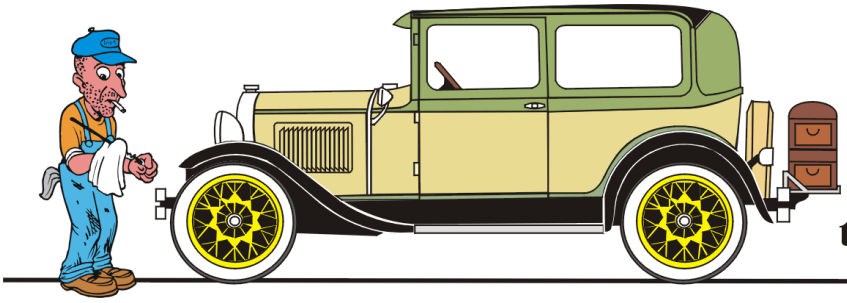


Technical Guide
Model A Ford
1928 - 1931
For the Novice and the Master Mechanic

CHOOSING THE RIGHT OIL FOR YOUR MODEL A ENGINE

By: Andy Wiedeman and Wayne Russert **Rev. C**
Members of the Rocky Mountain Model A Club **March 2012**

INTRODUCTION

This article provides everything you need to know to make an informed choice about the engine lubrication oil to use in your Model A Ford. This article exposes several myths developed over the ages since the Model A was manufactured. **The Revision C of this article has included the effects of the cooling system on cylinder wall oiling, and a reversal of previous conclusions that the use of synthetic motor oil is not warranted in the case of the Model A Ford. WE ARE NOW RECOMMENDING THE USE OF SYNTHETICS.**

Recent investigations have shown that synthetic motor oils have higher flash points (flash point is the temperature that motor oil will vaporize and begin to burn. Burning of motor oil causes lubrication failure. This effect is predominant in the cylinders of the Model A Ford engine. Typically, engine designers size the cooling system to keep the inner cylinder walls at about 350 deg F. Temperatures of this value create a margin against the flash point of the motor oil. Typical margins for petroleum based oils are about 65 to 100 deg F depending on the oil manufacturer and the specific oil weight. Synthetic motor oils have somewhat higher flash points providing up to 150 deg F margin for the best synthetic we have researched. On average you can expect a 25 deg F increase (about 30%) in margin. For this reason we believe that the marginally higher cost of synthetic motor oil is justified. When this article was first written (2008) the cost differential between petroleum based oils and synthetics was between 200% to 300% times more expensive. Four years later in 2012 the difference is only 60% more. The cost of a Model A oil change is about $16 for petroleum based oils and $26 for synthetics.

Revisions this Issue:

- Added information on how the cooling system is responsible for keeping the cylinder walls lubricated, and the effect of using synthetic oils to improve engine wear.
- Reversed our opinion about using synthetic oils. The added cost is justified by getting better protection from their higher FLASH POINT

TABLE OF CONTENTS (Click a topic to read the Chapter)

WHICH OIL TO USE?

A common problem facing owners of Ford Model A automobiles is choosing the right oil to use in the car's engine for lubrication. There are many myths abounding in the owner's circles and forums. Some owners claim that straight mineral oil as Henry used is the way to go. Others claim that the use of a straight 30W non-detergent oil is preferred. Many owners put modern multi-grade oils in their restored vehicles, while others claim that the use of "detergent" oils such as found on the shelves of Walmart, Napa, and other retailers will clog up the engine with deposits scoured from the walls of the oil pan. This report seeks to shed some light on the facts of motor oils and dispel some of the myths surrounding their use in vintage automobiles.

In addition, the recent mandate by the US Government to remove or significantly reduce an additive from modern oils has caused a huge concern with vintage car owners, since that additive prevented excessive cam to valve and gear wear. What is the straight scoop, what is the "right" oil to use, how should we deal with the new modern oils? This paper covers the pros and cons of all types of oils and provides a reference for new and old Ford Model A owners, so that they can make an informed decision. In addition, the section on a recent change in oil formulation caused by an EPA mandate that reduces an anti-friction compound, with potential harmful effects on the Model A engine, is included. Information on what to look for in a modern oil, and what to do about the change in formulation is presented. We also compare the use of synthetic oils to mineral oils.

This paper draws upon previous work by others, and our own Internet research into the complicated world of engine oil knowledge. We start off with defining what oil the original Model A Ford was delivered to the customer with in the years 1928 – 1931, progress through the various improvements made to oils over the last 75 years, and their benefits to the restored Model A Ford, and conclude with some recommendations.

Our conclusion is that the use of the higher cost Synthetic Multi-Grade 10W-40 Motor Oil for newer Model A engines is justified since it has a benefit in terms of a higher temperature margin for preventing cylinder wall scoring. Some reporters of vintage car motor oil use have suggested that the lower friction of synthetic motor oil poses a problem for the cam to follower interface, and may cause premature failure of the cam shaft. There has not been testing or actual reports that this is or is not a real problem. If your engine is older, and worn, we recommend 20W-50 Synthetic Multi-Grade motor oil.

Finally, we provide an Appendix 1 to this report which compares the cost of various oils commonly available at retail outlets. Appendix 2 is "Motor Oil 101" which is useful to find out what the basic process is for making modern motor oils, and the derivation of various terms. Appendix 3 provides a current sampling of what the Model A "experts" are saying about the EPA mandate to remove ZDDP. Appendix 4 is a short history of the American Petroleum Industry Rating system and shows API designations of SA through SM and what they contain. Appendix 5 provides a listing of Motor Oil Flash Points.

"HENRY'S OIL" (ORIGINAL MODEL A FORD OIL)

Our best source of information regarding the original oils used in the Ford Model A automobiles in the years 1928 – 1931 comes from a book originally published in April 1931 and the Model A Service Bulletins published by Ford Motor Company during 1928 - 1931. The book, "Model A Ford Construction – Operation – Repair" [1] by Victor Page[2], has been reprinted several times and presents information as close to the original as possible. Page had the cooperation of the Ford Motor Company and covers the Model A strictly as it came from the factory.

Page's book provides information on the mineral oils originally shipped with the factory produced automobile and what oils to use when doing an oil change. Page emphasizes that "only medium light, high grade engine oil should be used in the engine" [3]. "It should have sufficient body so that the pressure between the two bearing surfaces will not force out the oil." Page goes on to say that it is important to choose the weight of the oil carefully, especially in cold weather. He sets out Technical Specifications in two charts, one for Winter use and one for Summer. In those days prior to the American Petroleum Institute's labeling of oil types (such as SA, SB and so on) there was only the S.A.E standards to use. The Ford Motor Company had its own oil formulation and it was designated Ford M-515-A for winter use, and Ford M-515-B for summer use. Page recommended, at that time [4], for owners to use an SAE 40 Weight (viscosity) for summer, and SAE 20 Weight for winter. [5] The Ford Motor companies Service Bulletin shows that these weights approximates the Ford M-515 A and B respectively [6]. In this publication the Ford Motor company "strongly recommended an oil having the body of S.A.E. viscosity No. 40" for use in the summer.

Page also provides a treatise on "Lubrication Theory" which is quite interesting. It categorizes the characteristics of a "proper oil" and the derivation of oils. [7] The term "mineral oils" are used to describe oils derived from crude petroleum by refining. Page also discusses the lubrication method of the Ford Model A Engine. "A series of troughs are placed on the centerline of each cylinder in the bottom crank case, these being so arranged that as the connecting rods rotate the big ends dip into the troughs and scoop out some of the oil present in these members, throwing it about the engine interior" [8]. In this so called "dip and splash" oiling system was common to engine design prior to 1931. This means, that it is only necessary to keep these troughs full of oil to properly lubricate the engine. This is done by simply keeping the oil at the "full" mark on the oil filler gage (bayonet), thus insuring that considerable oil will be sucked in by the oil pump gears which then lift the oil into a feed pipe attached to the side of the crankcase. In turn, the oil is communicated to the valve spring compartment. From this compartment after lubricating the valve stems, springs, and timing gears, the oil drains back, filling the troughs until they overflow, and thence back to the sump.

Page claims that the Ford Model A will consume about 1 quart of oil per 100 miles. [9] He stresses that Ford recommends frequent checking of the oil level and keeping a "Full" sump. He also recommends draining are replacing the oil every 500 miles, and especially in cold weather, to remove and clean the oil pan clean-out plate once a month. [10]

SO … WHAT IS WRONG WITH "HENRY's OIL" ?

It simply does not have the improvements in wear reduction, keeping combustion particles in suspension, anti-foaming, and viscosity index improvers, that have been added to oils during the last 75 years. "Henry's Oil" simply is not as good an oil as the modern oils. These older oil formulations, have two major drawbacks. Firstly, combustion products mainly in the form of carbon particles are deposited in the oil during the operation of the Model A. These particles settle to the bottom of the oil sump, forming sludge. Secondly, "Henry's Oil" did not have a multi-viscosity improver additive. Multi-viscosity oils such as 10W-30 are available today, thus avoiding the necessity to use two different weights of oil as in the 1930's. As discussed above, the Model A owner was advised to use 20W oil in the winter and 40W oil in the summer.

Lack of Sludge Removal

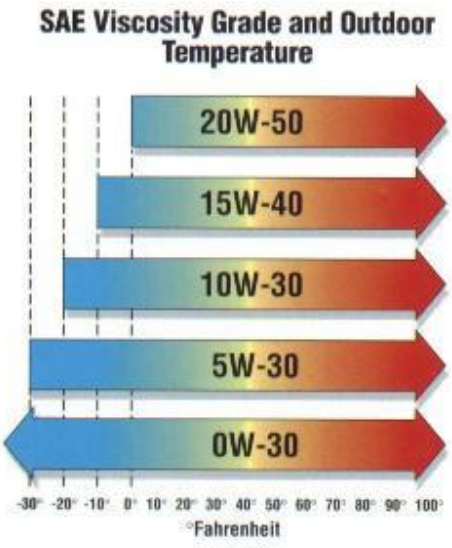
The value of detergent additives not present in "Henry's Oil" is elimination of sludge. Those of us who can remember the 1950's can remember pulling the oil pan, and seeing the thick layer (sometimes as much as ½ inch) of sludge coating the bottom of the pan. Modern oils have reduced this to a minimum by adding "detergents" , a term coined in the 1950's to sell the oil. Detergents are not soap, a myth caused by equating the apparent cleaning of the engine to clothes being cleaned by detergent soap. Another myth complains that the modern oils with the "detergent" additive will stir up any residual sludge in the engine and clog oil passages and cause engine damage. In fact, motor oil additives called detergents neutralize acids and clean engines, but are incapable of removal of sludge and varnish. Detergents are more like solvents than wire brushes. Dispersants and Detergents keep products of combustion, and other particulates suspended so that they do not block passages or lodge in cavities. To use an oil which does not have detergent it is necessary to use an oil with the API label SA or SB oil, if you can find it. However, if you use a non detergent oil you must be prepared to change oil more frequently, clean the oil pan monthly [11], and drop the pan and clean the engine at least once a year.

Some old timer Model A owners cling to the myth that "detergent" oil will clog your engine's oil passages and damage your engine. However, since the "detergent" in fact cannot do this, it is recommended that modern oils with the capability of keeping combustion products suspended combined with frequent oil changes is recommended.

Lack of Multi-Viscosity Operation

Modern drivers of restored Model A Fords may only drive their cars less than 2000 miles a year, and only use them periodically when temperatures vary between winter and summer conditions. Thus, a problem occurs of which weight oil to use. Model A owners that want to use a "straight weight" oil generally split the difference with the use of a 30 weight oil, however, this means that after the engine is hot, the recommended 40 weight oil lubrication quality is missing. This has been solved for us by the oil manufacturers. In the 1960's multi-viscosity oils appeared on the scene. These oils have a viscosity index changing feature added, which allows an oil to behave like 20 weight in the winter, when it is cold when you start the car, and then behave like a 40 weight oil when the engine warms up.

Multi viscosity oils work like this: Polymers are added to a light base (5W, 10W, 20W), which prevent the oil from thinning as much as it warms up. At cold temperatures the polymers are coiled up and allow the oil to flow as their low numbers indicate. As the oil warms up the polymers begin to unwind into long chains that prevent the oil from thinning as much as it normally would. The result is that at 100 degrees C the oil has thinned only as much as the higher viscosity number indicates. Another way of looking at multi-viscosity oils is to think of a 20W-50 as a 20 weight oil that will not thin more than a 50 weight would when hot. So, which temperature range should you select? The chart to the right shows the temperature ranges for various winter temperatures. As you can see the difference between 10W and 20W is 20 degrees F. While it is unlikely that you will be attempting to start your car at -20 degrees F it is also true that a 10W initial viscosity will help you with starting your car at 0 degrees F due to its lower viscosity.



To approximate "Henry's Oil" you would use a year round 20W-40 oil. A recent survey of retailers shows that a 20W-40 oil is hard to come by. On the other hand, 10W-40 is a common oil. The oil will be transitioning between 10 weight and 40 weight rapidly, as the engine heats up. Most of the operation of the car the oil will be acting as a 40 weight. It is judged that a 10W-40 is an appropriate oil for new and engines in good working order. Les Andrews a California Model A expert recommends 20W-50 for older engines with more wear on them. A multi-viscosity 20W-50 oil is readily available from most retailers.

Other Modern Oil Additives Missing in "Henry's Oil"

The following additional features in modern oils that are missing in "Henry's Oil" are; Anti-Wear Compounds (friction modifiers), Corrosion Inhibitors, Anti-Oxidents, and Anti-Foamants. Their benefits are listed on the chart in the next section.

The Bottom Line

So lets answer our original question. "So what's wrong with "Henry's Oil"? Nothing, as long as you do not want the benefits of 75 years of oil improvements. However, the use of "Henry's Oil" (a non-detergent, straight weight oil) is the drawbacks listed above. Indeed, the use of a straight 30 weight oil recommended by many Model A forums may lead to a lack of lubrication quality. The use of an oil similar to "Henry's Oil", especially if much care is not taken by the owner, will result in an engine needing rebuilding sooner than an owner using a modern oil. There are no statistics available on this issue, however, logic concludes that this is a reasonable conclusion.

Therefore, we recommend the use of a modern 10W-40 multi-viscosity motor oil. Now we are presented with the decision of whether to use a synthetic formulation, or a petroleum based oil. To understand this issue we must first understand what we are lubricating and why.

LUBRICATING THE MODEL A ENGINE

Understanding the Model A Ford Oiling System is detailed in Les Andrews book "Model A Ford Troubleshooting & Diagnostics" at page 4-36. The Model A is "oiled" using a combination of pumped oil under pressure, an oil fog caused by a splash and dip system, and gravity feed.

The oil pump is submerged in oil below the oil pan tray, a corrugated sheet metal pan, located in the main oil pan. A good diagram of the oiling system is shown in Les Andrews book on page 4-37. Oil is pumped at a rate of a little over 1 gallon per minute at 1300 RPM to the valve chamber. About 1 quart of oil remains in the valve chamber while the engine is running. Oil then proceeds downward from the chamber to the bearings by gravity feed. The pump delivers more oil than the chamber can hold and excess oil flows back to the pan through a slanted return pipe situated on the exterior of the engine, allowing cooling air to blow over the pipe.

The oiling of the cylinder walls is accomplished by scoops (dippers) on the connecting rods. These dippers pick up oil from the corrugated sheet metal pan and create a "fog" of oil that lubricates the pistons and cylinder walls.

Lubricating the bearings, cam and valve train will be covered in a future revision to this paper, but a discussion of the cylinder wall oiling is now included as it pertains to the selection of synthetic versus petroleum based oils.

Cylinder Wall Lubrication Protection

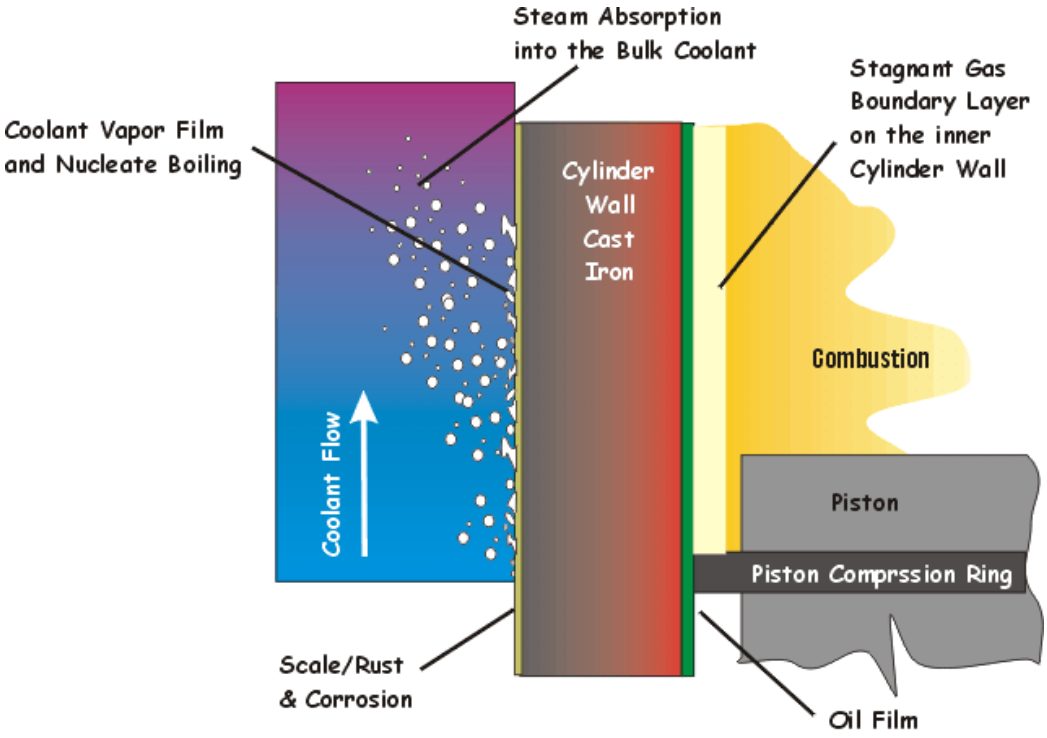
It is important to choose an oil which will not break down due to high temperatures of the engine. This is especially true in high altitude driving here in Colorado. As discussed above the cylinder walls are lubricated with a film of oil, delivered by the splash and dip system creating an oil fog in the lower part of the engine. An oil ring on each piston controls the amount of oil deposited on the cylinder wall on each stroke of the piston.

The oil deposited on the cylinder wall must not be subjected to high enough temperatures that would cause the oil to vaporize and burn. If vaporization and burning occur, then the cylinder walls will score and the engine will quickly wear and fail. The cooling system of the Model A has been sized to prevent the oil from reaching the vaporization point and burning. The vaporization point is called the FLASH POINT.

To understand how the cooling system prevents the oil from reaching the flash point we now discuss the heat transfer system in the Model A. A detailed discussion of this is covered in the Technical Guide to the Model A article posted on the Rocky Mountain A's website (www.rockymountainmodelaclub.org) on the Techincal Info page under the topic Maintenance.

Cylinder Wall Heat Transfer

The model shown in the diagram below illustrates the components of the engine in the area of the cylinder to piston. The piston operates in a cylinder which compresses a fuel-air mixture which is ignited by a spark generated by the ignition system of the Model A. In turn, the burning fuel generates a flame propagation effect causing combustion of the entire fuel-air mixture to



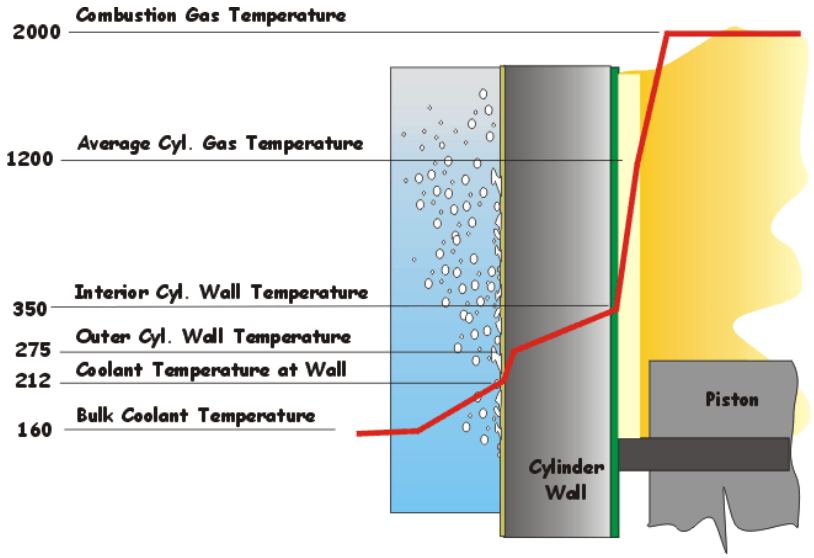
HEAT TRANSFER MODEL - MODEL A FORD CYLINDER WALL
Not to Scale

combust, pushing the piston downward on the power stroke. After the power stroke, the burned gasses are pushed out of the cylinder, by the exhaust stroke, and new fuel is pulled into the cylinder by the intake stroke. Finally, the compression stroke squeezes the fuel-air mixture up into the combustion chamber, and the cycle repeats. In this cycle there is a heating process by combustion, followed by a cooling process resulting in complicated heat input to the cylinder walls. This process is dependent upon the speed and operation of the engine. Slow speeds such as in a parade, or traffic, have higher heating and reduced cooling. Incorrect fuel-air mixtures, such as a too far retarded spark, or other engine ignition problems such as poor spark generation, worn spark plugs, carbon buildup, will also cause higher heating, and reduced cooling of the cycle. These effects are exacerbated by high weather temperatures, and altitude.

The combustion – exhaust – intake - compression cycle generates power, but also creates a boundary layer of stagnant gases at the cylinder walls (and other parts of the combustion chamber). This boundary layer at the surface of the cylinder wall is a very poor conductor of heat. Fortunately for the spark ignition cycle engine, this boundary layer exists, because it is this

layer of stagnate gasses which reduces the very high 2,000 degree plus combustion gas temperature to a more manageable temperature at the cast iron cylinder wall of about 350 deg F. Without this very poor conduction, of this stagnate gas boundary layer, the internal combustion engine as we know it, would not be feasible. The cylinder wall lubricating film is exposed to this high temperature boundary layer of burning gases.

The remaining elements of the heat transfer model are also shown in the diagram. The inner cylinder wall has a coating of lubricating oil placed there by the dip and splash operation of the crank shaft, and controlled by the oil rings on each stroke. It is this film which the coolant must maintain at below the flash point of the oil.



EXAMPLE TEMPERATURES - MODEL A FORD CYLINDER WALL
At Sea Level

The diagram above shows a typical temperature profile across a segment of the cylinder wall. The green layer represents the lubricant film on the interior of the cylinder. It is this film that is necessary to cool to below its flash point, leading to burning of the lubricating motor oil. The red line represents the temperature drops in the heat transfer model. When the fuel is combusting there are high temperatures formed, but the cyclic operation of the engine reduces the average temperatures considerably.

Oil is composed of hydrocarbons which can burn if ignited. The flash point of motor oil is the lowest temperature at which the oil gives off vapors which can ignite. The flash or ignition temperature of modern oils ranges from Amsoil at 507 degrees F to Exxon SuperFlow at 392 degrees F. Typically, petroleum based motor oils have flash points in the 415 to 450 deg. F range. Synthetic oils have higher flash points. It is unknown what the engineers at Ford contemplated as a design set point to establish the cooling system design, but it is reasonable to assume that the design evolved from previously established design practices and not a lot of modern scientific analysis or laboratory experimentation. The accepted practice of the era, would lead to keeping the oil temperature on the cylinder walls at a maximum of 350 degrees F.

The desire to maximize the margin between the inner cylinder wall temperature and the flash point of the oil is thus an important parameter in the selection of what oil to use.

Factors Leading to Cylinder Oil Failure

Factors which can cause engine overheating, leading to the temperature of the inner cylinder wall causing oil failure are many and varied. These are;

- Driving conditions, the altitude of operation, the temperature of the ambient air outside
- The mechanical condition of the engine and cooling system
- The type of coolant, and the flow rate of the coolant within the engine
- The fuel-air mixture and the spark advance setting
- The type and flash point of the oil used in the engine

In order to have the most margin in operation of the engine to allow for varying driving conditions and variability in carburetion and spark setting , it is important to have the mechanical condition of the cooling system in tip top condition and no obstructions in the coolant flow hoses and to select the highest flash point oil available.

THE USE OF MODERN OILS IN THE MODEL A FORD

The following information in this article was gleaned from the Model "A" News publication of an article written by Joseph Valentine [12] of the Model A Restorers Club article [13] and other sources. The Model "A" News paper points out that there are three choices for motor oil. There are Mineral based detergent (both straight weight and multi-grade), non-detergent oils, and new synthetic oils. As Wayne Russert points out there was only non-detergent, straight mineral oil with no additives available in 1928 through 1931 for the Ford Model A. Therefore, Ford Motor Company at that time, recommended the use of 20W oil in the summer, changing the oil to 40W in the winter. Notice that the old timers myth … "it is best to use 30W" was not advised by Ford. The purpose of an engine oil, as pointed out by our "oily" expert Don Nelson, is to Lubricate, Prevent Wear, Prevent Corrosion, and Cool the engine (actually the engine cooling provided by the lubricant in the engine is not significant).

The American Petroleum Institute (API) developed a classification system for labeling motor oils which are still used today. The closest equivalent oil that was originally used in the Model A would be labeled SA a non-detergent no additive oil. The designation SA stands for Service (or Spark) and the A for the "first designation". There are many classes of oils from SA to now SM to get information on oils of various API designations please review Appendix 4. The later in the alphabet the more (or in some cases less) additives have been blended into the oil. For example, SB oils have minimal additives and are non-detergent.

The Society of Automotive Engineers (SAE) developed a method of classifying the viscosity or grade of motor oils. Viscosity is the property of resistance to motion. Referred to as "weight" lower numbers mean less viscosity. A 10 weight oil is thinner than a 40 weight oil at a given temperature. There are two types of these motor oils, "straight weight" and "multi-grade". Multi-grade oils have Viscosity Index Improvers added that improved oils so that they flowed freely at low temperatures, but provide the required viscosity at high temperatures. A straight weight oil would be, as an example, labeled 30 weight, while a multi-grade oil would be labeled 10W-30 (the W in the designation stands for "Winter" not weight). The example 10W-30 multi-grade oil will provide 10 weight performance at about -20 deg. F and then increase to 30 weight as the engine warms up.

All this brings us to the designation "HD" which has come to mean a modern "Straight Weight Detergent" oil. Generally, HD oils have all of the modern additives listed in the next section. Detergent oils with modern additives add significant value to your engine. SA oils are devoid of any additives, and detergents, while SB non-detergent oils are only slightly better. Non-Detergent oils are still produced and serve for lubrication of gear boxes, compressors, and other devices which will not benefit from modern oil additives, and therefore are less expensive.

Finally, what are these additives, and are they beneficial to the use in the Model A Ford engine? The following chart lists the additives and their benefits which are formulated in modern oils. After the chart, is an important discussion of the most modern oil, labeled API – SM which is commonly available in retail outlets. Since this new oil, has had an important anti-wear

mechanism removed by mandate of the EPA, Model A Ford (and other vintage auto owners) should use an anti-wear compound additive prior to using this oil.

ADDITIVES and WHAT THEY DO

Additives are about 20% of the volume of a quart of oil[14]. The following table shows what types of additives are available.

Additives and What They Do	
Type of Additive	Benefit
Anti-Wear Compounds (friction modifiers)	Chemically absorb to metal surfaces forming a lubrication boundary that reduces friction and wear. NOT IN SA oils, some in SB oils
Corrosion Inhibitors	Corrosion Inhibitors encapsulate water and acid molecules, others neutralize the acids, that are formed in your engine by combustion. NOT IN SA oils, some in SB oils
Anti-Oxidents	Anti-Oxidents are dissolved in oils and inhibit the oxidation of the oil itself due to heat. Oxidation attacks bearing materials and thickens oil, and forms sludge. NOT IN SA oils, some in SB oils
Detergents (these are not SOAP!!!)	Detergents neutralize acids and clean engines, but are incapable of removal of sludge and varnish. Detergents are more like solvents than wire brushes. Dispersants and Detergents keep products of combustion, and other particulants suspended so that they do not block passages or lodge in cavities. NOT IN SA or SB oils.
Anti-Foamants	Anti-Foamants reduce foaming of the oil by rapidly moving engine parts, thus reducing the probability that the oil will contain air. NOT IN SA or in all SB oils
Viscosity Index Improvers	Viscosity Improvers maintain correct viscosity with temperature change. These additives allow the oil to perform like a straight weight oil. This allows higher oil flow at low temperatures and correct weight at high temperatures. NOT IN SA or SB oils
STP and other After Market Oil Additives	STP and most other oil additives contain a large amount of Viscosity Index Improvers, along with other additives. Thus when you add STP to your oil you are making a multi-grade oil out of it. For example when added to a 30 weight oil it makes the oil a 30W-?? where the unknown number is higher

WARNING! Do not use API grade SM oils in the Model A (without an additive)

The lack of a compound ZDDP (Zinc-dialkyl-dithiophosphate), mandated removed by the US Government, is a hazard to engines with low pressure oiling systems (such as the Model A). ZDDP provided protection to engine parts that are subject to high metal to metal pressure levels, most commonly the cam lobes, flat base lifters and gear teeth. Wayne Russert in his article about using SM grade oils in vintage automobiles says "But the rest of us 'vintage' types need to take action and soon. There are a few oils still available that carry ratings of SF (1988 and older) thru SL (2004 and older). As of 2012, the stocks of SF-SL oil have been used up and are no longer available. We believe the best solution is to go ahead and use the new SM oils while adding your own "additive package" in the form of a commercially available oil fortifier. This allows us to gain the benefits of the new SM oil (and there are many) while adding the ZDDP back in.". [15]

When Henry's mechanics poured oil into the prototype Model A engine it was straight mineral oil that we call "Henry's Oil" with no additives. It wasn't a choice, it was all they had. In those early, low power engines the oil was adequate. But as higher RPM and compression ratios increased the lubrication demands, the oil companies began mixing additive packages into the oil. The American Petroleum Institute began to classify these oils with a letter designation. "S" for spark ignition (gasoline) and "C" for compression ignition (Diesel) [16]. The straight mineral oil was "SA". The first oil with additives became "SB", and so on. What followed over the years was a happy story of ever improving additive packages including anti-wear compounds, corrosion inhibitors, antioxidants, detergents, anti-foamants and viscosity index improvers. The venerable Model A could now be driven harder and longer with high compression heads to increase power and the new oils would provide more than adequate protection. The sun was shining brightly down the highway.

In 2005 a dark cloud was seen on the horizon and clearly visible on that cloud were the letters API "SM". It seems that the main anti-wear compound in modern oils was ZDDP (Zinc-dialkyl-dithiophosphate). It provided protection to engine parts that are subject to high pressure levels, most commonly the cam lobes, flat base lifters and gear teeth. The problem was that ZDDP shortened the life of catalytic converters, so with the introduction of SM grade oils the level of ZDDP was nearly eliminated. If you only drive a modern car built during or after the '90's, read no further. The SM grade oil will work just fine. But the rest of us 'vintage' car collector types need to take action by restoring the ZDDP by adding a commercially available additive. This allows us to gain the benefits of the new SM oil (and there are many) while adding the ZDDP back in. Be sure to check the amount of viscosity index compounds in any additive to ensure that the overall viscosity of a multi-viscosity oil does not get changed. [17] Since our old cars have no catalytic converters we are not harming the environment in any way. The additive will cost less than $3 per oil change and may allow a slightly longer oil change interval.

Additional Information On API – SM Oils

From the following information posted on the Ahooga.com website in early September 2007 it appears that the zinc levels in the SM oils is clearly the culprit in a wear out mechanism which affect the flat lifter cam lobe high mechanical pressure area of the engine. According to one Ahooga responder, a motor oil manufacturer representative said "the minimum zinc level for flat tappet cams is 1000 ppm. According to the same source, the maximum level of BOTH PHOSPORUS and ZINC is mandated by the US Government to be less than 900 ppm. Oil companies responded by reducing the ZDDP level to well under the 900 ppm level. Some oils have less than 800 ppm. It is dangerous to use an oil with a API classification of SM in a Model A without a ZDDP additive. At the Castrol website the "Ask the Expert" pages claim that 800 ppm common in most SM formulations may be harmful to flat tappet cams and lifters, however, stresses that there is no test results to verify this.

It also appears that "diesel oils" which have been suggested by some responders as being immune to the Government's mandate, and can be used in the Model A to skirt this lack of ZDDP. This is a myth, the Government applied the reduced ZDDP to diesel oils as well. Manufacturers have also reduced the ZDDP or Zinc/Phosphorus levels in these oils. For example the old tried and true API CI-4 oil has been changed to designation CJ oil with a reduced ZDDP level. Further, not all diesel oils are usable in the Model A engine. Diesel oils have a different formulation, with increased levels of detergents, to combat the higher "soot" levels in combustion byproducts. Since there is no test evidence available on the use of diesel oils in the Model A Ford, it would be wise to avoid the use of diesel oils as a means of skirting the lack of ZDDP in the SM type oils.

What I would determine from these arguments, is that Wayne Russert is correct in advising the use of a modern SM oil with an additive such as SFR Oil Enhancer which puts the Zinc back in. It may be dangerous to go by "hearsay" and "rumor" about "diesel oils" and other solutions to this problem.

What Do Other MODEL A Experts Say About API – SM Oils?

There is a large body of evidence being built up by the vintage car community, that SM oils are certainly detrimental to the Model A engine, as well as other pre-1990 engines. For example, the Mustang websites, also warn their visitors that the use of these oils without additives will damage their engines. John LaVoy of Model A times has recently talked to the folks at Iskenderian Cams and they reaffirmed that SM oil by itself will not protect flat bottom lifters.

While MAFCA's and MARC's website is silent on this issue they do have some information regarding oils. Appendix 3 is a download of articles posted on the MAFCA website regarding oils and lubricants.

What About using Diesel Oil as a Substitute for SM Oils?

Some information is floating around the Internet in vintage automobile circles that the use of diesel formulated engine oils will solve this problem. As stated before this is not true. The EPA at the same time as mandating the reduction or removal of ZDDP from gasoline engine oil and changing the API rating from SL to SM the government mandated that diesel oil formulations be changed as well. The diesel oil rating of CI or CJ-2 has been changed to CJ-4 and also has the ZDDP removed. If you plan to use diesel oil in your Model A you should be aware that diesel motor oil is formulated differently than passenger car oils. The reason for this is to combat the heavy amount of combustion by-products formed in the diesel engine. Other changes exist between gasoline engine oils (oils with API ratings starting with S) and diesel engine oils (oils with API ratings starting with C). Some manufacturers of diesel oil claim that you can run their oils in gasoline engines while others are silent on this issue. According to Castrol you can use heavy duty diesel oils if your car does not have exhaust after treatment systems (catalytic converters). While some of these oils (Chevron Delo 400, and Castrol Diesel among others) claim that you can use diesel oil in a gasoline engine, they are referring to modern cars. There is no testing available to show that the Model A engine will be unaffected by the use of diesel oil with increased levels of detergent. Therefore; we should proceed carefully in this area, and abstain from the use of diesel oil, since there are other solutions to using API – SM oils.

WHAT ABOUT USING SYNTHETIC OIL?

Synthetic Oil has been available for many years. It is composed of compounds not found in mineral oils (petroleum). It is generally superior in mechanical and chemical properties than mineral oil.

What is synthetic oil?

The easiest way to define what synthetic oil is, is to define what it is NOT. [18] Conventional motor oil as we have known it for the last 100 years or so is derived from crude oil that is taken from the earth with oil wells. Through a complex distillation process the crude oil is refined into many different liquids, or fractions, each having distinct characteristics. Some are very light and are used as fuel (gasoline, kerosene, diesel fuel), and some are heavier and are used as lubricants (motor oil, gear lube, grease). There are many molecular compounds present in crude oil and many of those compounds are still present in the refined product, detracting from the physical properties of that product. For instance, paraffin based waxes are present in crude-based oil, but contribute nothing to the lubricative properties of the oil. Also, the size of the hydrocarbon molecules themselves are non-uniform in crude-based oils. Synthetic oil contains none of these contaminants and the hydrocarbon molecules are very uniform, giving the synthetic oil base better mechanical properties at extreme high and low temperature (see the sections below on physical properties). By contrast, synthetic oil is not distilled from crude oil. It is made through a chemical process known as the Fischer-Tropsch process, starting with raw materials like methane, carbon monoxide, and carbon dioxide. This process was developed by Germany in WWII, when that country's access to crude oil was very limited.

Grades of oil

Motor oils are derived from base stocks. That is, a generic oil base is modified with additives to produce a lubricant with the desired properties. A base stock oil with no additives would not perform very well at all. Base stocks are classified by the American Petroleum Institute (API) and fall into one of five categories.

Group I and II - these are mineral oils derived from crude oil
Group III - this is a highly refined mineral oil made through a process called hydrocracking. In North America this group is considered a synthetic oil, for marketing purposes.
Group IV - these are true synthetic oils, known as Polyalphaoefin (PAO).
Group V - these are synthetic stocks other than PAO's and include esters and other compounds.

API group III base oils such as found in Chevron, Mobil, Castrol and other companies oils have been developed using catalytic conversion into “base stocks” which are then processed by adding other compounds “additives” which create the oil found on the shelves. Group III base stocks are considered synthetic motor oil in North America. These are sometimes marketed as “full”

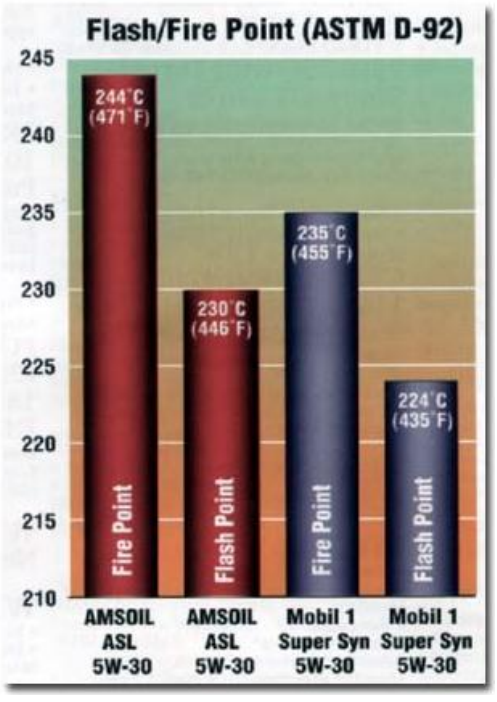
synthetic. Be aware that there are blends of mineral oils with synthetics. If you want a real synthetic oil you must choose carefully and look for a "fully synthetic" label.

Flash Point Advantages of Synthetic Oils

Generally, there is measurably better low and high temperature viscosity, chemical and shear stability, decreased evaporative loss, and resistance to oxidation and thermal breakdown. In addition, there is better resistance to sludge accumulation. Independent testing shows that users can have extended drain intervals.

Tests have shown that the FLASH POINT of Synthetic Oils such as AMSOIL is generally higher than petroleum based oils. This is important for having margin with respect to the scoring of cylinder walls due to high temperatures. Flash point is the temperature at which an oil gives off vapors that can be ignited with a flame held over the oil. The lower the flash point the greater tendancy for the oil to suffer vaporization loss at high temperatures and to burn off on hot 9+cylinder walls and pistons. The flash point can be an indicator of the quality of the base stock used. The higher the flash point the better. Flash point is in degrees F, 400 degrees F is the minimum desirable flash point for preventing oil burning. The synthetics offer the only truly significant differences, due to their superior high temperature oxidation resistance, high film strength, very low tendancy to form deposits, stable viscosity base, and low temperature flow characteristics. Synthetics are superior lubricants compared to traditional petroleum oils. You will have to decide if their high cost is justifed in your application.

Amsoil has performed ASTM tests for the FLASH POINT and compared its product to Mobil Synthetic products. The results are in the graphic at the left below.



Typical values for oil products are shown in the table

2012 Internet Survey	Flash Point (deg F	
	Conventional	Synthetic*
Valvoline 10W-30	420	455
Mobil Super 10W-40	430	486
Shell Helix 5W-40	428	431
Shell Adv. Racing 30W	-	521
Amsoil 10W-30	-	471
Pennzoil Ultra 10W-30	-	435
Average	426	455**

* Various grades of oil products by the same producer have different Flash Points (e.g. Mobil Super Syn in the weight 5W-30 is 413, while 10W30 is 486)
** Average excludes the Shell Racing Oil.

As can be seen in the graphic and the table, Flash and Fire points for Amsoil is better than the competitors. It is important to note that there are significant differences between oils, and formulations are

changing all of the time. Websites for Castrol, Chevron, and Havoline for example do not provide technical information on the flash point for their oils.

Beyond Flash Point Advantages

Because a synthetic oil is chemically produced, there are no contaminants in the oil. By contrast, conventional oils contain small amounts of sulfur, wax, and asphaltic material that can promote detonation as well as varnish and sludge buildup. With no wax, synthetics will flow at much lower temperatures than conventional oils. Because a synthetic oil's molecules are much more consistent in size and shape, they are better able to withstand extreme engine temperatures. By contrast, the unstable molecules in conventional oil can easily vaporize or oxidize in extreme heat

Finally, we can strike a small blow to the conventional, middle eastern oil cartels, and the grip they have on the American public.

Disadvantages of Synthetic Oils

Higher cost for the synthetic oils, in general about a factor of about 2 over mineral oils. Synthetics cost about $5 to $6 per quart at Walmart in 5 quart containers, compared to $3.00 to $3.50 for mineral oils. These costs are mitigated somewhat by the use of longer change intervals (not important for the Model A).

Lower friction may make them unsuitable for break in periods for new or rebuilt engines. Many vehicles are now shipped from the factory with synthetic oils, so at least the car manufacturers feel that this issue is of no importance. Some car manufacturers (many in Europe) require synthetic oils to avoid warrantee issues.

It has been found that older pushrod race engines with roller lifters have problems if they slide, not spin with camshaft movement. For the Model A, this may be of significance since the motion of the cam against the lifter would simulate that of a sliding cam to roller lifter. There is no Model A Ford testing that has been reported on this issue, however, one must be aware that this issue exists.

Another issue, is that there can be stress cracking of plastic components that come in contact with the oil.

Reports

Consumer Reports in July 1996 published a two year study involving a fleet of New York taxicabs which showed no measurable advantage to using synthetic oils in wear, less frequency of motor overhaul, and repair of components. However, this information does not account for low temperature starting, or driving long distances at high speeds as would be found in passenger car use of synthetic oils.

CONCLUSION: WHAT IS THE BEST FOR ME?

NON-Detergent Oils:
If you want to use EXACTLY the oil used by the Ford Motor Company in 1928 to 1930 (not recommended) then you have to find an SA pure mineral oil (not easy these days) and use 20 weight in the winter, and 40 weight in the summer. However, you will give up Anti-Wear, Corrosion, Anti-Oxidant, Anti-Foaming and Multi-Grade Viscosity protections, and incur sludge in your engine. If you insist on a non-detergent oil but want to have some minimal protection select an SB designated oil, if you can find it! Be aware, if you go this route, you WILL NOT have combustion generated particulate materials suspended in the oil (since the detergent/dispersal function is not included), and they will not all drain out with the used oil.

Straight Weight Detergent Oils:
If you want the protection of all of the additives available today in modern oils you then have two choices. Choose a straight weight "HD" oil or find a straight weight non-detergent "SA" oil and add an additive. However, be aware that your straight weight oil will not have the benefit of changing viscosity with temperature. As an example 30 weight HD means that your engine will "see" a 30 weight oil at cold weather startup and remain a 30 weight oil at higher temperatures.

Note: If you add STP, Marvel Oil, or other similar additive products with low to high values of Viscosity Index Improvers (usually said to make the oil super slippery) to a straight weight oil, you are in fact making a multi-grade oil out of it with the cold weather startup weight (in our example) of the base oils weight, 30 weight in our example, and a high temperature weight of a higher but unknown value … you will be making a 30W-?? oil. When the engine is hot, the lubrication quality will be unknown.

Multi-Grade Detergent Oils:
If you want protection of all of the additives and the further advantage of a lower cold weather startup flow for your oil (probably a good idea here in Colorado with unheated garage temperatures in the winter of about 0 to 32 deg F), choose a multi-grade oil such as 10W-40 or some such oil. Thus you will gain the advantages of modern additives with the added advantage of cold temperature oil flow in your low oil pressure (3 psi) Model A engine. However, see the warning if choosing an oil with an API classification of SM.

Note: Adding a commercial additive product to multi-grade oils will have unknown effects. For example; adding STP, Marvel Oil, or another commercial products, with high values of Viscosity Index Improvers to a multi-grade oil formulated to a 10W-30 will change its overall viscosity rating to ??W-??, with unknown results other than costing you some money.

Synthetic Oil:
Generally a synthetic oil will give somewhat better performance than a mineral oil, but at a cost of about two times that of the mineral oils. The synthetics have a higher flash point and therefore add margin against cylinder wall scoring. Especially if high temperatures are created by cooling system failure or inefficiency. The higher flash point averages 25 deg F more than

conventional oils. We recommend the use of synthetics for this reason. For the Model A which has its oil changed only about once to twice a year the higher cost of the synthetics may be of little significance. For example; assume that you change the oil in your Model A twice a year in the spring and fall. Since you will be using 4 ½ quarts per oil change the cost will be for 9 quarts of oil. If you used the least expensive oil this would be about $45 per year. On the other hand if you used an expensive synthetic, the cost would be about $90 per year.

API Classification choices:
Modern oils in today's marketplace usually are multi-grade and have designations SM. However, as shown above the SM oils are a potential danger to premature wear out of high pressure interfaces in the Model A engine, such as the cam to valve interface. To solve this problem it is recommended that this designation oil be either avoided or modified. Generally, to avoid the use of SM oils you have to really shop around to find multi-grade oils with designations less than SM. On the other hand, it is easier to find either straight weight or multi-viscosity diesel oils labeled HD which have an API classification of less than CF-4 which are used for tractors, trucks and other utility vehicles. However, as shown above, there is no reliable test information available on the effects of using diesel oil in the Model A engine. If you are going to use an oil with an API classification of SM it is recommended that you add a compound which replaces the ZDDP which has been removed in this classification. It is not recommended that diesel oils be used in an attempt to avoid using an oil without ZDDP.

Finally
As usual, this paper is gleaned from many sources and contains a good dose of non-professional opinion. If you have any facts, knowledge or experience in this matter, please share it with us.

Appendix 1 - OIL COSTS

This appendix provides information on the cost and availability of various oils at various locations near Castle Rock Colorado

Summary:
The following summary table shows the availability of various oils, their prices, and types in Warlmart retail outlets (3) in or near Douglas and Elbert Counties in Colorado.

Table 1 Summary of Automotive Oils (1)

Manufacturer	Grade	Type	Cost per 5 qts
Mobil 1	10W-40	Full Synthetic	$26.50
Mobil 1	5W-50	Full Synthetic	$26.50
Mobil 1	0W-20	Full Synthetic	$26.50
Mobil High Milage	10W-40	Conventional Petrolium	$15.23
Castrol Edge	10W-30	Full Synthetic	$27.00
Castrol GTX	10-W-40	Conventional Petrolium	$16.00
Valvoline	10W-30	Synthetic	$26.50
Valvoline Max Life	10-W-40	Conventional Petrolium	$16.25
SuperTech (Walmart)	10W-30	Full Synthetic (2)	$20.25
Supertech (Walmart)	10W-40	Conventional Petrolium (2)	$14.65

Notes:
(1) All oils have an API rating of SM unless otherwise specified
(2) An independent website review of Super-Tech oil that Wal-Mart sells under their house name indicates that Super-Tech is very good quality oil. [19] In many tests the 'Super-Tech' oil was superior to many name-brand oils. [20] The oil is supplied to Wal-Mart by Pennzoil/Quaker-State, Warren Performance Packaging (Omaha, NE), ExxonMobil and Shell. It uses the high-quality group II/III base stocks as their name brand oil, but uses an off-the shelf additive package not their own. Each Walmart gets its oil from a different source, so you may not know which supplier is providing oil or the additive package being used.
(3) Finding 10W-40 in a full synthetic oil is difficult, while multiple vendors carried 10W-30 weight oils in full synthetic versions, 10W-40 was available at Walmart Castle Rock from Mobil 1 ONLY.

Appendix 2 - MOTOR OIL 101 (a tutorial)

The following text [21] has been downloaded from www.castrol.com and is a tutorial on how oil is formulated.

Let's start with the basics. The oil used in your car has two primary ingredients: base oil and additives. The base oil allows the motor oil to perform its vital function - lubricating the engine's moving parts to protect them against wear and tear caused by friction. The additives provide additional engine protection by helping prevent the oil from deteriorating under the extreme temperature conditions in the engine.

The base oil is refined from crude (oil in its natural state when pumped from the ground). The crude must undergo a variety of refining processes before yielding base stock suitable for use in engine oil. Undesirable components such as wax, sulfur and nitrogen compounds must be removed. Unsaturated hydrocarbons must be extracted or converted into more stable molecules. Crude is first separated by vacuum distillation into a series of fractions or viscosity ranges. The fractions intended for base oil production are processed further using various combinations of refining processes, such as:

- Solvent Extraction- separates the naturally occurring saturated and unsaturated hydrocarbons.
- Hydrofinishing- removes some of the nitrogen and sulfur compounds, improves color, oxidation and thermal stability of base stock.
- Hydrotreating- converts some of the unsaturated hydrocarbons to saturated hydrocarbons to help improve yield prior to solvent extraction. This process also helps remove of large portion of sulfur and some nitrogen compounds.
- Hydrocracking- a sophisticated process in which molecules in the base stock fraction are rearranged into the desirable saturated hydrocarbon molecules. The yield of saturated molecules is much greater than that achieved with hydrotreating and solvent extraction.
- Hydroisomerization- when used along with hydrocracking, can transform the molecules of the base stock fraction into the most stable form possible.

Base oil alone is not enough to properly protect your engine. A motor oil needs to perform a wide variety of functions under a wide range of engine operating conditions. Therefore several additives are incorporated into the formulation:

- Detergent/dispersant additives- are used to maintain engine cleanliness, keeping the various contaminants in a fine suspension and preventing them from settling out on vital engine components.
- Rust and corrosion inhibitors- are added to protect the engine from water and acids formed as combustion by-products.
- Antioxidants- are added to inhibit the oxidation process, which can result in oil thickening and sludge formation.

- Anti-wear additives- form a film on metal surfaces to help prevent metal-to-metal contact.
- Viscosity modifiers and pour point depressants- help improve the flow characteristics of motor oil.

Now that you know what motor oil is, how it is made and what it does, here comes the most confusing part of all: grades. In order for motor oil to perform its major function - lubrication - its viscosity (the measure of it's thickness or resistance to flow) must be capable of holding up under your engine's extreme temperature conditions. Oil thins when heated and thickens when cooled. Choosing the proper viscosity grade for the ambient temperature of your geographic location becomes vitally important.

A monograde is an oil whose viscosity is defined at only one temperature, either high or low. A multigrade must meet both high and low temperature viscosity requirements simultaneously. This makes multigrades an easy and popular year-round choice for drivers who experience hot summers and harsh winters. They are easily recognized by the dual viscosity designation (i.e. 10W-30 where the 10W is the low temperature, or winter designation and the 30 is the high temperature designation). It is the viscosity modifier additive that produces a thickening effect at high temperatures but is dormant at low temperatures.

Information concerning the performance, viscosity grade and energy conserving properties of an oil can be found within the API Service Symbol, also known as the "Donut". This symbol displays the API (American Petroleum Institute) Service rating, a two-letter classification that identifies the quality level of the motor oil and the type of vehicle it is suited for. The first letter "S" indicates the oil is appropriate for "spark ignition" or gasoline engines. The first letter "C" indicates the oil is intended for "compression ignition" or diesel engines. The second letter in each category indicates the performance level of category. For the "S" categories, the performance level increases as the categories go through the alphabet. However, the same is not true for the "C" categories as the types and intended application range for diesel vehicles vary greatly. It is important to refer to the owners' manual for appropriate performance recommendation.

In the center of the donut will be the SAE (Society of Automotive Engineers) viscosity classification. The bottom of the donut is reserved to convey the energy conserving properties of the oil as determined in a standard industry test.
If an oil meets both the latest "S" API service category and the current energy conserving standard, it is also able to display the API Certification Symbol, known as the "Starburst". The Starburst will always be found on the front label.

Appendix 3 – COMMENTS ON SM OILS by other "Experts"

The following is a download of articles posted on the MAFCA Website regarding oil and lubricants [22]. The MAFCA website does not have any information about the current API rating of SM oils or their usage. Summarizing:

- Les Andrews (A California Model A Ford expert [23]) says "Any detergent oil will work OK" he also indicates that a multi-grade oil (such as 20W-50 for older engines). He recommends changing oil every 500 miles.

- Lyle Meek [24] also recommends the use of detergent oils and changing the oil every 500 miles. He also claims that the use of unleaded gas in a Model A without hardened valve seats is OK. He does not recommend adding ATF oil to gasoline to lubricate the valves.

DOWNLOADS of INFORMATION POSTED ON THE MAFCA WEBSITE

DETERGENT VS. NON-DETERGENT OIL

Question:
I am changing the oil in a Model A. I don't know what type of oil was used before. I have seen your tech answer saying the an SAE 30 detergent oil is appropriate and desirable if the engine is clean. What about my situation. Can I replace the oil with detergent oil even if I don't know what was used before without cleaning out the oil pan and oil pump? What are the consequences? just smoky exhaust? And what about using a 20W-50 high detergent oil? Thanks. -- **B. Cassels**

Answer:
Any detergent oil will work OK. If your engine has been using a non detergent oil for a long period of time, there will be deposit buildup around the rings, valves, and cylinders, etc.. Many times the wear in the engine parts is taken up by these oil deposits left in the engine. This is OK until you go to a detergent oil. After a couple of oil changes you will wind up with a real clean engine [25] and the deposits that were taking up some of the wear space is now gone so expect to start using more oil. This will only be noticeable if the engine has a lot of miles on it and sufficient wear. I would think 20W-50 would be OK [26] . You should change every 500 miles. Maybe sooner the first time if you are not sure what was previously used. Hope it works for you. -- **Les Andrews**, Technical Director

GAS AND OIL:

Question:
I've a couple of simple questions concerning my 1931 A roadster deluxe: Is it better to run the engine on leaded or unleaded gas? What happens if I use motor oil with detergent without cleaning anything before? -- **Christian Affolter**

Answer:
Unleaded gas will not harm the Model A engine. Originally lead was added to gasoline as a lubricant to cool the exhaust valve seats. Over the many years of use the seats in the block have absorbed much of the lead deposits. Even with out lead additive, there is very little chance of burning the valves with this low compression engine. Some people have hardened valve seats installed when their engine is rebuilt. It is questionable weather this is necessary.

Adjust intake valves at .013 and exhaust valves at .015 inches and you will never burn a valve. I have three Model A's with standard block valve seats and have never had a problem with unleaded gas. In California we have had unleaded gas for a long time. If your engine has been using a non-detergent oil, you may have a build up of oil deposits and sludge in the engine. The detergent oil will in time clean all (or most) of the deposits and sludge from the engine and you will end up with a much cleaner engine.[27] The detergent oil will suspend the deposits and sludge in the oil. When the oil is drained, the deposits and sludge are drained with the oil. A non-detergent oil works opposite. Sludge and other deposits are not suspended in the oil and settle to the bottom of the pan and collect around the rings. When the oil is drained there still remains oil sludge in the pan and around the rings.

The affect of using detergent oil in a dirty engine is it will give you a much cleaner engine after a couple of oil changes. [28] It will also clean the deposits around the rings. If the engine has a lot of wear, the deposits are probably taking up a lot of the wear space. When the deposits are cleaned away with the detergent oil, you may start using or burning more oil because of the added clearances obtained from a cleaned engine. When using detergent oil , the oil should be changed every 500 miles. Since the Model A has no air or oil filters, the engine absorbs a lot of contaminates. I recommend using detergent oil and changing it every 500 miles which will give you a cleaner engine that will not wear the engine parts as quickly. **– Unknown Contributor**

OIL WEIGHT

Question:
I have a 1931 Model A standard coupe. I would like to know what type of oil I should use, 30 weight non-detergent or can I use a detergent oil? I live in the hot climate of Arizona. I have removed the oil pan and cleaned the oil pump and pan. I also removed the valve side plate and cleaned that area. The pistons and valves were checked with the head off. The engine seems to be in good condition and I plan on changing oil every 500 miles. -- **Howard Little**

Answer:
If your engine is clean as you stated I would definitely use 30 weight Detergent oil [29]. I have no preference as to brand. They are all far superior to 1930's oils. By using detergent oil and changing every 500 miles (as I do also) the grime is held in suspension and when draining the oil so goes the dirt and grime. Most contamination comes from no air filter on the carburetor. – **Unknown Contributor**

Appendix 4 - API RATING HISTORY

API Numbers [30]

Shortly after WWII, the American Petroleum Institute (API) developed a system that established three basic types of engine oils: regular, premium and heavy-duty. Naturally, three oil classifications could never hope to cover all of the different applications ranging from conventional passenger cars to heavy-duty trucks. The API eventually realized that other variables had to be considered, such as the type of engine and its usage. In 1952, the API launched the service classifications system.

The API system revolves around two general classification: S for Service (typical passenger cars and light trucks) and C for commercial applications (typical diesel equipment). The breakdown of "S" varieties is as follows:

SA: This is a plain mineral oil that doesn't contain additives common in today's high-tech lubricants. This oil was primarily used in the 1920s and is obsolete today.

SB: Lubes that contain anti-wear and oxidation inhibitors as well as corrosion inhibitors. This oil was primarily in use prior to 1964, was created for vehicles that saw moderate conditions and is obsolete today.

SC: This classification was originally recommended for use in 1964-67 vehicles. It contains additives that control rust, wear, corrosion and engine deposits. It too is now obsolete.

SD: These lubes were recommended for use in 1968-70 vehicles as well as certain post-1970 passenger cars. This oil contains the same additive packages as the SC class and can be used in place of it. SD is obsolete today.

SE: This category was recommended for certain 1971 vehicles as well as most 1972 vehicles. This classification offered more protection than the SD group of lubricants and was suitable for severe-duty applications. This classification is used in place of SD oils, but it is now obsolete.

SF: Recommended with 1988 and older passenger vehicles. This oil has superior anti-wear properties and enhanced oxidation stability over SE lubricants. It too is obsolete today.

SG: The SG rating was introduced in 1989 and combined the performance properties of the commercial rating CC (lubricants designed for use in supercharged/turbocharged diesel applications in moderate to severe service). Its designated use is for 1993 and older engines, and is also obsolete.

SH: Now obsolete, SH was designed for 1996 and older engines.

SJ: Introduced in 1996, this rating is for all automotive engines, early 2001 and older and is still current.

SL: This rating is for all gasoline engines currently in use. SL oils are manufactured for better high-temperature deposit control and lower oil consumption. Some SL oils also qualify as "Energy Conserving."

SM: This rating is the most current as of 2005 and has reduced levels of ZDDP to account for degradation of catalytic converters in modern cars. It has problems with flat tappet cams and with high pressure gears.

FOOTNOTES

[1] Published by Lincoln Publishing Co. Lockport NY
[2] Victor Page rose to literary prominence as a Technical Writer with successes with the Model T and his books sold tens of thousands as being a comprehensive repair and maintenance reference book.
[3] The Model A Ford Construction-Operation-Repair; by Victor Page; Lincoln Publishing; April 1931: at page 160
[4] According to the Ford Motor Company's Service Bulletin for October 1928
[5] It must be understood that in those days the thermo-mechanics of oil was not advanced. Ford's recommendation, in the light of modern day science is faulty. Since the engine warms up quickly to a high operating temperature the oil weight at this operating temperature should be a constant regardless of the time of year. If 40 weight is needed at high temperatures then it should be available winter or summer. However, multi-viscosity oils were not available in 1928 to 1931 therefore, Ford had to choose which to use. Apparently they chose 20 weight to ease the starting problem in the winter (a 20 weight flows ok at 0 degrees) to the detriment of the lubrication quality at operating temperature of a 40 weight oil. The notion of using 30 weight oil in the Model A stems from this consideration.
[6] Original Ford Service Bulletin published September 1931 at page 291.
[7] Page at page 74 - 77
[8] ibid at page 78
[9] ibid at page 80.
[10] Ibid at page 160
[11] Depending on how much you drive
[12] Joseph Valentine, Newburgh NY; semi-retired engineer at the Texaco Research Center, ASTM, SAE and ASME
[13] Choosing the Right Oil for your Model A: Joseph Valentine, Vol. 54 No. 3 May-June 2007
[14] Of a detergent oil.
[15] One such additive is SFR corporation's OIL FORTIFIER at the rate of 1 oz. per quart. SFR Oil Fortifier may be obtained from SFR in Butte MT. Info at 1-800-735-6438
[16] In later years the API began referring to "S" as Service and "C" as Commercial.
[17] If you are using SFR's Oil Fortifier, the addition of SFR 100 at 5% changes the viscosity about only 1%
[18] www.synthetic-oil-technology.com
[19] According to Yahoo Answers Website and others . Google "Super-Tech"+Oil to get other comments
[20] It is claimed by the writer of this review that the tests were made at a Texaco Laboratory.
[21] Source: www.castrol.com ask the experts
[22] Disclaimer: "MAFCA makes no representations or warranties of any kind, express or implied as to the operation of the site or the information, content, materials or products included on this site. To the full extent permissible by applicable law, MAFCA disclaims all warranties, express or implied, including, but not limited to implied warranties of fitness for a particular purpose. Nothing expressed, furnished, or supplied by this site is, or implied to be, technical advice or services, or substitute for the advice and services of a qualified mechanic."

[23] And author of the Model A Ford Mechanics Handbook, a widely used restoration manual.
[24] The technical director for MAFCA
[25] This may not be absolutely true, since deep sludge will not be removed and a "clean engine" may not be the result
[26] The closest multi-viscosity oil to the original Model A Ford oil would be 20W-40 Les Andrews seems to lean on having a heavier 50 weight oil for high mileage cars.
[27] A myth (see footnote 26)
[28] This observation may be a "myth" since there are no solvents in the "detergent" oils. The mechanism of the "detergent" oil is to keep combustion products in suspension, not to scrub your engine of prior deposits. While it may be true that some "cleaning" of the engine will occur, it is certainly not to the degree claimed by the writer of this answer.
[29] 30 weight oil is probably OK for the Californians but definitely not good for Coloradoans. Note that Ford Motor Company recommended 20 weight in the winter and 40 weight in the summer. A multi-grade 10W-40 will perform much better than straight 30 weight.
[30] Downloaded from the Castrol website