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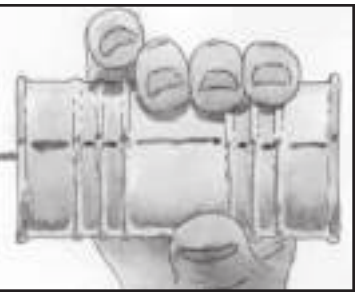
INSIDE: ***Technical Topics:*** *Oil Analysis/Oil Change Interval*

Member 2 Member



I think you will agree with me when I categorize Turbo Diesel owners as independent people who are not afraid to try something new. You are an ingenious membership who reinvents and improves a product to make it better serve your needs. You show a strong willingness to share your shadetree solutions. With your input each quarter, we publish the "Member2Member" exchange to give you a forum to tell other members how you solved a problem.

In this issue we've got a write-up by TDR writer John Roberts about lubricants for the G56, six-speed manual transmission used in '06-current model year trucks.

FLUIDS IN YOUR TRUCK/G56 GEARBOX LUBRICANT

by Robert Patton and John Roberts

Since day one of the TDR we have preached that you should use the correct fluids in the day-to-day maintenance of your vehicle. Over the years this philosophy has given us ample subject matter. In the past we have: done several exposés about "the best lube oil"; many editorials on snake oils and additives; countless articles on diesel fuel, bio-diesel fuel, fuel additives, and premium diesel fuel; several articles about the correct coolant; close examinations of brake fluid and the department of transportation (DOT) codes that spell-out brake fluid temperature performance; cussed and discussed specialty lubricants for manual gearboxes; and looked at the lubricants for the two differentials (Dana '89-'02, American Axle '03-newer) that have been offered by Ram. Whew!

Looking up all of those reference magazines and pages was quite an exercise. The chapters and verses for TDR information on all of these fluids are listed at the end of this article.

As the moderator of a membership group I have seen owners question the factory's recommendations. However, I've yet to see us uncover a rationale or a product that "meets or exceeds" the printed factory recommendation. Wait—don't take that at face value—I'm well aware that a synthetic lubricant meets or exceeds a mineral-based lubricant in a cold flow/high temperature stability test. I'm talking "meet or exceeds" with documentation showing why some other fluid should be substituted.

So, what's new in the world of "fluids used in your truck?" How 'bout this: Since 2006 the manual transmission used in our trucks is a six-speed unit known as the G56. Looking through the truck's Owner's Manual we find that the recommended lubricant is Chrysler ATF+4.

Is ATF+4 the best lubricant for your G56?

TDR member Clark Fish forwarded me a report from writer John Roberts that looks at the G56 lubricant. Just as we have done in past lube oil articles, Roberts sent the lubes out for analysis and reported his findings at his web site www.carbonitecummins.com. I contacted Roberts and offered payment for using his article in the TDR. Without further delay, here is what he found.

The G56 Lubricant Comparison

by John Roberts

The G56 is a six-speed manual transmission found in 2006+ Turbo Diesel trucks. The transmission is manufactured by Getrag, which is the largest independent manufacturer of transmissions in the world. Initial applications of the G56 were in Mercedes midrange trucks in the European market. In its factory configuration from Chrysler, the transmission utilizes a dual mass flywheel with a single disc clutch and is filled with ATF+4 automatic transmission fluid.

When increasing the power of the engine, it is very common to perform a clutch upgrade. Most aftermarket clutches utilize a standard single mass flywheel. A problem with the single mass flywheel is that it now transmits all of the harmonic vibrations from the engine directly into the transmission. This results in gear rollover which sounds like a "growling" noise in the transmission at low RPM, high torque situations. This is especially noticeable in 4th and 5th gear.

While trying to remedy this annoying situation, a lot of research was done on alternatives to the prescribed fluid. In this research, I discovered that Mercedes-Benz (remember the Daimler influence at the Daimler-Chrysler in the years, '98-'07) does not use ATF+4 in this transmission. ATF+4 is something that Chrysler decided was acceptable to use in the G56 transmission. After all, for purposes of warranty it is a Chrysler item. ATF+4 is already stocked at every dealership and it is less expensive than the recommended oil. From my research, Mercedes-Benz requires 75W/90 oil that meets their 235.13 specification. This specification references an oil called "Vollsynth" which is available in Europe, and an oil called MobilTrans SHC DC which is available in North America.

MobilTrans SHC DC is a 50-weight manual transmission oil from the Mobil company and is very difficult to obtain because it is not stocked in very many places and must be special ordered. I was able to identify a retailer that stocked this oil. This led to more research to find a suitable substitute to use instead of the MobilTrans SHC DC.

Two potential substitute oils are thought to be the recommended fluid for the G56 transmission. These oils are the Mobil Delvac Synthetic Transmission fluid 50 and Pennzoil Synchromesh fluid. Both of these oils claim to be suitable for use in the G56, but as we all know, all oils are not created equal. This is what led to my oil analysis comparison. These three oils were sent to Blackstone laboratories for a side-by-side comparison along with the ATF+4.

Sample #1 –
Chrysler OEM ATF+4, MS-9602

Chrysler ATF+4 is produced by Petro-Canada Lubricants Inc. to Chrysler specifications. This is the fluid that comes pre-filled from the factory in the G56 transmission. It is the only fluid authorized for use by Chrysler. It is a standard ATF+4, nothing fancy about it. It can be purchased at numerous retailers. ATF+4 is bright red and smells just like every other ATF. The Product Data Sheet (PDS) and Material Safety Data Sheet (MSDS) of this oil can be found in the expanded report at my web site, www.carbonitecummins.com.

Sample #2 –
MobilTrans SHC DC

MobilTrans SHC DC is produced by Exxon Mobil Corporation. This is the fluid required by Mercedes-Benz for use in the G56 transmission.It states right on the label "APPROVED AGAINST MERCEDES-BENZ 235.13." It is 50-weight GL-4 synthetic gear oil that is hard to find in North America and must be special ordered. This oil is a medium golden brown color and smells almost like engine oil. The MSDS can be found at my web site, www.carbonitecummins.com.

Sample #3 –
Mobil Delvac Synthetic Transmission Fluid 50

Mobil Delvac STF 50 is produced by Exxon Mobil Corporation. The published specifications and the MSDS nearly mirror that of the MobilTrans SHC DC. It is 50-weight GL-4 synthetic gear oil. This oil is a medium golden brown color and smells almost like engine oil. It can be purchased from several industrial supply companies (Grainger) and many semi truck shops that do transmission maintenance. The PDS and MSDS can be found at my web site, www.carbonitecummins.com.

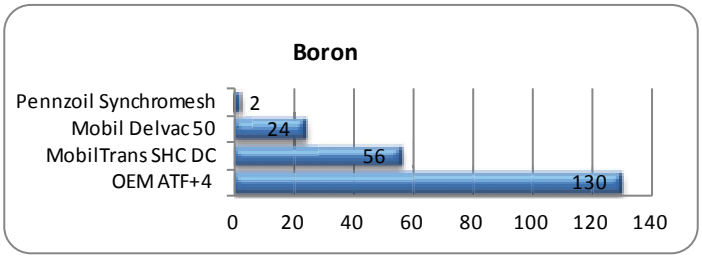
Sample #4 –
Pennzoil Synchromesh Manual Transmission Fluid

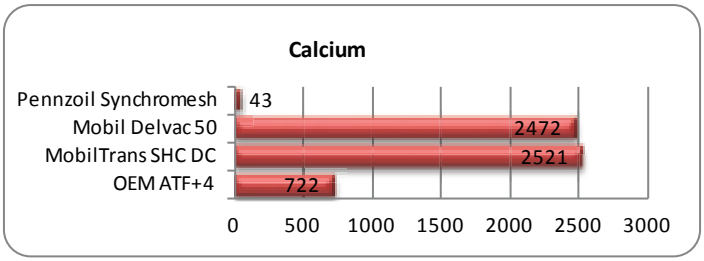
Pennzoil Synchromesh is manufactured by SOPUS Products. It is marketed as being specifically formulated for synchromesh transmissions used by General Motors that require specification #9985648 and Chrysler that require specification MS-9224. It is a light golden brown color and has a very faint (almost nonexistent) oil smell. It can be purchased from various local retailers and numerous online stores. The PDS and MSDS can be found at my web site, www.carbonitecummins.com.

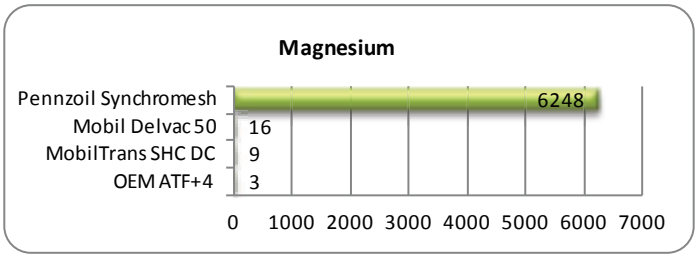
It is the only fluid authorized for use by Chrysler. It is a standard ATF+4, nothing fancy about it.

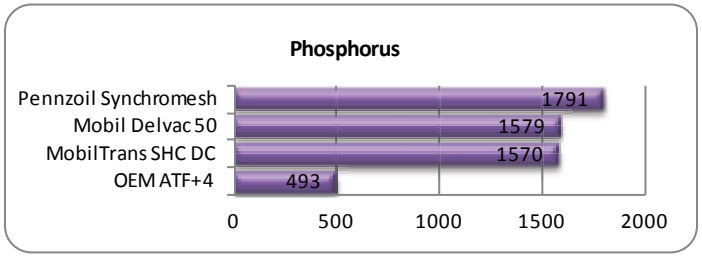
All four of these samples were bottled into individual sample packs, put into a single box, and mailed to Blackstone Laboratories. After a short amount of time, I received the four sample reports with the technical information that I was seeking. The comparison chart shows the composition of each of the four oils.

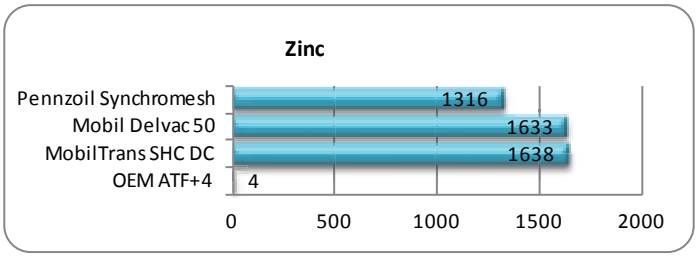
Comparison Charts

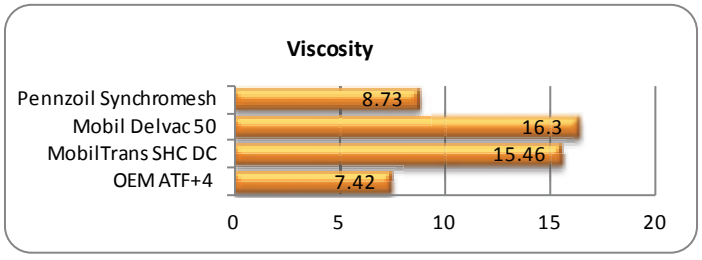












All right, there is the comparison chart; now the following comments are from the folks at Blackstone.

ATF+4: Nothing strange to report in this sample of Chrysler ATF+4. Boron, calcium, and phosphorus are the main additives present. No moisture or insolubles showed up and the viscosity is where it should be for Chrysler ATF+4. The TAN was 1.9 showing a little acidity. This is serviceable oil. As for our opinion as to what oil should be used; since Chrysler is paying the warranty and the other oils may be hard to get and/or expensive, we think this is the one to go with.

MobilTrans SHC DC: In this sample of Mobil SHC DC there certainly is a lot more calcium, phosphorous and zinc in the oil. It looks more like what we'd expect from a manual transmission fluid, compared to the previous sample, which was obviously ATF, although it is not too uncommon to see ATF used in manual transmissions. This sample's viscosity was correct for Mobil SHC DC and in the 75W/90 range. The trace of insolubles is likely just additive that's fallen out of suspension. The TAN was 4.1 showing some acidity and that's due to the additive present. This is serviceable fluid.

Mobil Delvac Syn 50 trans fluid: In this sample of Mobil Delvac 50 transmission fluid you can see that the additives match up very closely to the Mobil SHC DC fluid. The viscosity is correct and once again in the 75W/90 range. No moisture or insolubles showed up and the TAN was 3.5 showing a little less acidity than the SHC. We don't test for all of the things that are needed to certify an oil, so we can't say for sure that MobilTrans SCH DC and Mobil Devlac Synthetic 50 are the same, but judging by the things we do test for, they look almost identical.

Pennzoil Synchromesh: In this sample of Pennzoil Syncromesh Fluid a little iron showed up, but that's probably just from the transportation or storage process and isn't harmful. The first thing you notice is the additives. Very little calcium is present, but magnesium read 6,248 ppm. Phosphorus and zinc are reasonably close to the Mobil samples. Silicon could be abrasive dirt, but we're leaning towards an anti-foam additive. No moisture or insolubles here. The TAN was 4.7. There's nothing here showing this oil isn't serviceable.

So now that I have all of this information, it's time to decode it. I'll start with the basics, viscosity.

Viscosity is a measurement of how thick oil is. The higher the viscosity, the thicker the oil is. Viscosity numbers between different types of oils (gear versus engine) are not directly comparable. A 30-weight engine oil does not have the same viscosity as 30-weight gear oil. In a manual transmission, a higher viscosity will always lead to slower/harder shifting in the transmission, especially when cold.

After viscosity, you get into the American Petroleum Institute (API) rating (MT-1, GL-1, GL-4, GL-6, etc.). These are specific standards that transmission/gear oil must meet. According to the API, MT-1 is used for non-synchronized transmissions and GL-1, GL-4 and GL-5 are used for synchronized manual transmissions. GL-2, GL-3 and GL-6 are obsolete standards and are no longer in use. This document from the API does a real good job of explaining what they mean: http://www.api.org/certifications/engineoil/pubs/upload/1560.pdf

The Bottom Line

Now we get into the meat and potatoes of this project: the chemical compounds in the oil. I'm going to focus on four main parts in the oil's additive package, these being: friction modifiers (FM), detergents, anti-wear (AW) additives, and extreme pressure (EP) additives. Friction modifiers are used to reduce coefficient of friction which helps to lessen heat and increase fuel economy. Detergents are used to clean material buildup off of the surfaces, keep debris suspended so they don't deposit on the surfaces, prevent oil foaming, and neutralizing any acids that form in the oil. AW additives prevent metal to metal contact within the transmission, which reduces wear. Finally, EP additives are used as a higher level AW additive. EP additives only come into play when there are extremely high stress loads between the gears, such as lots of power or heavy loads.

These additives are usually made up of multiple chemical compounds and perform several functions at once. Such a compound would be a sulphur-phosphorus-boron combination which is mainly an EP additive, but also doubles as an AW additive and probably a friction modifier of some sort. For simplicity, I'm only going to list a primary function for each of the main substances posted in the reports above:

-Boron is a friction modifier/anti-wear additive.
-Calcium is a detergent.
-Magnesium is also a detergent.
-Phosphorus is an extreme pressure additive.
-Zinc is an anti-wear/extreme pressure additive.

The other chemicals (aluminum, iron, silicon, and sodium) are minimal and are probably left over from the production/packaging/distribution process, but could also be a part of some special additive package.

A few sources that help explain it a little better are:

Extreme pressure additive - Wikipedia, the free encyclopedia

AW additive - Wikipedia, the free encyclopedia

Additive Metals - Boron, Magnesium, Calcium, Barium, Phosphorus, and Zinc – Polaris Laboratories

Now that you know a little about what we're looking at, it's comparison time. Since we know that the MobilTrans SHC DC is the specified fluid for the G56, we'll use that as a baseline and compare all of the other samples against it.

We'll start with the OEM Chrysler ATF+4. Looking at the cSt Viscosity, you'll notice it's around 50% of the baseline. It is fair to say that ATF+4 is roughly half as thick as the recommended fluid. It does have more boron, which means it has a better friction modifier package. However, all of the detergents, AW, and EP additives are 1/3 of the baseline, with the exception of zinc which is almost nonexistent. It's half as thick and less than 1/3 as protective as MobilTrans SHC DC.

Next we'll look at the Mobil Delvac Synthetic Transmission Fluid 50. It's about a point thicker than the baseline and has half of the Boron. However all of the other measurements are almost right on par with MobilTrans SHC DC. Based on the information provided, I believe it's safe to say that the friction modifier package is less, but other than that, it should be a perfectly suitable substitute for the specified requirement.

Finally, look at the Pennzoil Synchromesh. Viscosity is better than ATF, but still significantly lower than the baseline. As far as detergents, calcium is very low, but holy magnesium Batman! The combination of detergents in this sample was off the charts. I have no doubt in my mind that you would have an extremely clean transmission with virtually no debris build up at all. Phosphorus is slightly higher, and zinc is slightly lower. That would indicate a better EP additive, but a weaker AW additive. Overall, I believe this would be good oil for use in a transmission that requires thinner oil, but due to the recommended oil's viscosity I don't think this would be a suitable substitute for MobilTrans SHC DC.

Conclusion

So what's the overall conclusion? Based on the information provided, I believe that the absolute best oil would be that specified by Mercedes: the MobilTrans SHC DC. Obviously from our report, Mobil Synthetic Transmission Fluid 50 is a close second. However, if you're still under warranty and would like to keep that warranty, I wouldn't use anything but ATF+4. Regarding the Pennzoil Synchromesh, I personally wouldn't recommend the product. The viscosity is way out of spec and the chemical protection is very lacking compared to either of the Mobil oils. As for me, the only fluid going in my transmission from this point forward is MobilTrans SHC DC.

John Roberts
TDR Contributing Writer

Now, for a final chapter and verse on the G56 gearbox, you'll want to keep TDR writer Joe Donnelly's write-up about the G56 and its quirks close by. The reference material was most recently found in Issue 75, pages 106-107. After his technical discussion of the gearbox, Joe recommends, "Owners are well advised to avoid the browned and failed bearing problems with a better lubricant and add an extra quart of lubricant to the gearbox."

Also, at the onset of the article I mentioned that I would give you the reference articles for the myriad of fluids used in your truck. Here are the "chapters and verses":

Diesel fuel: Issue 54, pgs. 50-57
Biodiesel: Issue 80, pgs. 54-56
Fuel additives: Issue 64, pgs. 52-55
Premium diesel fuel: Issue 55, pgs. 48-49
Coolant: Issue 62, pgs. 42-44
Brake fluid: Issue 43, pgs. 14-17
NV4500 manual transmission fluids: Issue 62, pg. 21
Differential lubricants: TDBG, pgs. 324, 327
Engine oil: Issue 76, pgs. 52-57

Robert Patton
TDR Staff