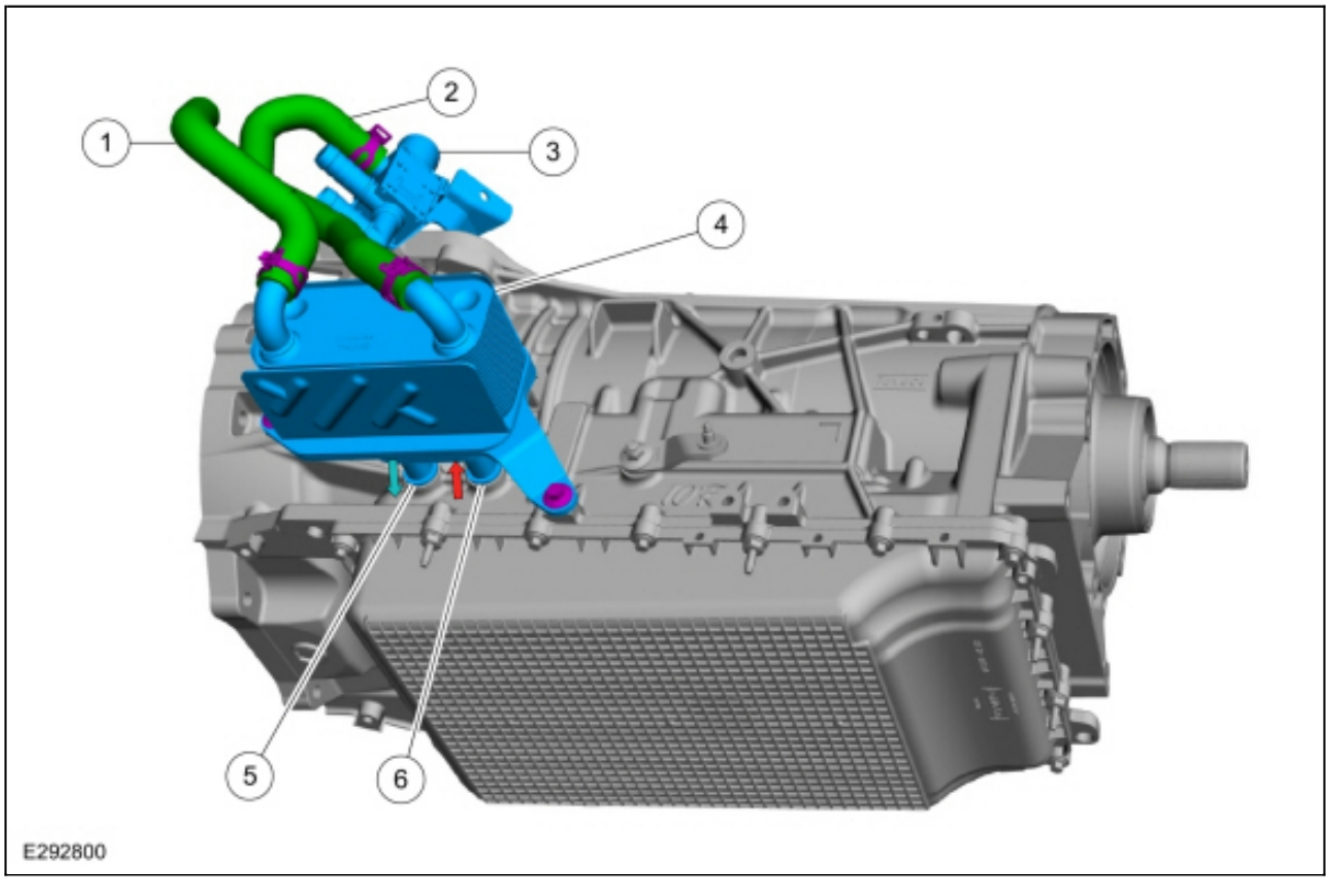
Transmission Cooling - Component Location



Item	Description
1	Transmission fluid cooler coolant outlet tube
2	Transmission fluid cooler coolant inlet tube
3	Transmission fluid cooler coolant control valve
4	Transmission fluid cooler
5	Transmission fluid cooler outlet tube
6	Transmission fluid cooler inlet tube

With the PPE deep pan, 170 deg engine thermostat, and trans cooler thermostat bypassed (because it’s an external electrical component programmed to not allow coolant flow until 195 deg), I average in the low to mid 170’s.

If heat soaked in rush hour traffic on a hot day, coolant temp is 183 and trans temp is 188, but with the aluminum pan radiating heat / increased fluid capacity / radiator fan running, it drops fluid temp back down to 179 very very quickly (like 2 miles down the road at 35mph quick).

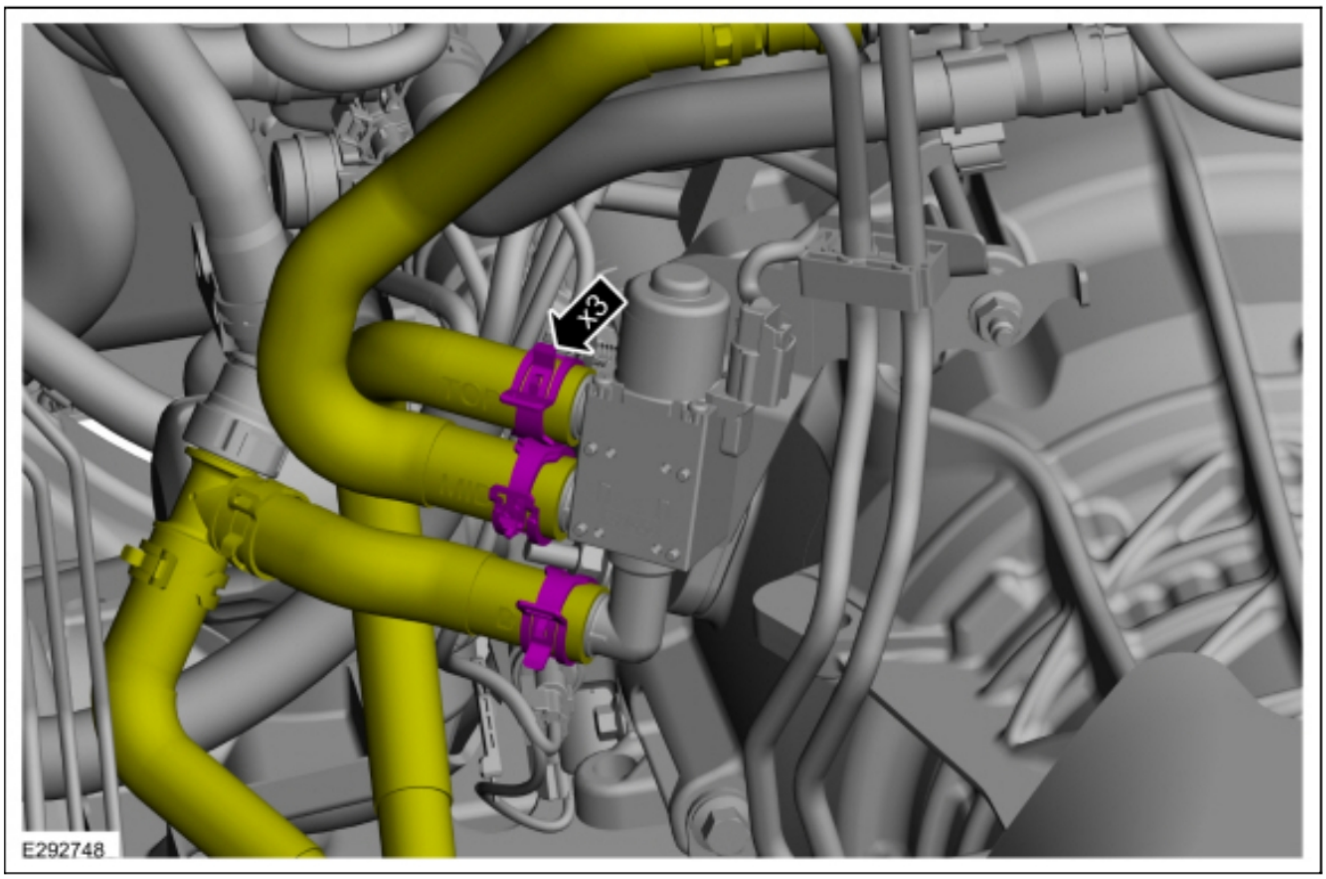
This a good article about 10r80 and info about ideal operating temps here:

https://www.fordmuscle.com/tech-stories/ask-an-expert-10r80-transmissions-with-brady-performance/

There are 3 ports on the external trans cooler thermostat.

I capped all 3 with large rubber vacuum caps and left the electrical plug plugged into it. This allows the ECU to not throw a fault code thinking there’s an issue with the thermostat opening / closing.

Remove the line that left the thermostat port that loops coolant back into the system when it’s bypassing the trans cooler and use a radiator rated rubber cap to cap off the part of the T fitting it utilizes in the main coolant hose tract.



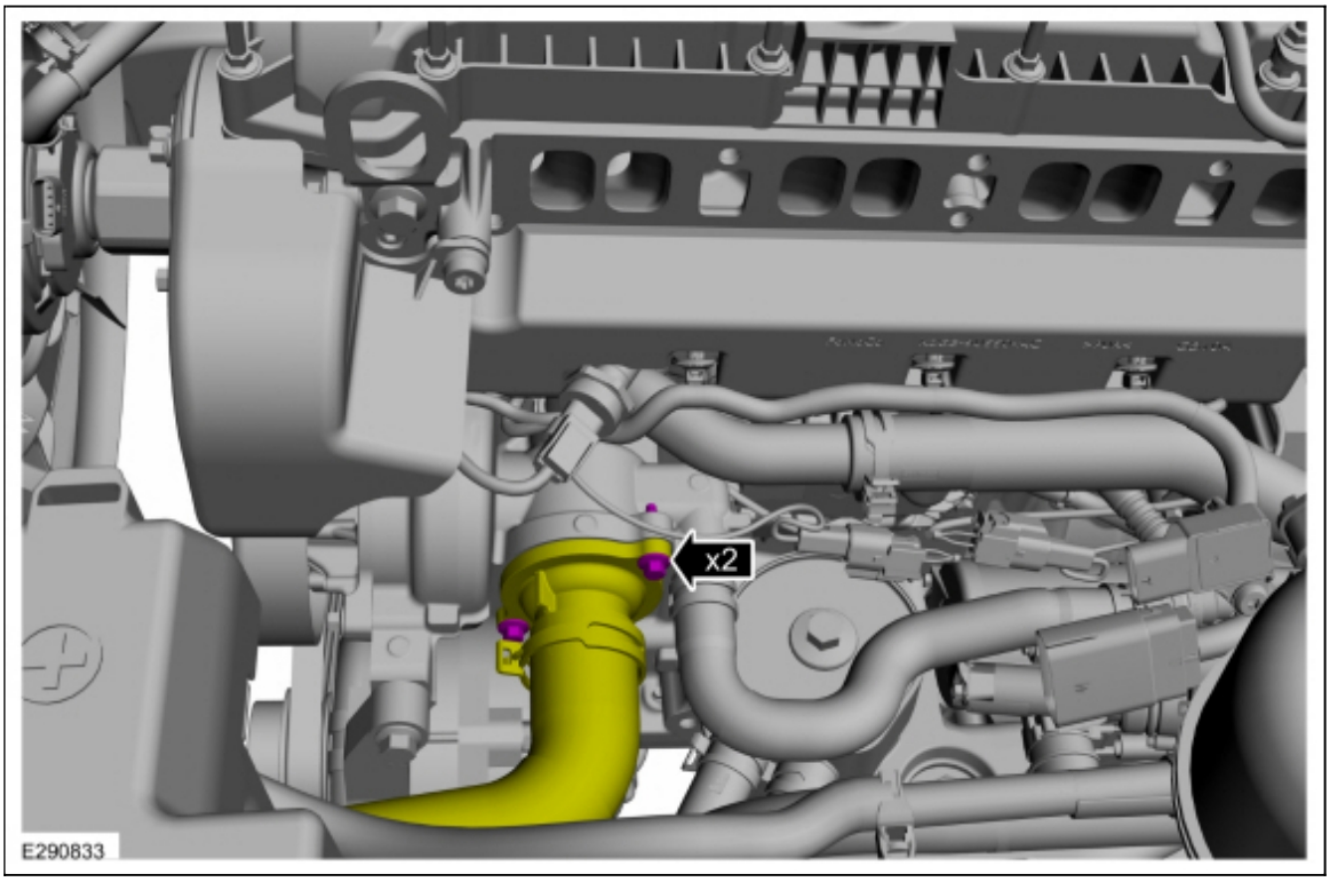
You then connect the coolant feed hose that was sending coolant into the thermostat to the thermostat output hose that leads to the trans cooler. I used a brass barb fitting from Lowe’s to accomplish that.

You need to remove the drivers side front tire and inner fender liner that covers the oil filter to access everything.

Space is tight, hoses are a PITA to get off the thermostat, and you’ll get a coolant bath (which you have to replenish and burp the coolant tank after due to coolant lost), but overall I’m happy with the end result.

Changing the Thermostat

Remove the two bolts below, disconnect hose, replace T-Stat, and reinstall the hose. See picture below.



Thermostat has worked well. I qualify that statement before everyone decides to come here saying that I'm endorsing it incorrectly and how OEM temp is perfect, etc to clarify that the part itself it functioning as intended. Here is the data I've observed scanning with the Ford Performance tune display. Please note for trans temps that the trans cooler thermostat is bypassed (it normally will not flow coolant to the trans cooler until trans fluid temp is 195 deg) and has the aluminum PPE deep transmission pan.

Avg coolant temp - 177 f
Avg cylinder head temp - 178 f
Avg Transmission fluid temp - 176 f

One day I decided to get into the gnarliest stop and go traffic I could for 30 min on a warm day here in GA to see what the temps would be with an extended heat soak.

Highest coolant temp - 185 f
Highest cylinder head temp - 185 f
Highest transmission temp - 188f

I am very pleased to say that without modifying the factory fan to kick on sooner (can't be done from research I could find from Ford F-250's that have similar electric fan clutch as us), the factory radiator does a nice job of dissipating the heat from the coolant and as soon as airflow comes into play when the truck starts to move again temps drop very quickly as well. The truck does reach closed loop with this cooler thermostat, and while I'm confident if I had the all aluminum radiator from Mishimoto I could get right down to 170 consistently, the research I could find on modern Fords said that some emission readiness monitors won't set until an operating temp of 170 is reached. Thus to not have that struggle I'm happy with the results of the stock radiator and 170 deg t-stat (esp considering that this radiator cools the engine, engine oil, EGR exhaust gases, and transmission).

Ask An Expert: 10R80 Transmissions With Brady Performance

April 27, 2022

When it comes to modern transmissions, most owners view them as pure mechanical sorcery. It's a rarity for a 10R80 to be rebuilt by the DIY mechanic. While the ability to make big power comes easily on a Coyote-equipped S550 Mustang or F-150, the ability to hold that power begins to diminish when forced induction is applied. We sat down with Johnny Brady of Brady Performance to gain some insight into the magical 10R80, where its boundaries are, and what you can do to make your 10-speed transmission last.

Ford Muscle (FM): The 10R80 transmission has been touted as the ultimate transmission by modern Mustang lovers, but what parts do you see failing?

Johnnie Brady (JB): The parts that fail the most on the 10R80 are the E and F clutches. The E and F clutches are the overdrive ones and have the least amount of torque multiplication, and this makes them inherently the weakest.

FM: Is there anyone that makes a better clutch pack to resolve this issue?

JB: I like the way Suncoast Performance does its rebuild kit using Raybestos Powertrain GPZ frictions. Instead of thinning the steels, Suncoast Performance is machining the drum to allow you to run its thicker-than-OEM steels, and still have room for one additional friction and steel. This process allows the clutch pack to be stronger and last longer. Whereas, if you thin the steels to create room for more, it won't hold up to the heat and will eventually warp.

FM: At what power levels do you start to see these clutches fail?

JB: Stock clutches are holding up to around 700 horsepower. Once you approach the 750 horsepower mark or higher, then I would upgrade the clutch count and rebuild the transmission.

FM: What products are you using to rebuild the 10R80?

JB: We use a Ford factory seal kit, Suncoast Performance steels, Raybestos Powertrain GPZ frictions, and Ford Mercon ULV fluid. I always use the Raybestos Powertrain GPZ frictions, as they're the best for holding the most power. I've seen cars between 1,200-1,400 horsepower running them at the dragstrip with no issues.

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FM: How much does heat play a part in the 10R80's longevity?

JB: Cooling is a huge part of keeping the 10R80 alive and working well. I run a transmission cooler on anything above 700 horsepower. For a more intense transmission cooler, I run the Derale external transmission cooler mounted underneath the trunk with a fan. In most cases, I wire the fan to run continuously, regardless of whether I'm racing or just riding around town.

I also take out the thermal bypass, which lets the transmission fluid get to a certain temperature. The 10R80 works best at 150-160 degrees –anything cooler and the transmission gets finicky. With the thermal bypass removed, the fluid is allowed to flow all the time and is essentially creating a cooling process.

FM: Is there anything else you remove or replace?

JB: I would also look into replacing the valve body. The valve body is a big problem on the 10R80 because solenoids in the valve body are magnetic. The magnetized components get metallic friction material stuck to them when the plates are wearing down. This starts to cause issues and the solenoids stop working like they should, as it affects pressure, which in turn can burn up a clutch.

I run a Raybestos Powertrain inline magnetic filter with a rare earth magnet that catches any kind of clutch material that would cause issues with the valve body.

FM: Do you have any advice for the naturally-aspirated crowd?

JB: I would stick with the stock clutch count and perform the thermal bypass removal (aka Cooling Mod). When you get into forced induction, then you upgrade the clutch count.

FM: What is your break-in procedure?

JB: I tell everyone to drive the car 500 miles with stop and go driving added in the mix to get the proper heat cycles in. You don't want to install the new clutches and immediately make your way to the dragstrip. Before the test drive, I perform a transmission relearn and recalibration; this allows the transmission to learn itself again. At first it will shift rough, but will smooth out as it relearns.

As you can tell, the 10R80 is a solid transmission, but can be a lot stronger with the right modifications. Replacing the clutch pack, performing cooling modifications, and properly breaking it in can lead to a long life, even with high horsepower.

We wanted to dive a little deeper into why the GPZ frictions come so highly recommended from transmission builders and aftermarket manufacturers. So we went directly to the source to gather more intel. We reached out to Raybestos Powertrain Marketing Manager, Nick Truncone to further fill us in on its GPZ frictions and its capabilities.

FM: It's becoming obvious that the GPZ frictions seem to be well trusted in the automotive industry. Product supplies use them for its kits and transmission builders make them a must have for install. What can you tell us about the origins of the Raybestos Powertrain GPZ frictions and why they handle high-horsepower builds so well?

Nick Truncone (NT): The GPZ frictions have been proven for years in other transmissions, it's not something that was created just for the 10R80. We've seen it more on the towing side of things, as it was originally intended for the diesel truck applications that had high torque, horsepower, and heat. We moved onto the racing side and have had great success with that, as well.

FM: Have you seen the horsepower limit of the GPZ frictions?

NT: We've had clutches back from a transmission that had over 40 passes on it in a car that made 1,543-horsepower on the dyno, and 1,100-horsepower on the track. We know it can handle the abuse. However, most of the feedback from our transmission builders is that the standard clutch count using the RGPZ-268 kit can hold around 1,000 horsepower. After that is when everyone wants to start adding extra clutches and machining steels to increase holding capacity.

FM: What is the recommended fluid to be used after a rebuild and any thoughts on proper break-in procedure?

NT: We recommend only using the OE fluid. We design the GPZ frictions around the fluid that came in the transmission. We also recommend the relearn procedure to make sure there are no shift issues occurring.

If someone you know or love is suffering from clutch slippage, Raybestos Powertrain GPZ frictions may be the right answer. Ask your transmission builder today if Raybestos Powertrain GPZ frictions are right for your combination. Common side effects include increase holding capacity, less torched overdrive clutches, decreased quarter-mile times, and a lot more smiles. In all seriousness, as high horsepower builds continue to dominate the race track, your clutches need the ability to keep up. Instead of hoping the clutches will sustain the abuse of drag racing, think of Raybestos Powertrain as preventive maintenance saving you from a tow truck off the strip.