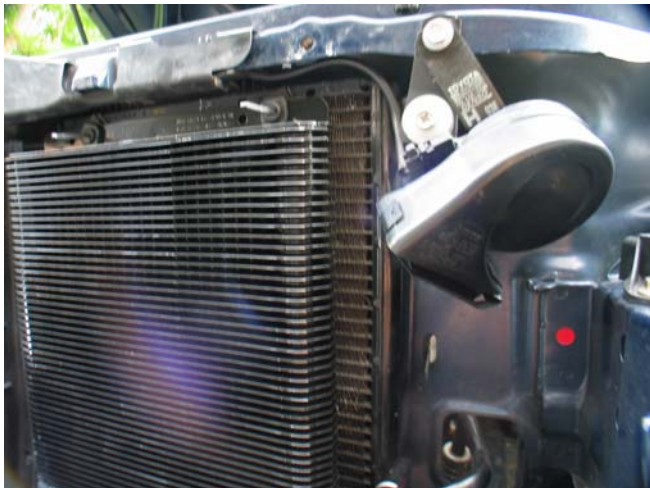
Picture 5. Nylon straps protruding through the condenser fins with foam pads installed. The condenser hardware has been reinstalled, sans the horn on the right side of the core support.

We can now mount the cooler. Notice the small tabs on the nylon strips. You pull the strips and push the tabs. The tabs lock into place, clamping the cooler to the condenser (Picture 6). Trim the nylon strips. Believe it or not, this mounting mechanism is pretty darn stout.



Picture 6. Cooler mounted.

The right horn now needs to be relocated. I moved the horn to the right, but to do so and have the horn fit behind the hood/grill, I had to reorient the horn bracket and bend it back a bit. When you unbolt the horn (the 12mm bolt) and turn it over, you will see a 19mm nut on the backside of the horn. By loosening this nut, you can remove the mount bracket and move it around on the horn (Picture 7).



Picture 7. Relocated horn on right side of core support.

Line Identification

In order to hook up the cooler properly, we need to identify the output and return lines coming from the transmission. On V-8 A340E equipped Tundras, the rear line is the return line. When looking at the factory (non-tow package) trans cooler lines from the front of the truck (from above, looking down between the fan and the radiator), the return line is the line on the left side of the radiator (as seen when standing at the front of the truck). The return line is the line that we need to identify and work with!

If you want to be sure, or you're working on a different vehicle, you can figure out which line is the return line by disconnecting both cooler lines from the radiator (stick them in a can or something) and start the engine momentarily. One of the two lines will be pumping fluid. This is the output (hot) line. The other line is the return (cold) line. We want the return line.

Line Routing

Because we mounted the cooler on the right side of the core support and the trans return line is on the left side, we have a lot of line to run, so much so that I had to go to the parts store and get 4' of 3/8" ID transmission fluid line (make sure to get trans fluid line, not vacuum or fuel line). While you are there, get an additional small hose clamp...we'll need that later.

Disconnect the factory return hose that runs from the radiator to the hard line mounted to the frame. Connect this factory return hose to one of the barbs on the auxiliary cooler. At the end of that piece of hose, connect the OUTPUT side of the Magnafine filter. To the INPUT side of the filter, connect a long piece of rubber line and run it to the left side of the core support and then back to the barb fitting on the radiator. NOTE that the Magnafine filter is DIRECTIONAL. Secure hose clamps at all ends; the factory spring clamp can be used on the radiator barb fitting and the worm clamp in the kit can be used on the filter/cooler ends. We now have the input side of the cooler plumbed.

The remaining barb on the auxiliary cooler needs to be connected to the hard return line. This will require about 4' of hose. Connect one end to the cooler, route it to the left side of the radiator, and back to the hard line. Make sure all of your bends are smooth. Use worm clamps on both ends; the factory spring clamp won't work with the slightly smaller 3/8" hose supplied in the kit on the hard line side of things.

Now, we really need to make sure that these lines don't just flop around. If they do, they can chafe and cause a leak. I love to use zip ties for just such purposes. Down near the filter, I used a line clamp that I had in my tool box to secure the filter line down behind the bumper. If you look right behind the bumper, to the left of center, you will see two mounting points probably used for the factory cooler. I used the 12mm bolt that was used to mount the horn (I moved the horn and didn't need the bolt anymore) to mount my line bracket (Picture 8).

I was worried about the lines chaffing in the area where they bend around the radiator. I made protective sleeves using 3/4" heater hose I had lying around. I cut two 4" or so lengths and sliced them open. I then wrapped these around the cooler lines and zip tied them shut. The sleeves are located where the lines would make contact with the radiator (Picture 9).



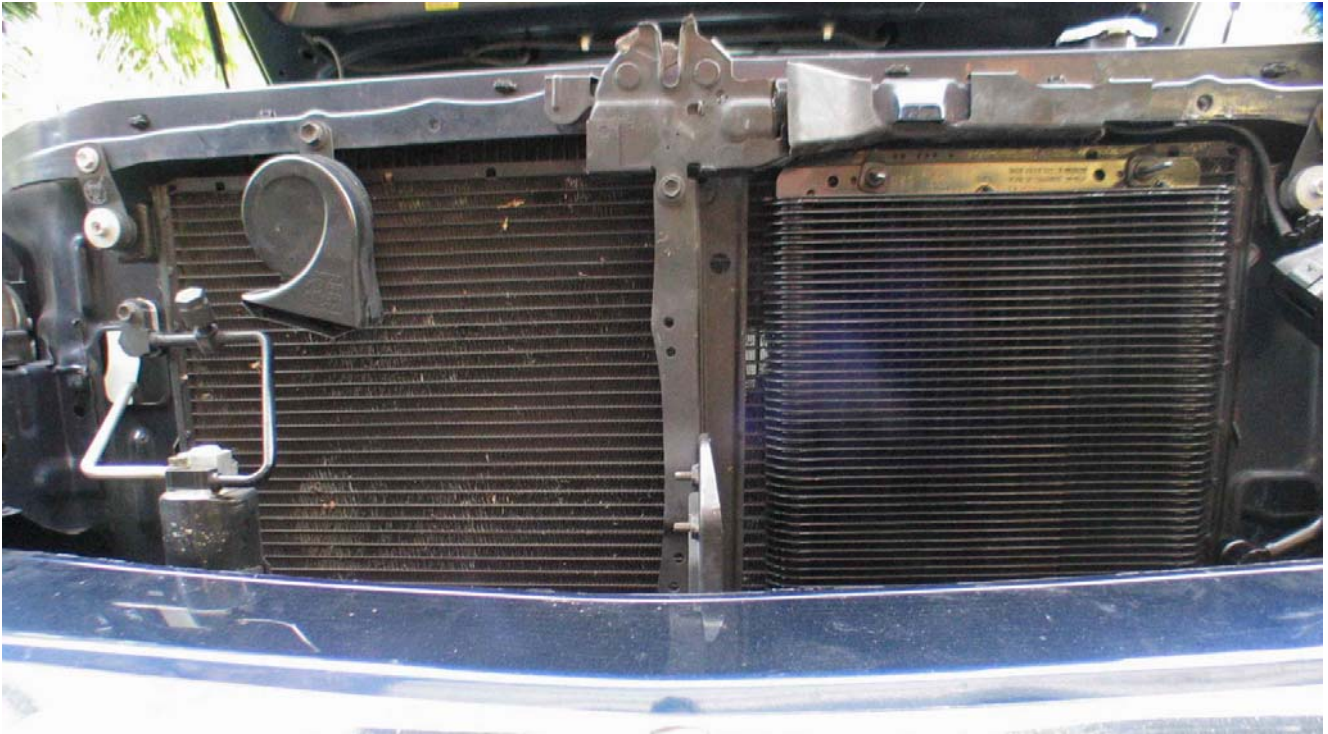
Picture 8. Filter installed right in front of cooler. Note line bracket mounted to factory trans cooler mounting boss.



Picture 9. Protective sleeves on cooler lines as they pass between frame rail and radiator. Note zip ties holding hoses together.

Remember to use zip ties liberally. I used two to fasten both lines to holes in the front bumper support and at least two more to hold the lines together as they route behind the radiator. Make sure that the lines are secure and can't chafe on anything.

Conclusion



Picture 10. Finished installation.

This is a fairly easy mod that anyone can do in a couple of hours or less. Smaller coolers will be easier to mount and if you can mount the cooler on the left side of the core support, you probably won't need to buy additional trans line. Make sure that you top off the transmission fluid given that you will lose a little fluid during the install and the cooler and lines add capacity to your system.

After a quick test drive, the cooler was warm but not too warm to touch. I have no doubts that this cooler will keep my fluid temperatures in line, even under heavy towing. I'm more concerned about the fluid temp being too low, but we'll see.

Take your time and be thorough. Make sure all of the clamps are secure and be neat with your routing. Do not make your bends too tight and remember, if the hose can chafe on something, it will!