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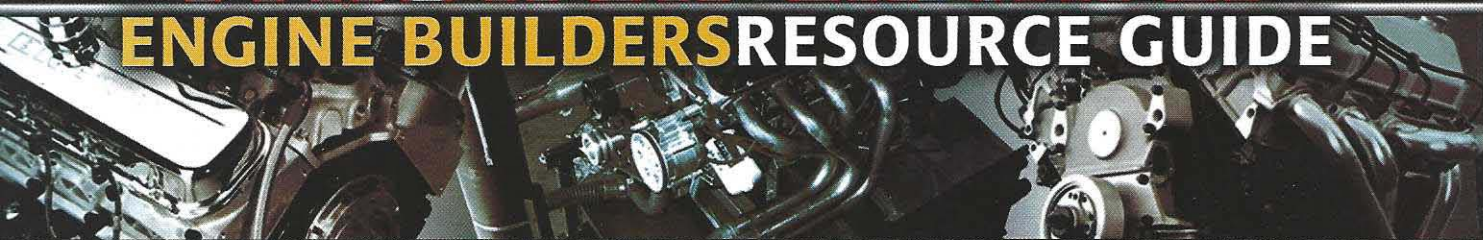
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# ENGINE BUILDER



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See  
Pg. 34





Melling's Ford Modular 4.6L & 5.4L 3-valve and 5.4L 4-valve engines (2004 and newer) M340 & M360 stock replacement oil pumps have 30% more flow as compared to the original 4.6L & 5.4L 2-valve engines. The increase in flow is required by the Variable Valve Timing (VVT).

53021622AF pump. Melling's 10342 Select Performance high pressure pump can be used with either the 5.7L or the 6.1L Hemi engines.

- Chrysler first Gen Hemis: Melling has reintroduced the M-50 and M-51 oil pumps for the first generation Hemis. These hard-to-find pumps had been discontinued, but with ongoing demand for restoration work, they are back.

- Chrysler 2.4L FWD cars & minivans (2001-2008): Melling has released the K392 repair kit for these applications.

Osterhaus said Melling has also released pressure relief spring kits for engine builders who want to adjust the oil relief setting in small block or big block Chevy oil pumps. Each package contains 5 different relief springs. Osterhaus said replacing the spring in an oil pump is a far better and safer way of changing the relief pressure setting than trying to shim or cut the spring.

To reduce the risk of dry starts, Melling also has a new pre-lube engine oiler for priming late model engines with crankshaft driven oil pumps. On these applications, there's no way to rotate the oil pump without rotating the crankshaft (unlike engines with crankcase-mounted pumps that can be spun with a traditional shafted priming tool).

Melling has also posted several how-to videos on YouTube ([www.youtube.com](http://www.youtube.com)) that describe the proper techniques for installing oil pumps and pickups. In one of the videos, they describe how most pickup tubes have an interference fit with the oil pump inlet. This requires a special driver tool to install the pickup tube on the oil pump (which should be done on a bench, not on the motor). Installers are also warned to never pound on a pickup tube with a hammer, and to never attempt to install a pickup tube on an oil pump that has been mounted on the block as this may damage the pump.

One of the videos also provides advice on how to measure and correctly position the pickup inlet about 1/4" above the bottom of the oil pan. A pickup that is mounted too high may suck air while one mounted too close to the bottom of the pan may restrict oil flow to the pump.

## Wet Sump Pump Progress

Vern Schumann of Schumann Sales & Service has been busy working on 12 new patents for the wet sump high performance oil pumps that his company makes. Schumann's current product line includes their high flow, dual feed racing pump for small block Chevy V8s as well as various performance pumps for SB/BB Chevy, Oldsmobile and Pontiac, Ford V8, 6 and 4-cylinder engines, and Mopar 340-360 V8s.

"Our newest oil pump is for LS/LT/Gen III GM engine applications," said Schumann. "The prototype is done and should be in production by July or August. The new pump features a modified casting design and gear set that flows 14 to 17% more oil than the stock pump."

"The stock LS oil pump has a vertical relief valve that can trap air. When the air vents out of the valve, it can cause a momentary loss of oil pressure that may last 3 to 5 seconds. This can be very unnerving if the vehicle owner has an oil pressure gauge and sees the gauge suddenly drop while driving down the highway. Our pump has a patented relief valve design that eliminates this problem. It also has an adjustable ball relief valve with external bypass so excess oil is dumped out of the pump rather than being forced back into the pump inlet."

"Our new LS oil pump will also have an adjustable mounting so the pump can be repositioned to compensate for changes in crankshaft alignment if the block has been line bored. You can't do that with a stock pump."

Another problem Schumann says affects both crankcase-



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Schumann will have a high volume replacement for this stock pump that incorporates numerous design features to overcome some of the weaknesses that have been discovered in the stock pump, says the company's founder Vern Schumann.

mounted gear driven pumps and crankshaft driven front-mounted pumps is wear on the pump cover, though the problem is more noticeable with most crankcase-mounted pumps. Gravity pulls the weight of the gears down against the pump cover when the engine is not running. When the engine is restarted, the gears rub against the cover and produce a circular wear pattern over time. This can increase end play inside the pump, causing a loss of pumping efficiency and oil pressure over time.

"Some engine builders will machine down the cover plate to remove the wear marks. But that only addresses half the problem, because the gears can also wear against the top of the housing, too. Our patent-pending solution for eliminating this type of wear is to machine small dimples into the top and bottom of each gear tooth. The dimples hold oil and provide start-up lubrication so the gears don't rub against the cover plate or housing. The same solution also works with front-mounted oil pumps that experience cover wear," said Schumann.

Another factor that can inhibit oil flow during start up as well as at higher engine speeds is poor oil flow into the oil pump due to restrictions in the oil pump pickup. A buildup of sludge or debris on the pickup screen can certainly cause this

kind of problem, but so can a poorly designed pickup.

The pickup may restrict oil flow if the screen mesh is too fine, or the size and number of holes in a perforated metal pickup cover don't have enough open area to flow an adequate volume of oil. Schumann says he's seen so-called "high performance" pickups that are quite restrictive and can actually reduce the volume of oil coming out of the pump. Schumann's solution for this is to use a honeycomb style mesh over the pickup inlet that has relatively large openings to provide little restriction to flow.

"The screen or perforated metal cover over the pickup opening does not really protect the oil pump anyway because the clearances inside most oil pumps are typically .002" to .005". The only purpose the screen serves is to prevent large pieces of debris from being pulled into the pump."

Schumann says that cutting the inlet tube at an angle rather than a straight cut also increases the effective size of the tube inlet so it can flow more oil.

Schumann also has a shim kit for adjusting the oil pressure on his pumps. The shims come in 5 and 10 psi thicknesses, and can be stacked to achieve the desired relief pressure setting. On Schumann's pumps, a pair of shims are placed under the cup that sits on top of the relief spring, and a third or additional shims are then stacked on top of the spring and cup as needed to adjust the pressure. By placing a pair of shims under the cup, the spring is free to rotate which prevents coil bind that could cause erratic pressure readings.

Schumann says his new oil pump test stand allows engine builders to not only test and verify pump flow across a wide range of speeds, but to also check the pump's relief pressure. A simpler (and less expensive) version of the test stand is also available for testing and adjusting oil pump relief pressure using air compressor from a small compressor.

## Oil Pans

One trend that's taking place with oil pans, according to Sue Jerovsek with Baker Engineering, is that more and more engine builders and racers are using a wet sump oil pan that accommodates an external pump – if the rules allow it. The advantage with this setup is a shallower oil pan, much like a dry sump system, but with less expense.



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Jerovsek said their Pro-Cam oil pan 9137-EX is only 5-1/2" deep, while most oil pans for engines with an internal wet oil pump must usually be at least 6-1/2" deep. This allows the engine to be mounted lower in the chassis to reduce the center of gravity for improved handling and aerodynamics.

"Our newest product is our Pro/Cam big block Chevy oil pan with a billet one-piece cover and integrated pickup. It offers improved oil flow and control, reduced cavitation, lower oil temperatures and less aeration as oil bypasses directly into the pan."

"Pro/Cam also has a wide variety of aluminum oil pan systems, from circle track wet sump pans with an optional aluminum oil pump, to big block aluminum dry sump pans. Most of our aluminum pans are built to order, so the number and location of the pickups can be customized to the engine builder's needs. We can also custom build pans in steel or stainless steel," said Jerovsek.

Most engine builders understand the importance of the oil system. But most do not realize that it can be a source of horsepower, and that the oil system can actually enhance the engine's overall performance. "The Pro/Cam wet sump oil system includes an oil pan with unique features that control how and where the oil collects. The pump is paired with a customized oil pump that improves flow and reduces aeration. Together, they form a very efficient system that increases horsepower, reduces oil temperature, and ensures consistent oil pressure even in the corners. These are all things the racer will appreciate at the track, but the engine builder isn't



*A slightly out of focus shot showing how small dimples have been machined into the ends of the gear teeth to reduce cover and housing wear in a SB Chevy oil pump.*



*Schumann says his new oil pump test stand allows engine builders to not only test and verify pump flow across a wide range of speeds, but to also check the pump's relief pressure.*

necessarily going to see during dyno runs," said Jerovsek.

Ken Sink of Milodon Inc., said his company introduced about 20 new oil pans at the SEMA show, including pans for the new Chrysler 5.7L and 6.1L Hemi, Chevy LS engine family, Ford modular V8s, and Dart SHP block."

The Chrysler oil pan allows late model Hemi engines to be installed in 1959-1974 A, B, C and E body Chrysler cars. The Mopar crate engines come with a rear sump pan which won't fit the vintage muscle car chassis. The new pan clears the K-member and drag link, while also providing increased oil capacity and oil control. The pan can be used with a stock or Milodon windage tray to reduce oil aeration and improve horsepower.

The new oil pan for the LS series also allows the late model GM engines to be retrofitted in older 1968 & up Camaro, Chevelle and Nova chassis. The pan is shallower than a factory pan, yet has increased oil capacity (7 quarts). The pan can handle crankshaft strokes up to four inches.

Milodon now has their own line of oil pumps, including standard, high volume and high volume/high pressure versions for the small block Chevy, and will be adding Ford and Chrysler applications in the near future. Sink said one of the features of their SB Chevy pumps is a thicker neck that won't break like a stock pump. "Our pumps are built to a higher standard of quality with closer tolerances than stock pumps. This allows the pumps to run smoothly and quietly, unlike some pumps that sound like a box of rocks when you spin them up on a dyno."

For 2010, Moroso has come out with a new line of small block Chevy oil pans that have a stock appearance, but can handle strokes up to 4.125" and fit a Dart, GM or Merlin four-bolt main block. They are available to fit pre-1980 style engine blocks, 1980-'85 blocks

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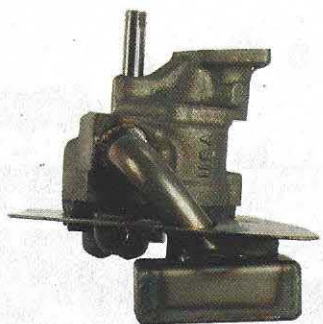
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Moroso's BBC oil pump with windage shield protects the oil pump pickup from windage for steady oil pressure throughout the rpm range. Pick-up orientation ensures proper clearance from pickup to bottom of any Moroso oil pan.

Other new SB Chevy circle track oil pans include p/n 21316 for pre-1980 engines with driver-side dipstick and two-piece rear main seal, p/n 21317 for 1980-'85 engines with passenger-side dipstick and two-piece rear main seal, and p/n 21320 for 1986 and up blocks with one-piece rear seal.

For 2010, Moroso has two new oil pans for big block Chevy applications. Part number p/n 20408 for Mark IV style BB Chevy blocks that fits most chassis (except 1962-'67 Chevy II, Vega, Monza or 1955-'57 Chevy). The sump has flat sides to alleviate header clearance issues, and can handle cranks up to 4.75" stroke with steel rods, or 4.5" strokes with aluminum rods. Inside is a unidirectional windage tray that adds horsepower, and trap door baffling to control oil flow under hard acceleration and deceleration.

For bracket racers and Budget Super Stock race cars, Moroso oil pan p/n 21049 fits BB Chevy Mark IV style blocks. The pan features a Passenger Power kick out for horsepower savings, yet is a core based oil pan that utilizes a stock style oil pan rail bolt pattern. Louvered steel windage tray and directional baffle across the front of the pan direct oil to the sump. The pan can handle up to 4.75 inch stroke cranks with steel rods.

Also new from Moroso for 2010 is an aluminum oil pan with billet aluminum rails for the 5.7L and 6.1L Chrysler Hemi engine in Chrysler LX series platforms (Chrysler 300C, Challenger, Charger and Magnum). The oil pan has trap door baffling which provides oil control for both drag and road racing applications.

Thor Schroeder of Moroso says one thing engine builders should do is upsell their customers from a generic, "one-size-fits-all" type of oil pan to one that is specific for the type of racing and/or chassis the engine will be used for. The right oil pan can enhance both engine performance and longevity. **EB**

with passenger side dipsticks, and 1986 and newer engines with one-piece rear main crankshaft seals.

Another new product from Moroso is a 6.5" deep circle track oil pan (p/n 21315) for 1986 and up small block Chevy crate engines.

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