Answers
to Transmission-Fluid Questions

By Wayne Colonna
Technical Editor

Publisher's Note: An inquiry from one of our readers concerning fluids caused us to contact Technical Editor Wayne Colonna. Since the characteristics of ATFs involve a highly specialized science, Colonna called upon the chemists at Lubegard for help. Pat Burrow heads research and development at International Lubricants Inc., parent company of Lubegard. Burrow certainly is biased toward his company's aftermarket formulations but has endeavored here to keep the discussion as generic and educational as possible.

1. Long life with carefree performance is something every transmission-repair facility expects to have with transmission fluid. And at one time it was easy and carefree; now we are seeing more and more manufacturers requiring specific fluids for their transmissions. Why?

In my opinion, this is half marketing, half technology. Let me explain: When automatic transmissions started to become common and popular in the late 1940s, many of the deficiencies of earlier fluids (straight mineral oils, mainly engine oil) showed that fluids used in automatic transmissions had to perform many demanding tasks that were beyond the capabilities of the available oils of the time.

The tasks the fluids had to perform were no small matter. They had to transmit power to the torque converters, while optimally performing in the hydraulic control system for shifting; friction control and energy transmission for bands and clutches; lubrication of hard parts, bearings, bushings and seals; and last, but certainly not least, heat transfer for the removal of all this generated heat as the transmission changed speed ratio between the engine and drive wheels.

It quickly became evident that ATFs would be the most sophisticated and most difficult of all lubricants to formulate. General Motors took the lead in 1949, and the first specification for automatic-transmission fluid was issued for "Type A" ATF. From 1949 until about 1960, most passenger-car automatic transmissions required the use of "Type A" or "Type A, Suffix A" transmission fluid. Ford, however, was not thrilled about specifying a transmission fluid for use in a Ford vehicle that was approved by General Motors! So in 1961, Ford released its fluid specification (M2C33-D) that eventually would evolve into the Ford Type F (1967) and Type G for Europe (1972).

The passage of the Endangered Species Act of 1972 changed the direction of transmission-fluid development forever by eliminating the use of sperm-whale oil as an additive for transmission fluids. When a suitable replacement for sperm-whale oil was not readily available, it resulted in immense sums of time and money being spent to research, develop and manufacture additive packages that worked as well as the sperm-whale oil. It was this huge R&D cost in new fluid-additive packages that convinced OEMs to release their own specific ATF requirement for their transmissions, a fluid tested and trademarked by them.

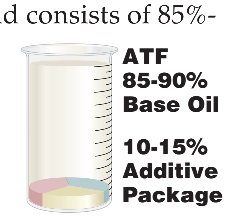
Once this decision to differentiate and trademark their own ATF generated unexpected new sales, the collaboration among the OEMs to create a universal fluid specification for all automatic transmissions took a back seat to corporate identity and profits.

The OEMs used this opportunity to make "exclusive-use requirements" that could now be imposed on the customer and the vehicle-service industry. These specific use requirements were justified by the OEMs in the name of improved protection and claims of "fill for life." The end result has been a proliferation of ATF fluid types that vary by OEM and are available from them, at inflated prices and limited to the dealerships.

Lest I be misunderstood, I feel it is important to note that the fluids specified by the OEMs are tested and designed to meet their specific fluid requirements and will protect the transmissions they are designed to be used in. There are transmission fluids that meet or exceed the OEM requirements available today that will work as well as or even better than the OEM-specified fluid. This is another of those situations where knowledge is power from the standpoint of being knowledgeable enough about specific fluid requirements to be able to select the proper ATF to substitute when availability or price is a factor.

2. What is the basic composition of a transmission fluid?

In most instances, automatic-transmission fluid consists of 85%-90% base oil and 10%-15% of a transmission-fluid additive package.



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base oil is the largest component of an ATF, it has a dramatic effect on the performance of the fluid over the life of the transmission. The biggest change in fluids over the past decade has been the unilateral move to base stocks that will improve the ability of the transmission fluid to flow at very low temperatures, in great part because of the use of electronic controls. At the same time, retention of high-temperature viscosity is required for maintaining film strength for the operation of continuous-slip torque-converter clutches as well as enhancing pump performance by reducing pressure losses (a problem in high-temp front-wheel-drive applications).

The additive packages used to blend ATFs are the most sophisticated of all lubricant packages. They require about 15-20 different chemical components that are finely balanced to provide the protection and performance required by the OEM specifications.

The exact chemical compounds and amounts used for that additive package are specific to the additive manufacturer. Additive packages have had to change to keep up with the demands of today's automatic transmissions.

3. What is the difference between paraffinic, naphthenic, hydrotreated and synthetic oils?

These oils all have one thing in common: They are, or have been, used as base oil for the formulation of transmission fluids. The viscosity-temperature characteristics of an ATF are dependent on the choice of base oil and on the viscosity-index improver used (viscosity-index improvers reduce the change of viscosity with increasing temperature). Base oils are refined – by a number of methods – from crude oil, as pumped from the ground. The type of crude oil used and the method of refinement determine the properties of the base oil.

Paraffinic oils, prepared by solvent-separation techniques from parafinic crude oil, give good yield of high-viscosity-index stocks containing a lot of wax. Paraffinics have good thermal and oxidative stability and good high-temperature viscosity characteristics. Low-temperature dewaxing of paraffinic base oils also is required to achieve the low-temperature flow requirements of ATF.

Naphthenic oils derived from naphthenic crude are very available and inexpensive. They yield medium-viscosity-index and low-viscosity-index base oils with very little wax and naturally low pour points. Unfortunately, their poor thermal and oxidative stability coupled with their modest viscosity characteristics rules them out for use in today's high-performance transmission fluids.

Hydro-treated oils are derived from almost any crude oil using an alternative refining process that substitutes deep hydrogen treatment for solvent extraction. This process can increase the yield of high-viscosity-index components instead of unwanted low-viscosity-index components. This process also reconstructs cracked waxes into branched paraffins, which offer excellent low-temperature properties.

The benefits of hydro-treated base oils are key in formulating current and future quality ATFs. Use of hydro-treated base oils has led to the proliferation of "synthetic" transmission fluids that have hit the market in the past few years. The higher costs of these products reflect the higher cost to produce base oils.

Synthetic oils are perhaps the *least* understood of all the base oils currently in use. In the lubricant

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market today, there is no absolute definition of the word "synthetic." In Europe and the U.S., hydroisomerized base oils (hydro-treated) are being sold and marketed as "synthetic." Some engineers and chemists would argue that these base oils are not a true synthetic. For them, the definition of a "synthetic" would be a molecule built from simpler substances to give the precise properties required. The most-widely used "synthetic" base oils are the polyalphaolefins (PAOs). Others available include the synthesized esters but in general are expensive and have limited availability.

"Synthetic" base oils used for formulating ATFs all have viscosities in the range of the lighter high-viscosity-index mineral oils. Their viscosity indexes and flash points are higher and their pour points are considerably lower. This makes them the best choice for formulating transmission fluids for extreme service in very hot or cold environments. The main disadvantage of "synthetics" is that they are more expensive and, until recently, had somewhat limited availability.

To further complicate the whole base-oil scenario, all the base oils mentioned can be mixed together in varying proportions to produce base-oil blends that have "the properties of synthetics" and are sold as "semi-synthetic" ATFs.

4. We hear terms like "coefficient of expansion," "shear factor," "viscosity," "thermal stability and durability," "anti-oxidants," "friction modifiers," "esters" or "phosphates." Can you define these terms, and do they describe the characteristics found in every variety of transmission fluid?

Some of the terms you have mentioned are used to describe either the properties of the additives or the additives themselves. Let me expand on this and define these terms and several others key to understanding what they are and why they are so important to ATF quality.

Coefficient of expansion –

Expansion in physics is the increase in volume resulting from an increase in temperature. The amount of expansion that any unit of volume undergoes for every 1° rise in temperature is called its "coefficient of expansion." That's why it is well known that you are supposed to check the fluid level in an automatic transmission when it is at operating temperature, because the volume of fluid expands as it gets hot. Setting the fluid level when cold could result in overfilling the transmission.

Shear factor –

This is a term that is more relevant to measuring the distance a point moves because of shear. For our purposes, shear stability is a more-relevant property to use when describing transmission fluid.

The operating viscosity of transmission fluid is extremely important to the function of the automatic transmission, especially critical for the performance in electronically controlled transmissions. Any loss in operating viscosity below a critical level will reduce long-term durability.

(Viscosity is a measure of a fluid's resistance to flow. It is important to remember that viscosity ratings are always given for a specific temperature. Viscosity will increase when the temperature drops and will decrease when the temperature rises.)

Automatic-transmission lubricants experience shear stresses at surfaces inside gear and vane pumps, needle bearings and bushings, planetary gear sets, and clutches and bands. This mechanical shearing breaks the long-chain polymers and, in time, causes viscosity loss.

Permanent viscosity loss (PVL) occurs after intense shear stress causes unrecoverable degradation of these long-chain molecules. Temporary viscosity loss (TVL) due to the orientation of the long-chain molecules under less-intense shear stress (operating at elevated temperatures will do this) with a return to its previous viscosity value indicates that the molecules return to their original shape when the stress (lower temperature) is removed. Fluids that do not experience PVL or TVL are defined as shear stable.

Thermal stability and durability –

A thermally stable transmission fluid is one that has the ability to withstand temperatures without decomposing. Do not confuse thermal stability with oxidation stability, where oxygen must be present and oxidation is occurring instead of thermal decomposition. The transmission-fluid durability, of course, is seriously affected by the onset of either decomposition or oxidation. Both conditions eventually will result in viscosity loss that will cause failure of the transmission fluid and then, shortly thereafter, the transmission.

Anti-oxidants –

Anti-oxidants are part of the additive package used to formulate automatic-transmission fluid. Their purpose is to lengthen fluid life, permit high-temperature tolerance and prevent the formation of sludge and varnish. These additives control oxidation by deactivating chains that start the oxidation that leads to sludge and varnish.

Friction modifiers –

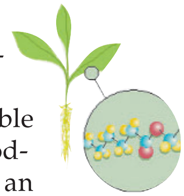
Friction modifiers are additives that make the fluid more "slippery" by decreasing the coefficient of static friction.

In other words, the frictional forces between clutches and bands are higher when there is no motion or sliding between the clutches and steels (or band and drum) as lockup occurs. When the clutches and steels (or band and drum) are sliding as lockup occurs, this reduces frictional force.

The smaller the frictional surface on the clutch plates, or band, the greater the requirement for the elimination of slippage to prevent heat generation and wear. This was a requirement of non-friction-modified automatic-transmission fluid like the Ford Type F. General Motors transmissions require a friction-modified or "slippery" fluid to ensure the proper "shift feel" that is so important to GM transmissions.

What actually occurs is that the coefficient of static friction is less than the coefficient of dynamic friction. As the clutches and bands lock up to complete the shift, less engagement feel is transmitted to the driver, resulting in a more "pleasing" shift. There is very little difference in the frictional requirements for Ford and GM transmissions, which is why so many available approved transmission fluids are Dexron®/Mercon® approved. Other manufacturers, such as DaimlerChrysler and Toyota, have different frictional requirements for their transmission fluids. These differences in frictional requirements are the main reason why no universal specification for automatic-transmission fluid is in place.

Esters –



Esters are synthetic lubricants reacted from fats and vegetable oils. An ester is a product of the reaction of an acid (usually organic) and an alcohol. The process of producing an ester is called esterification. Esters have unique lubrication properties and are the basis for some of the most-effective lubrication products available today. Esters can be used as a main base oil or as a quality-enhancing additive. Chemical stability and lubricity over a wide range of temperatures are just a few of the beneficial properties of ester-based lubricants. The biggest drawback to their wider use is the cost factor. Esters are expensive to use.

Phosphates –

Phosphate is a chemical term used to describe any of several substances containing phosphorus. How this applies to transmission fluids is that phosphorus is used in additive packages to enhance wear protection and provide friction modification. It has been used to a great extent in current ATFs to replace the zinc that was used with phosphorus in the past for the same purpose. Selection of anti-wear and friction-modification additives is very important, as interaction with other components must be kept to a minimum to avoid causing corrosion of copper or other metallic components of the automatic transmission.

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5. Do all transmission fluids contain dispersants, corrosion inhibitors, viscosity improvers, seal-swell agents, pour-point depressants, foam inhibitors, anti-wear additives, antioxidants and red dye? What does each of these additives do?

As I mentioned earlier, an automatic-transmission fluid consists of base oil and a performance-additive package. Since the base oil is the single component of automatic-transmission fluid that is in the greatest amount (85%-90%), it has a significant effect on certain properties of that transmission fluid.

To be more specific, base oil has the greatest effect on viscosity, oxidation, tendency to foam and flash point. Obviously, there are other performance requirements placed on the transmission fluid not supplied by the base oil. This is where the use of all the additives you mentioned comes into play. The hardest part of producing this additive package is combining all these different chemistries that perform all the required functions of that additive without adversely affecting the performance of the other 10 to 15 additives present in the same base oil.

Some additives (like red dye) have little cross-over effect and do not create problems. Anti-wear additives, on the other hand, can drastically affect the frictional properties in the process of preventing wear. The balance between testing and formulation allows the additive chemist to blend additive packages that do not compromise performance of that transmission fluid in the real world of day-to-day driving. The exact chemical compounds and amounts used in additive packages vary by additive manufacturer and are generally proprietary to them. I will try to go over the different categories and explain what the different performance categories do without boring you with a bunch of chemistry details that are of interest to only the chemists who blend the additive packages.

Red dye –

Red dye is present in ATF as a way to distinguish transmission fluid from other lubricants in the event of a leak. Certain European OEMs have started using automatic-transmission fluids that are not red. Why this is is a question that only they could answer. They have chosen to use a yellow dye to mark these fluids.

Dispersant –

Dispersants are additives that help keep solid contaminants (usually used in an engine oil where combustion by-products are present) in colloidal suspension (molecules that do not settle) by forming a micelle (a molecule that can change in size without a chemical change), which prevents the formation of sludge and varnish on components. They usually are used with detergent additives designed to keep parts clean. Since automatic transmissions are sealed units and do not have the same contamination problems of engine oils, they have limited use in transmission-fluid additive packages.

Corrosion inhibitors –

Corrosion inhibitors are additives that protect metal surfaces from corrosion by preventing chemical attack by water, contaminants or other additives present in the transmission fluid. We obviously conclude that this means protection from rust on steel parts, but it is also very important for preventing corrosion of copper alloys used in bushings, bearings and thrust washers.

Viscosity improvers –

Viscosity-index improvers expand the useful operating-temperature range of transmission fluids. They allow low viscosities for low-temperature operation while still providing adequate viscosities at operating temperatures. The active ingredients of VI improvers are organic polymers. To understand the behavior of these polymers you have to mentally visualize the polymer molecule as being curled up into a spherical shape in the oil. These spheres thicken the oil in proportion to the diameter of these spheres. The VI improvement results because the diameter depends on temperature. At low temperatures the polymer molecules curl up tightly so their ability to thicken the fluid is reduced, allowing the transmission fluid to flow. At high temperatures they expand, increasing the diameter of the sphere, which enhances the thickening of the transmission fluid and provides better lubrication at higher temperatures. The end result of the use of VI improvers is increased shear stability, a very important requirement of today's and future ATFs.

Seal-swell agents –

Seal-swell agents are added to transmission fluid to help meet the seal requirements called for by the OEM specifications. The main purpose of seals in automatic transmissions is to prevent internal leaks in the hydraulics of the transmission and prevent external leaks of the transmission fluid. Seals also keep dirt, water and other contaminants out of the transmission. Various synthetic elastomers are used to perform these functions. Each of these elastomers has different applications and properties, so compatibility between these different seal materials and transmission fluid is essential for long life and adequate performance. Some seals are required to swell to seal properly and prevent leakage; others are more affected by the fluid itself and require protection from excessive softening or from hardening. Again, achieving this balance is the end result of much testing and research on the part of the additive-package blender and is a primary contributor to the complexity of additive-package formulation. One of the greatest challenges for transmission-fluid formulators today is achieving acceptable elastomer-compatibility test results.

Pour-point depressants –

One of the greatest problems with transmission fluids is their flow properties at low temperatures. When transmission fluids are cooled, the waxes present in the fluid can form crystals and precipitate (fall out) from solution. The temperature at which wax crystals first become visible as a slight haze, or cloudiness, is called the cloud point.

As a transmission fluid is cooled below its cloud point, the wax crystals grow and start to form a structure within the fluid that prevents the fluid from flowing. The temperature at which the transmission fluid first appears to solidify is called its pour point.

Between the cloud point and the pour point, the viscosity increases of the transmission fluid occur quickly as the temperature decreases. Severe problems will occur in an automatic transmission if the fluid temperature is below its pour point. The transmission fluid will not be able to flow to the oil pickup in the sump of the transmission as rapidly as the pump draws fluid from the pickup area. This allows the pump to cavitate (pick up air, not oil). When this happens, the transmission will starve for transmission fluid and will experience rapid wear or even catastrophic failure. Since synthetic base oils contain very little or no wax, it becomes obvious very quickly why they are preferred in transmission fluids for the complicated electronically controlled automatic transmissions of today. Pour-point depressants lower the temperature at which pour point occurs. They disrupt the orderly growth of the wax crystals. Pour-point depressants do not prevent wax from precipitating; they only affect the structure of the wax crystal that forms, which allows flow at lower temperatures.

Foam inhibitors –

Foam inhibitors are antifoam additives that reduce the transmission fluid's tendency to foam. Foam control is critical for the sat-

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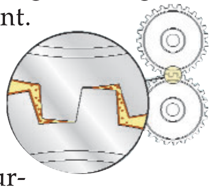
isfactory operation of the automatic transmission. As transmission fluid is pumped through the transmission, the action of the pump, converter, oil pickup and filter tends to cause aeration of the fluid, with the resulting formation of foam. Foam decreases the transmission fluid's efficiency and has the potential to cause mechanical damage. The thinner fluids now in service have an even greater tendency to foam at higher temperatures as the fluid thins and becomes the perfect medium to form the air bubbles that we call foam. This foaming can lead to low line pressures, clutch slipping and accelerated wear, poor heat transfer, and pump cavitation and wear. A worst-case scenario is the rise in fluid level from foaming that can cause the loss of fluid through the air vent or dipstick tube and the resulting fire that occurs as the transmission fluid spills out onto the vehicle's hot exhaust system. The foam inhibitors don't actually reduce the amount of foam per se; what they do is reduce the surface tension of the air bubbles, allowing the bubbles to collapse at an accelerated rate. Foam testing is performed for all transmission-fluid specifications and is another very important property of transmission fluids for today's high-tech, high-performance electronically controlled automatic transmissions.

Anti-wear –

Another important function of transmission fluid is the prevention of wear. Anti-wear additives reduce the wear that results from metal parts rubbing or sliding against each other. Anti-wear additives are surface-active compounds that react with metal surfaces chemically to produce a self-sacrificing layer of film that wears off instead of the metal surface they are on.

The accompanying drawing illustrates this point.



The additive reacts with the metal to form a microscopic "film" on metal surfaces, and when surfaces scrape, the actual metal-to-metal scraping is replaced with metal-to-additive. The additive is scraped off and instantly reforms again and again, infinitely.

Another important anti-wear additive of transmission fluids is *extreme-pressure additives*. Under very high loads (as with planetary gear sets), metal-to-metal contact can cause scuffing, adhesive wear and even welding in severe instances. Extreme-pressure additives react with metal surfaces under high-pressure, high-temperature conditions to form a protective surface film. This protective film will wear instead of the metal surface. Both anti-wear and extreme-pressure additives contain sulfur and phosphorus to accomplish this protection.

6. You have fluid specialists and you have friction specialists. Who decides the proper fluid-to-friction compatibility? Is it the engineer who writes the "shift feel" and "TCC apply" logic in the on-board computer system? Or is it the engineer who designs the transmission who determines the spring tensions and orifice sizes in the spacer plate used to control apply pressure? Not to mention cold weather and hot weather regions.

There is a very interesting but complex chain of events that occurs as you start to understand all the different processes and participants that determine the shifting characteristics of each vehicle before they are sold to the public.

Fluid specialists and friction specialists are the collaborators who actually blend and test the transmission fluid that is the baseline for all the other specialists to perform their tasks in the final product. Factory fill is almost always the reference transmission fluid everyone works from.

There isn't an OEM that does not have its own interpretation of the frictional properties it wants in a fluid. This frictional requirement may go back 30 or 40 years and is still the criterion for high-performance fluids produced for its vehicles today.

You will not find any OEM that wants to issue a new radical fluid specification that can't be back-serviceable. They want to avoid having a problem servicing older transmissions that could possibly be frictionally unacceptable to the new fluid.

The term "back-serviceable" means that a new fluid (factory fill) must perform no differently frictionally from the way the prior factory fill performed. Tremendous amounts of time, effort and money are spent by the additive manufactures to develop new transmission fluids with improved performance characteristics that are frictionally the same as the factory fill they will replace. This is not to say frictional requirements do not change. The proliferation of converter clutches and the phenomenon of low-speed frictional problems commonly know as "shudder" has generated tremendous research and expenditure to solve this problem without changing the current high-speed frictional requirements of factory-fill and service-fill automatic-trans-

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mission fluids.

The engineers who program shift logic and the engineers who design transmissions are performing their jobs on the basis of the factory-fill transmission fluid they are given by the fluid and frictional specialists. All fluid is tested in the mechanical testing labs and chemistry labs and has gone through vigorous field testing under every imaginable type of climate and condition.

Trained fluid evaluators and sophisticated instrumentation are used to verify the exact frictional performance of the fluid. Baseline-shift evaluations are performed on vehicles whose only function in life is to be the baseline for frictional shift quality. The OEMs even maintain a stock of factory-fill transmission fluid that is used only to compare and verify "shift quality" compliance.

Using this baseline fluid, the engineers responsible for calibration of a particular vehicle and transmission type will determine the programming, spring tensions and orifice sizes that will determine the shifting characteristics of that particular chassis/driveline configuration. Once the calibration engineers at the proving grounds have configured the software and mechanical/electronic components to deliver the shift characteristics, they start field testing under all types of conditions to debug the software and shift-control systems. When they believe they have achieved the targeted performance and durability, this calibration is released to production, and vehicles get produced and sold to the public. As the public buys and drives the vehicles, any problems or complaints that crop up are evaluated and calibration adjustments are made in subsequent versions of that vehicle. So, in answer to your question, it is the efforts of all the specialized engineers that determine the proper fluid-to-friction compatibility for each vehicle type, with the emphasis on the specific "shift quality " requirements of that particular vehicular application.

7. What are the differences between the fluids: GM, Ford, Chrysler, Honda, Mitsubishi, VW and ZF? Is there such a thing as "one fluid does it all"? Couldn't a total synthetic fluid survive in any of these environments?

This is a very interesting question from the standpoint that there are many more similarities than there are differences. GM Dexron® transmission fluids are so close to Ford Mercon® transmission fluids that it is almost unheard of to find a bottle of service-fill transmission fluid that is not qualified and approved by both Ford and GM, with both approval numbers on the label. Both Ford and GM have moved in the same direction when it comes to issues like seal compatibility, anti-wear, shear stability, oxidative stability, improved viscosity characteristics and frictional characteristics.

So many of the problems today are shared by all of the OEMs. Everyone has gone to computer-controlled, electronically operated transmissions. Extended warranties are a necessity to compete in the market. With declining profitability (industry average profit per vehicle for each vehicle was in the $180-$190 range, according to a recent industry publication), new profit centers must be created by selling more parts, service and lubricants (proprietary, available only from them, required by the warranty and expensive).

DaimlerChrysler decided it needed its own fluid to meet its own unique frictional requirements, and the ATF + family of transmission fluids was born. Corporate affiliations have led to the similar fluid requirements of Hyundai, Mitsubishi and Kia with the appearance of Mitsubishi Diamond SP III, Hyundai SP III and Kia ATF SP III. The interesting thing about the DaimlerChrysler licensing program for service-fill fluids is that it does not exist. No formal service-fill program has been announced, and no commercial products are available. Mopar® is the only marketer of ATF + 4®, which interestingly enough not only has specific performance requirements but also specifies the additive chemistry and the particular base oils that may be used. This ensures that the only place you will be able to buy it is at the DaimlerChrysler dealer. This policy of making the ATF + 4 available only from DaimlerChrysler has prompted a call from the automotive-service industry for the Federal Trade Commission to take DaimlerChrysler to court for violation of the Magnuson-Moss Warranty Improvement Act.

Most Japanese OEMs have followed in the same path as Daimler Chrysler (DC has a fluid specification but allows no licensing; Japanese OEMs do not use a service-fill specification) and recommend only their part-number fluids, or “Genuine” oils for service transmission fluids.

As for the European OEMs like Mercedes Benz, ZF and VW, there is a move to high-quality base-oil fluids with all the benefits of shear stability, improved anti-wear, improved low-temperature characteristics and acceptable low-speed frictional properties that the North American market is moving toward. For service fill, ZF requires that the ATF use a ZF-approved additive system and have Dexron approval. It then must meet the ZF listing requirements in the ZF service-fill application form. Mercedes Benz will accept only approved fluids for a listing. VW has taken the same path as the other European OEMs, requiring improved fluid performance for “long life” and improved durability. Interestingly enough, VW has chosen to remove the red dye from its fluid and have settled on yellow as its color choice for VW service-fill products (again available only from VW dealers at elevated cost).

If you ask any OEM’s representative, you will be informed that you can use only fluids approved by that company. Use of anything else will void your warranty and can damage your transmission. As you can see, most current factory-fill transmission fluids with the exception of frictional properties are very similar. So, I would have to say in answer to the question, “Is there such a thing as one fluid does it all?” Well, not unless you have an excellent (high-performance base-oil) fluid to start with and the ability to adjust the frictional properties to dial in the desired amount of “slip” required if that is the direction that OEM requirement sends you.

Any high-quality synthetic transmission fluid with Dexron III approval and the proper frictional properties could survive in this environment. There are products available on the market today that allow the savvy mechanic to do just this. It is being done hundreds of times every day across America in every kind of garage and fluid-change facility with great success. This drives the OEMs crazy as they try to improve their financial situation by the exclusive nature of their fluid requirements and the limited availability that drives the consumer into the dealership to have routine maintenance performed at high cost dictated by the exclusive nature of the supply chain they are trying so hard to implement and control. TD