Transaxle Cooling

Posted by AgRacer - 20 Feb 2014 17:43

Has anyone taken advantage of the new rule allowing transaxle cooling?

Ive started to develop a setup and got a quote from one source that included pump, filter, and cooler with fan that scavenges off the drain plug and returns through the fill plug.

The source seemed to agree that its not a lubrication issue for us but rather a heat issue that kills the bearings holding the ring and pinion. He seemed knowledgeable on our transaxles and also made a good point that particles off the LSD clutches can add to wear, which is why he recommended a filter. Any temps over 220-230 were said to be too high, and that's under what some reports on here were saying they were seeing.

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Re: Transaxle Cooling

Posted by joeblow - 09 Mar 2014 12:48

I have been offline for a while and as one of the loudest voices for this new rule I want to chime in.

There are lots of ways to do this, some better than others and as you would guess with differences in cost.

Simple/Cheap Way:

I think the cheapest way to do this is with a tilton or generic electric oil pump and a small cooler. You will need some fittings and lines to plumb it all up. If you run high pressure/temp rubber hose and SAE fittings it will be cheap. If you run AN braided SS hose and fittings it will be more. If the pump is off the transaxle runs as it would stock and as such means you can run the car for a while to get the tranny temps up before you engage the pump. If you turn the pump on right away then you do run the risk of hurting the cooler since the oil is very thick. That being said electric pumps also dont do very well with thick oil. You could hook the pump to a thermostatic switch and make all this automatic so once the oil hits 180F or so the pump comes on. An electric fan for the cooler is usually not necessary as just basic airflow will provide a good amount of cooling most of the time. Cost on the low end is $300.

The Hard/Expensive way:

This entails a multi-pump set-up or at least multi-stage. You can run a gear driven pump off the driveline

of the car (axle or tourqe tube) which has the benefit of matching pump output with RPM and can be a multistage pump (like a dry sump pump). There will be a slight loss of HP but there is also a loss with the electric pump through the alternator. You can still use the Tilton as well but will need two. For this 'high end' setup one pump or stage draws oil from one or more points in the sump of the tranny along with air and aerated oil. The oil is then passed to a drysump tank which separates the air from the oil. The pickup off the tank then has the second pump or stage pull oil out to a multi-discharge return with nozzles spraying oil at the gear mesh points along the tranny (6 points for a 5spd). Critical is the R&P mesh point and to a lessor extent the rest of the gear pack. Nozzle diameter controls the flow to each point. The benefit here is that the oil aeration is controlled and oil is sprayed where it is needed vs all over the place as with a wet sump set-up. Cost $2000

What am I going to run? Well when I was running Hewland gearboxes worth $12000 the $2000 set-up was appropriate. Even though we can get junkyard boxes for $200 the reality is that we all have more than that in these with 5th gears and LSDs and there is always the risk of a catastrophic failure taking it all out. Still I think the high end set-up is way to extreme for my needs. I will be running a Tilton pump with a single pickup in the drain plug, AN fittings with AN stainless lines (for the safety of it) and one well placed return to spray the R&P (I may add one more in the tail cone but not sure yet). The cooler will be a Setrab unit of reasonable size with no fan just some ducting to it and from it. I can do this for $400 or so. It will take me less than a day to hook it all up (If I can fine the time! Still need to do the cage for crying out loud!).

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Re: Transaxle Cooling

Posted by AgRacer - 20 Mar 2014 06:48

Had a trans temp gauge installed at Road Atlanta this past week end. High temps seen on Saturday were in the 180 degree range with high 60s ambient temp and my first time on the track in this car. I was running lap times ~2.5 seconds off the record set by Kuhns last spring, so I wasn't pushing the car as hard as it could be going. Sunday it rained, so the temp data wasn't really of concern.

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Re: Transaxle Cooling

Posted by AgRacer - 22 Mar 2014 13:34

Decided to go racing with the Mid-Atlantic guys at VIR this week end. Afternoon 25 minute race saw ambient temps in the low 70s and partly cloudy. I feel like I was able to drive much harder than last Saturday which may indicate a more realistic temp. By the cool down lap I was seeing temps around 220 after 9 laps. I was mostly driving by myself with occasional traffic.

Did an Australian pursuit race to close the day out. Ran a few laps chasing a Spec E30 and set a new PB time. Temps were closer to 230 by the end of the 25 minute session. Video below showing traqmate internal temp (about 5-10 degrees below actual ambient) and what the trans temp gauge was reading (located next to the wideband on the dash).

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Re: Transaxle Cooling
Posted by AgRacer - 02 Apr 2014 07:27

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added video to the above post.

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Re: Transaxle Cooling
Posted by joeblow - 02 Apr 2014 07:44

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Obviously if you run in 90 deg temps you would expect gearbox temps in the 250+ range. West coast guys can see 100+ degree temps so 260+ with your numbers.

What LSD do you have in the gearbox? Clutch style LSDs increase operating temps significantly with stock units being the worst (due to slippage). I have personally seen 300+ temps in turbo cars (I know different animal but with factory cooler!).

Your numbers will go up as you push the car harder and as the ambient temps go up. I think north of 270-280 and you really need a cooler. Personally I will run one regardless but I think the above is sound advise for the group.

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Re: Transaxle Cooling
Posted by RacerX - 02 Apr 2014 09:31

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AgRacer wrote:

One last COA that I've also seen before is to mount the cooler on the inside of the license plate area between the tail lights, then do the same NACA ducting from the passenger side quarter window. Then you just need to make sure you protect the lines, etc. accordingly based on what the CCR says.

If I'm not mistaken, you can't cut holes between the tail lights to vent the cooler to the outside.

12.8.4 Any opening cut into the unibody for ducting to these units shall be kept to the minimum

dimension necessary, not serve any other function, and not compromise the strength of the unibody. No modifications of the external body panels are allowed for these purposes.

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