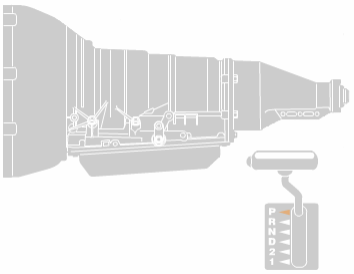
Automatic Transmission Fluids

AUMT 2325.2501



Question???

- There is only one type of transmission fluid?
  - No.
- Any transmission fluid is compatible with any transmission?
  - No.

Fluid types

- Type A
- Type CJ
- Type F
- Dextron
- Dextron II
- Dextron IIE
- Dextron III
- XT-9-QMM5 (mazda)
- Mercon
- Mercon V XT-5-QM
- Mercon Synthetic
- Mercon SP XT-6-QSP
- CVT XT-7-QFC
- Motorcraft Premium transmission fluid. XT-8-QAW

Types???

- What do the different types indicate?
  - The names and numbering that goes along with the fluids are testing specifications that the fluid has achieved.
  - Mercon VI (2006 and newer GM)
    - max. 6.4cSt @100C
    - 42,000 shift cycles
  - Mercon V (Ford)
    - min. 6.8cSt @100C
    - 32,000 shift cycles
  - cSt Centistokes measure of viscosity
  - With the specifications given above it is impossible to have a universal fluid.

Fluid Purpose

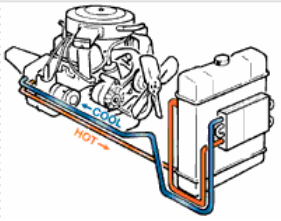
- The purpose of the fluid:
  - Lubiricate
  - Cool
  - Transfer power
  - Disperse particles
  - Anti-oxidation
  - Friction modification
  - Impact dampening

Lubrication

- Transmission fluid in its simplest form is an oil. It is used to lubricate bearings, bushings, and other moving parts.
- The viscosity of the fluid is important because the thinner the fluid the less effective it is as a lubricant.

Cooling

- The interior components of an automatic transmission undergo large amounts of pressure and friction. To control this buildup of heat the fluid is used to cool the components.
- Transmission coolers are an externally mounted heat exchanger, that is either an oil to air or oil to coolant exchanger.



Transfer of Power

- The transfer of power is done via hydraulic pressure.
- The transmission fluid is a hydraulic oil that under transmits force.
- Transmission fluid does not breakdown under high pressures and does not easily foam.

Dispersion

- Transmission fluid is designed to keep particulate matter from settling and accumulating in the transmission. Because, a clump of settled particles can at one time be released causing massive localized contamination.
- If the particles are kept in suspension it allows them to circulate through the transmission an eventually be contained by the transmission filter.

Friction Modification

- Oil is great, but not when friction is needed. Lubricating bearings and allowing clutches to grip have two different ideologies. Bearings need low friction and clutches need relatively high friction.
- The fluid allows for a certain amount of friction to be maintained.

Impact Dampening

- Automatic transmissions have harsh gear interactions and the fluid is there to dampen the impact force.
- The internals are literally hammered.

Fluid Components

- Transmission fluid components:
  - Anti-foam agents
  - Anti-wear agents
  - Corrosion inhibitors
  - Dispersants
  - Friction-modifiers
  - Oxidation stabilizers
  - Seal swell controllers
  - Viscosity index improvers
  - Magnesium

Anti-Foam

- Hydraulic pressure is not effective if the fluid is not 100% liquid. If there are air bubbles there will be a loss in transmitted pressure.
- Anti-Foam agents are added to prevent the formation of air bubbles.
- Fluid that is bubbly on the dipstick has lost its Anti-Foam agents.

Anti-Wear and Dispersants

- Anti-Wear:
  - Zinc, Sulfur, and Phosphorous are added to decrease the overall coefficient of friction within the oil.
  - The elements are being phased out for better and less environmentally damaging chemicals.
- Dispersants:
  - These keep particles suspended in the fluid, which helps prevent the buildup of sludge in the transmission.

Corrosion Inhibitor

- Transmission cases house many dissimilar and readily corrosive metals. Corrosion inihibitors are added to prevent or slow the corrosion.
- If corrosion does form it may damage bearing surfaces, gasket surfaces, and other wear surfaces.

Friction Modifier

- Added for two separate purposes:
  - Some are added to only decrease the coefficient of friction in the transmission system.
  - Some are added to decrease the friction only to a plateau and go not further. The may decrease or increase the coefficient, these take it to a specific value under certain conditions. (thickness)

Oxidation Stabilizer

- To control the oxidation of the fluid, additives are used to allow the ATF to absorb and dissipate heat.
- If the fluid is not designed to handle the high heat that is normally present in a transmission, the fluid will burn/oxidize.
- Oxidized fluid is usually brown, thin, and has an acrid odor.

Seal Swell Controllers

- These additives are added to control the swelling and hardening of the transmission seals, while maintaining their normal pliability and tensile strength.
- Old oxidized fluid causes seals to shrink, harden, and become brittle.
- Some ATF fixes in a bottle cause seals to swell, tear, and become spongy.

Viscosity Index Improver

- These additives are blended into the fluid as an attempt to maintain the viscosity of the fluid regardless of the temperature.
- They allow the ATF to maintain a low pour-point at low temperatures and maintain a high viscosity at high temperatures.

Impact Dampening

- Magnesium is often added to control impact forces on gear faces, and bearing surfaces.
- The magnesium is a soft metal that is deformed once the two surfaces come in close contact.
- When the metal deforms it takes some of the energy out of the impact.