Which oils are right for your 356 engine?

By: Ray Morgan

The push rod engine used in the 356 is characterized by its flat tappet cam design for opening the overhead valves. What this means is that a tappet or cam follower rides against the cam shaft and is activated by the cam lobe to move the push rod, raise and lower the rocker arm to open and close the valve. It is a simple mechanical approach and has been for years extremely reliable until recent federal regulations for motor oil mandated the severe reduction of zinc in passenger car formulations. This is important because without sufficient levels of zinc in motor oils, there is nothing to cushion the flat tappet as it moves against the cam lobe.

Zinc is an anti-wear additive and an absolute necessity for older flat tappet engines. However in new modern engines, zinc has been found to damage the catalytic converter and together with auto manufacturers, oil producers have reduced the level of zinc formulations in oils labeled “SM”.

The American Petroleum Institute or API sets the standards for oil formulations. These standard designations can be seen on oil bottle labels and are so strictly enforced that oil brands like Shell, Mobil, Exxon, Pennzoil and Valvoline are all virtually identical.

There are two types of lubrication needed in an engine; hydrodynamic and boundary. Hydrodynamic is formed by the movement of parts like bearings and shafts where a layer of oil builds to separate these parts and is continuously replenished. Boundary is lubrication formed without full film separation and requires additives like zinc to cushion and help reduce friction. These higher level zinc containing oils are designated by the API code “SL” or earlier.

At this year’s Performance Racing Industry show in Orlando, the chemists from Shell Research lectured on levels of zinc needed to sustain flat tappet engine life. The general consensus minimum was defined as 1600 ppm zinc or about 0.110 percent by weight. Any oil labeled by the API as “SM” or later contains less than 800 ppm zinc or half the percent by weight needed to protect the cam and followers. If ‘SM” oil is used in a flat tappet engine the owner can expect serious wear of the tappet and cam. Only oils blended to “SL” standards or earlier contain high enough levels of zinc needed to protect boundary lubrication components. This chart compares various API designations.

API Designation or Specific Brand	Year Formulated	Zinc Content % by Wt
SH	1996	0.130
SJ	2001	0.110
SL	2004	0.110
SM	2005	0.087
Shell Rotella T	2006	0.147
Pennzoil 20W50 Racing	2006	0.196
Quaker State Q Racing	2006	0.200

The ideal oil for the 356 engine as designated in the 356 owner's manual is SAE 30W. This is specified in all the literature from the 1950's and 1960's. In those days many passenger car engines utilized flat tappet designs and the oil of the day met those needs. It is now 2007 and most automotive engines are the overhead cam type needing only hydrodynamic lubrication. The common oil designated for new Porsches is synthetic 5W30. These oils can be low in zinc and are needed to help the engine meet emission standards as certified by API for all gasoline engines. What is good for Porsche engines today might not be so good for Porsche engines built 50 years ago.

There are still a number of oils available that contain adequate levels of zinc to protect the flat tappet cam design of the 356 engine. However finding single grade oils makes the hunt a bit more interesting. Converting to multi-grade is one solution but for the purist where only mineral based SAE 30W will do, Pennzoil, Quaker State, and Valvoline all offer "SL" formulations. Another alternative is Shell Rotella heavy duty motor oil. Although it is marketed for diesel engine use, there is no reason not to use it in gasoline fueled cars. In the late 1960's this was the brand recommended by Porsche for its 911 engines.

Is reduced zinc in motor oil a serious issue for 356 owners? Absolutely! It is so important that even freshly rebuilt engines can experience excessive wear. Careful attention to the selection and use of motor oil in older cars built prior to 1970 is imperative. Owners can not take for granted that what once worked will still work today. Just as gasoline has been reformulated removing lead and adding ethanol, so have motor oils and other lubricants been changed to meet today's market place needs.