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Jeep Cherokee XJ Cooling System Upgrade

Author: [ThePhantom](#)

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Synopsis

This writeup will cover cooling system replacement parts and upgrades. Although these were installed in a 97 XJ, any Jeeps cooling system will benefit from them. The work was pretty straight forward and there were no unexpected glitches or "surprises" encountered. I did take my time though...total work time was about 10 hours, but I stretched that out over two days.

History and Objective

Since I bought the XJ new back in 97, it's always run at around 210 degrees without deviation. Over the last year however, it has started running a little hotter...as hot as 220- 225 degrees, especially in the summer. All this despite the fact that the cooling system has been very well maintained. Because of this I decided to upgrade from the stock 2 row, plastic radiator to a 3 row all metal unit as well as add a transmission cooler. Everything else that was done was based on a "while I'm in there I might as well" attitude.

Parts Acquired



The following is the list of parts that were installed.

- a) GDI 3 row, all metal radiator - obtained from radiator.com.
- b) B&M transmission "supercooler" - obtained from [Jegs Hi-Performance](http://JegsHiPerformance.com) (B&M part #70268 - 19,000 GVW, 11" x 7.5" x .75")
- c) New (not remanufactured) DuraLast Aluminum Water Pump - obtained from local auto parts store
- d) 180 degree, Hi flow thermostat - obtained from [TurboCity](http://TurboCity.com) (Model #640-110)
- e) Hi flow thermostat housing - obtained from [TurboCity](http://TurboCity.com) (Model #640-130)
- f) New viscous fan clutch - obtained from local auto parts store
- g) New coolant sensor - obtained from local auto parts store
- h) New hoses, clamps, antifreeze, radiator cap and serpentine belt - obtained from local auto parts store

The following tools were used for this project:

- Instructions that came with each component
- Factory Service Manual
- 3/8" drive Torque wrench (in/lbs & ft/lbs)
- 1/4", 3/8" and 1/2" drive ratchets, breakbars and sockets in metric and imperial sizes
- Open end and box wrenches (metric and imperial sizes)
- Torx bits
- Screwdrivers (flathead and philips)
- Bench Grinder
- Safety Goggles
- Belt Tension Gauge
- Pipe flaring tool
- Dremmel Tool with wirebrush and polishing attachments
- Mechanix Work Gloves

- PB Blaster
- Anti-Seize Compound
- Thread Sealant Compound
- Hi Temp Black RTV
- Indian Head Gasket Shellac

Teardown

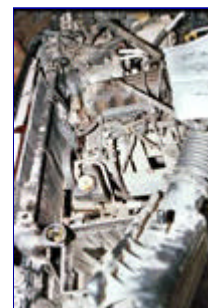
I started by pulling the XJ in the garage and disconnecting the battery. I then removed the grill to give easy access to the petcock so I could drain the radiator (also, it would allow for an easy installation of the trans cooler....more on that later).



After giving it a little while to cool down I removed the radiator cap, attached a hose to the drain, positioned a catch pan and and opened the petcock to let the antifreeze drain out.

*****Never open the cylinder block drain plugs, radiator cap or open the petcock while the engine is hot or the cooling system is under pressure. You're likely to burn yourself. Also, antifreeze is poisonous. Children and animals are attracted to it due to the color and odor. If you suspect a child has consumed any antifreeze, immediately call 911 or your local poison control center. Make sure to dispose of it properly.*****

While the antifreeze was draining, I took the opportunity to remove the electric fan and mechanical fan shroud. Each is held in place by two bolts into the radiator crossmember on top (three of which also hold the overflow hose in place) and by two tabs into a bracket on the radiator at the bottom. For the electric



fan, I disconnected the plug, removed the two top bolts and pulled straight up on the unit to remove it. For the shroud, I removed the bolts, pulled it straight up and placed it over the fan for the time being. Then, after marking where the hood latch lines up, I removed the bolts that hold the crossmember in and removed it. Click on the photo at left for larger image.

Next, I removed the upper, lower and heater hoses. Then it was onto transmission lines. The upper connection was threaded into the radiator, so after applying generous amounts of PB Plaster, a line wrench took it right off. The lower Transmission line was a little different. It was actually molded into the radiator. There was a "quick connect" fitting to connect the line to the radiator. Because of space limitations, there was nothing "quick" about it...but after some cursing it finally disconnected.

Now it was time to remove the radiator. Since the XJ has A/C, there is a condenser that sits in front of the radiator and they are held together on top with a bolted bracket and held together on the bottom with two dowels on the radiator that go through a bracket on the condenser then into dowel holes in the frame. I simply removed the bolts on top and pulled straight up on the radiator to remove it. Then I removed the fan shroud (previously placed over the fan). Now that there was some room to work, it was onto the front side of the engine... Click on the photo at left for larger image.



First, I removed the two bolts holding the thermostat housing on and removed the thermostat. Then, I loosened (but did not remove) the 4 bolts holding on the mechanical fan and the 4 bolts holding the idler pulley on the water pump (Since the belt is holding tension on these pulleys, it's much easier to loosen them prior to removing the belt). Then, after loosening the idler pulley bolt (under the power steering pump), I loosened the belt tensioning bolt until the belt could be removed and followed this by removing the mechanical fan and water pump pulley. Now that all that stuff is off, it was time to remove the power steering pump and bracket. There are three bolts that hold the pump to the bracket and three bolts that hold the bracket to the engine...two to the water pump and one to the engine block. Once these were removed, it was time to remove the water pump. Four bolts and small tap with a hammer later the pump was off. Click on



the photo at left for larger image.

Prep and pre-assembly

Now that everything was apart, it was time to clean it all up for the new parts. After stuffing rags in the water pump and thermostat openings, I used engine brite to clean off all the dirt and grime. Then I used a dremel tool to clean up the mating surfaces.

Next it was time for some preassembly: First, I had to remove the heater hose pipe from the old water pump and install it on the new one. So after I removed it, I put it to the bench grinders wire brush to clean it up and then gave it a few good coats of hi temp black paint. While I was waiting for the paint to dry, I cleaned up all the bolts I intended to reuse on the bench grinder. I then installed the freshly painted pipe onto the new water pump using thread sealant to ensure a leak free fit.

Next, I removed the old viscous fan clutch from the fan by removing the four bolts that hold them together and installed the new clutch on the fan. Easy. I then moved onto the transmission line fittings for the radiator. It comes with plugs in the trans cooler and all the hardware needed in a bag. This took a little thought as to how I was going to run the aux trans cooler lines, but I decided to just set it up to mimic what was on the old radiator, of course, using thread sealant when installing the fittings.

Finally, I installed the new coolant temperature sensor into the new thermostat housing. The threads on the sensor came with sealer already on them, so there was no need to add any more.

Now, it was time to get all this stuff installed.....

Transmission Cooler Install

This was a piece of cake...namely cause I've installed one of these before (actually I've installed 4 of these in various vehicles I've owned). It installs in tandem with the existing cooler (built into the radiator) by going inline on the supply tube from the transmission. So first, I needed to determine which line was the feed from the tranny. On the AW4 (like most Chyco transmissions), the rearward line on the tranny is the feed...which translated to the lower line on the radiator. After figuring out all the



hose routing, it was time to mount the cooler. I installed it in front of the condenser, pretty much right in the middle...which worked out well since it was dictated by hose routing. Click on the photo at left for larger image.

The cooler installs with a sort of zip strip that goes through the fins of the condenser. Pads keeps the cooler from damaging the fins. Click on the photos below for larger images.



After running the hoses into the engine compartment, I attached them to the cooler with clamps and mounted the cooler to the condenser. Then I cut off the quick connect from the old radiator and flared the non quick connect end. I then placed one hose from the cooler over the flared end, secured it with a clamp and snapped the other end back into the quick connect. That's it...the other end of the hose will get connected to the radiator.

Water pump, Thermostat and Serpentine Belt

These are pretty easy too. On the water pump, I applied some Black RTV to pump side of the gasket, put the gasket on the pump and then put RTV on the other side of the gasket. Then, after dressing the bolts with thread sealer and placing them through the pump to hold the gasket in place, I put the water pump on, threaded the bolts in and torqued them to spec. Onto the thermostat....

During the research phase of this project, I came across the TurboCity hi flow thermostat housing. Normally, I look at stuff like this as snake oil...but since I felt that the stock housing was restrictive anyway, I decided to snag one as well as a matching hi flow thermostat. Total cost was less than \$40 shipped and after comparing it to the stock unit, I think it makes a difference....they say pictures are worth a thousand words...you can clearly see how the ported housing is less restrictive and how the new 'stat will allow more flow as well. Click the photos below for larger images.



Anyway, the thermostat has an air vent hole that needs to be at the top. After it was all snug in it's recess and in the correct position, the housing was installed just like the pump...RTV on the gasket, thread sealer on the bolts, torque to spec. Click the photo to the left for a larger image.



Then (just to get them out of the way) I installed heater hoses...one goes to the water pump, the other to the thermostat housing. Next it was onto the serpentine belt...

First, I reinstalled the PS bracket, followed by the PS pump (using anti seize compound on all the bolts) and torqued them to spec.. Next, I installed the pulley on the water pump as well as the mechanical fan getting the bolts snug. Then, after routing the belt around it's proper path along the pulleys, I cranked down on the tensioning bolt and using the gauge, set the belt tension to spec. Then, I tightened all the remaining bolts to spec and laid the shroud over the fan. Onto the radiator install.... Click the photo to the left for larger image.



Radiator and final re-assembly

Pretty much the reverse of taking it out...the trick was getting everything to line up correctly. After lining up the dowels on the radiator, with the brackets on the condenser and the holes in the frame...the radiator dropped in. Then I connected tranny feed line (from the new cooler) using a hose clamp and followed that by installing the lower radiator hose (using Indian Head, of course). Then, after applying thread sealant to the fitting, I attached the tranny return line to the radiator. Next I attached the upper hose and bolted the crossmember back in. This was followed by getting the fan shroud and aux. electric fan tabs to line up and drop in. After running the overflow line back to the radiator the final bolts went into place and the aux fan and temp sensor connectors were hooked back up. At which point I filled the radiator with half Prestone Extended Life antifreeze/half water and installed the new radiator cap.

Then I reconnected the battery, started it up, checked for leaks and topped off the tranny fluid.

In closing...

I could not be more happy with this upgrade. As I stated at the start, the Jeep has always run at around 210 degrees...even in cooler weather. Since doing this upgrade (and driving a few hundred miles now), it has yet to hit that mark...as a matter of fact it runs between 190 and 200 degrees now. That's a 10-20 degree drop...a huge improvement. I would recommend similar upgrades to anyone that owns a Jeep. To the folks with automatics, I highly recommend installing a tranny cooler. Every 20 degrees you lower the transmission fluid temp, you will double the life of the tranny....you can't beat that for \$50 and getting your hands a little dirty.

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