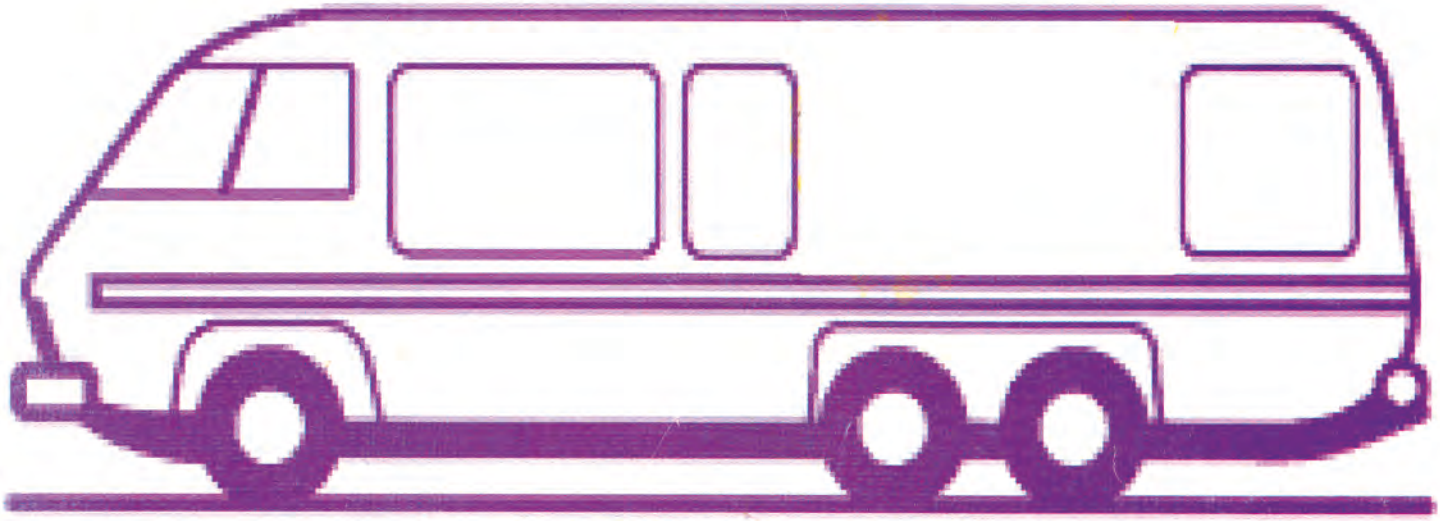
# GMC MOTORHOME ENGINE COMPONENTS



*Now You Can Be Powered By*

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**MONDELLO** HEADS by THE LEGEND

**Joe Mondello Engines**

**Order Your New 403 or 455 Coach Engine Today**
**We Build Reworked C, E, G, & J 455 Big Block**
**And 4A Small Block Heads**
**We Stock Many Internal Engine Kits and Parts**

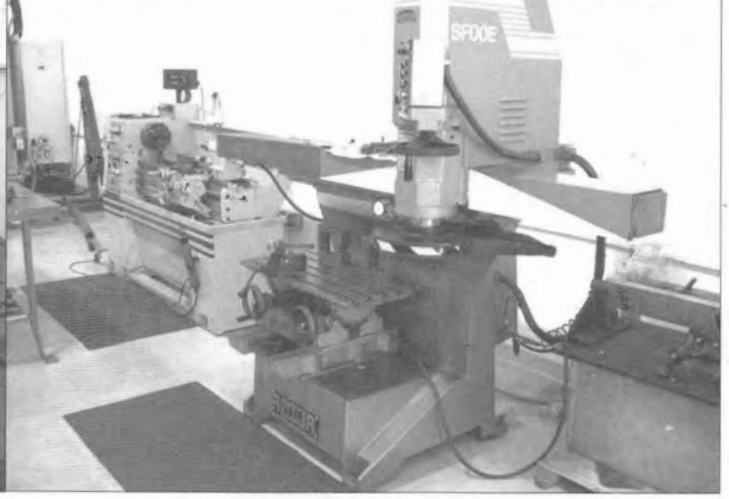
Joe Mondello Engines Mondello Tech Center
2470 Pomona Road Crossville, Tennessee, 38571
931-459-2760 www.mondello.com joe@mondello.com

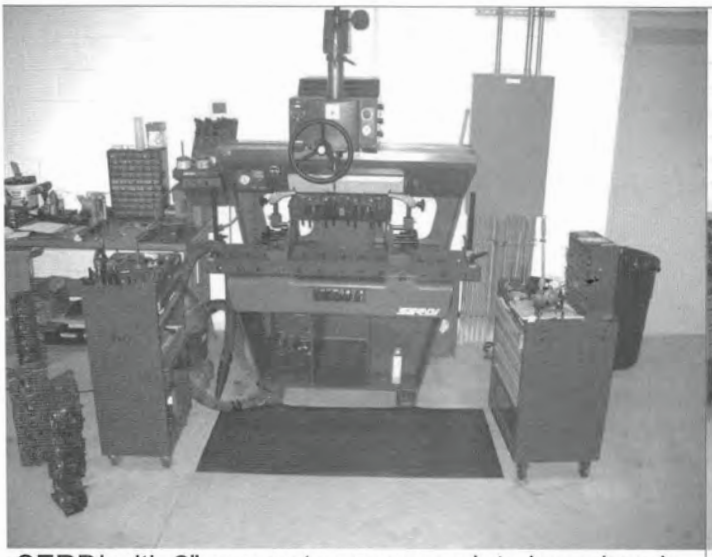
# JOE MONDELLO'S TENNESSEE TECHNICAL FACILITY

Views of our machine shop

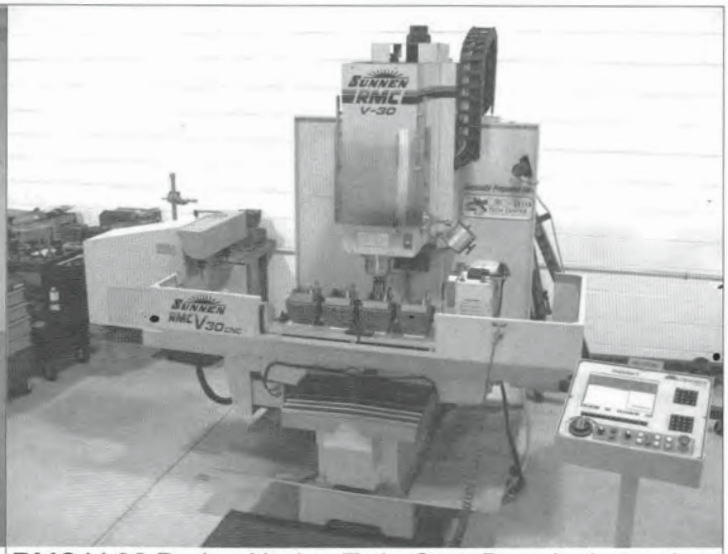
Joe finishing up a set of 409 heads in the porting room

Lathe and Rottler SF00E Block & Head Surfacer



SERDI with 2" spacer to accommodate large heads




RMC V-30 Boring Harley Twin Cam Barrels 4 at a time

## Re-Worked C, E, G, and J 455 Big Block & 4A Small Block Heads

**MH455** J 455 Big Block has 2.072 stainless intake & 1.625 or 1.680 exhaust valves $999.00

**MH403** 4A Small Block Heads has 2 inch stainless steel intake & 1.625 exhaust valves $999.00

**FP403** The best of the best for maximum cast iron performance. All ports are fully ported to the max for use with a modified Edelbrock Performer 2151 on the 455 or the 3711 for the 403. We raise intake port runners .100, widen the port at push rod area & install SS sleeves if needed, install SS sleeve in intake port side center head bolt hole, combustion chambers are shaped & polished before Cermet heat coating is applied. Intake & exhaust valves & exhaust ports are also coated. $1400.00

**FP455** Same as above but for the 455 *NOTE: In most coaches, we have to modify the engine box in the cab as it usually must be raised 2"- 4" for a 455 to accommodate the Edelbrock. We are currently doing R&D with Edelbrock to eliminate the need for this modification.* $1400.00

All heads have stainless steel valves, hardened exhaust seats, bronze wall valve guide liners, heat treated valve keepers, Viton valve seals, and chromolly retainers.
All surfaces are re-surfaced. Serdi 5 angle valve job. Correct valve stem heights.
New Silicon Vanadium valve springs. Valve guides Diamond honed for perfect fit.
Intake & exhaust valve bowls blended including short side radius to accept bigger valves.
Sold in exchange for your heads; must pass mag inspection with no cracks. Core charge $200.00
Your choice of 30° or 45° seats on MH455 & MH403

### ~ ~ ADDITIONAL PORTING FOR MH455 & MH403 HEADS ~ ~

Cylinder head porting includes bowl blending & cleaning up areas that are choked up, especially in the intake & exhaust flow track to obtain more power & torque. I believe good professional porting with a multi-angle job produces more power & torque than any other engine alteration. Filling the heat riser passages in your 403 or 455 is probably the best thing you can do to gain more power with a smoother, cooler running engine, intake manifold, & better MPG. When you have filled the passages you will need to convert your carburetor to an electric choke. On the exhaust side of the heads, Olds did not extend the center divider between both center exhaust ports to the exhaust gasket surface. When installing headers & trying to seal this area; it is very difficult & if you use an open center divider exhaust gasket your engine is running inefficiently because the exhaust gasses on cylinders 3 & 5 and 4 & 6 are crossing over between cylinders; giving you less power & torque. A lot of engine builders will sell you headers & say the problem is not there but the center dividers must be welded up properly to eliminate this problem.

I have four different porting jobs available for our GMC motorhome engines that give more power & torque for towing & cruising along highways or climbing hills & mountains that let your engines run cooler & have more throttle response when the proper cam, carburetor, & ignition system is used. Joe Mondello totally re-built heads include valve bowl blending for maximum performance mileage.

**BB403 or BB455** Short side radii & bowl blending with grinding stones & polishing to blend in the new valve job for maximum performance & MPG. Works best with filled heat riser passages & welded center dividers. Add $375.00 to MH455 & MH403 pricing

**SP403 or SP455** Street or RV porting includes bowl & short side radii blending, clean up around valve guide bosses, deburr intake & exhaust port runners & slightly widening exhaust port runner leading out of exhaust valve bowl area. Should be done when filling heat risers & welding center dividers (not included). Add $600.00 to MH455 & MH403 pricing

**PT403 or PT455** Street RV power & torque porting includes everything above plus more extensive work around the valve guide bosses, widen exhaust port opening nearly 1/8" in the runner leading out of the exhaust valve bowl area, raise exhaust roof .100 for better flow, combustion chambers are cleaned up & polished. This is the best power package for your money. I will help you make the critical choice of cam, carb, & ignition system. Add $950.00 to MH455 & MH403 pricing

### ~ ~ ADDITIONAL FEATURES FOR BOTH ENGINES ~ ~

Removal only of EGR bumps from exhaust ports Add $100.00
Raise intake & exhaust roof only Add $200.00

Filled Heat Riser Passages for better exhaust flow, cooler running intake manifolds & the four center valve springs, last longer because of less heat. NOTE: You must use an electric choke when the heat riser passages are filled. Braze & Blend of the Center Exhaust Port Divider Recommended when using Dougs-Mondello headers to hold exhaust seal better. Solid copper with divider gaskets are recommended. Add $150.00

**~ ~ ADDITIONAL FEATURES For The 455 ~ ~**

**IG500** Intake manifold gasket Add $18.00

**IG505** Super heavy duty Intake manifold gaskets Add $22.00

Dick Patterson Springfield Ignition intake manifold gaskets with SS heat riser plates Add $40
Not needed if intake risers are filled.

**8171PT-1** Fel-Pro blue Permatorque .041 thick head gaskets Add $64.00/pair

**MLS455** Custom Head Gasket Add $219.00

**~ ~ ADDITIONAL FEATURES For The 403 ~ ~**

**8507PT** Fel-Pro blue Perma-Torque .041 thick head gaskets Add $64.00/pair

**MLS-403** Custom Head Gasket Add $219.00

Thinking about a new cam for power & torque, or just mileage & torque? Well, we now have a lot more choices than we had years ago. There are now roller hydraulic cams & heat treated Nitrided hydraulic flat tappet cams besides the regular choices. All Engle cams are acid etched "Parkarised" to retain oil. I recommend you spend the extra dollars on a Nitrided Engle Cam because they are well worth their weight in gold. *See cam break-in instructions in italics on page 5.*

A high quality cam & timing chain set is a must. Do not purchase inferior products from China or other developing countries. Below I have listed the components I use exclusively at my tech center when building Oldsmobile engines & kits.

For Nitride heat treated mechanical flat tappet cams Add $125.00.

| Mondello Cams by Engle | Intake@050 | Exhaust@050 | Int Lift | Exh Lift | Lobe Sep | Size | Price |
|---|---|---|---|---|---|---|---|
| JM-14-100 flat tappet | 204 | 212 | .432 | .455 | 112 | Both | 149.00 |
| JM 15-100 flat tappet | 208 | 212 | .467 | .446 | 108 | 403 | 149.00 |
| JM 16-18 flat tappet | 210 | 216 | .472 | .488 | 112 | Both | 149.00 |
| JM 18-20 flat tappet | 216 | 226 | .488 | .496 | 112 | 455 | 149.00 |
| Mondello Cams by Comp | Intake@050 | Exhaust@050 | Int Lift | Exh Lift | Lobe Sep | Size | Price |
| RV1HR Hydraulic Roller | 206 | 215 | .534 | .534 | 112 | Both | 399.00 |
| RV2HR Hydraulic Roller | 210 | 221 | .534 | .515 | 112 | 455 | 399.00 |
| RV3HR Hydraulic Roller | 215 | 224 | .534 | .532 | 112 | 455 | 399.00 |

**EG535 $24.00 Exhaust Gasket** for headers of woven steel & exhaust fabric with center divider

**EG540 $44.00 Exhaust Gasket** designed for 403 & 455 heads ***that have not been welded or brazed*** on the center dividers; has full open center, no divider, to eliminate blown gaskets. Stock heads are .090 - .150 below the exhaust sealing surface causing blown exhaust manifold gaskets and inhalation of crossover un-burnt fuel returning back into the combustion chambers on center cylinders 3 & 5 and 4 & 6 which effects performance, power and torque, and mileage.

**EG4079** $59.00 **Exhaust Gaskets** for headers of Solid copper with center divider

**MLS455** $219.00 **Custom Head Gaskets** .050, .060, .070, .080 up to .130. Thicker can cause issues - .040 is standard. Multi-layer steel & composition construction creates the best seal out there! Lowers too high a compression in engines that have spark detonation or pinging. You will no longer need to use 93 Octane or booster additives. We will help you figure out your ideal compression and choose the MLS gasket size to suit.

**9-3113** $139.00 **Timing Chain Set** by Cloyes standard True Roller, American made, the best out there. Top & bottom gears made of billet steel not powder metal, Center-Center from crank to cam 5.044

**9-3113-5** $149.00 Same as above but .005 undersized for line bored or line honed blocks

**9-3113-10** Same as above but .010 undersized for line bored or line honed blocks $149

Always measure center to center before ordering chain sets.
.015 undersized not available for Olds blocks.

**HL-230** $96.00 **Hydraulic Performance Valve Lifters** - Made in U.S.A.
**HRT-455** $439.00 **Hydraulic Roller Tappets** for 403 & 455 - Made in U.S.A.
**SK240DR** $389.00 **Hydraulic Roller Valve Spring Kit** silicon chrome Vandium inner and outer springs; Chromoly retainers; & Chromoly heat treated keepers
**HDG-455** $98.00 **Distributor Drive Gear** of hardened steel for roller hydraulic cams
**TB-740** $22.00 **Thrust Button** so your cam does not move back & forth in the engine causing wear on the timing chain. A must with hydraulic roller cams, gives you better ignition timing.
**CS-120** Camshaft Thrust Bearing Washer, bronze, .041 thick I designed this for the Olds factory to repair worn blocks under warranty. These blocks were worn out by camshaft movement. $18.00
**Custom Built Shim** $50.00 If you have a worn block where the cam has ground into it, let me know the depth of wear & I will custom build a shim, thus saving your block.
**CS-40** $15.00 Crank Gear Spacer is .040 thick to align the top gear with the bottom timing gear.
**Custom Made Spacer** designed for the block that is badly worn we can make the top cam spacer & bottom steel spacer the same thickness. $40 per piece.
**VC-455** $23.00 Valve Cover Gaskets extra thick 3/16 with a steel core by Fel Pro, rubberized cork.
**CSAP1** $2.59 **Cam Shield** cam & lifter paste 5/8 oz
**CS1S3** $14.95 **Break-In Kit** goes in the oil 4 oz **CS1S4** $23.95 **Break-In Kit** goes in the oil 8 oz
**8398** $19.95/pint **Differential & Transfer Case oil**
**1600** $19.95/pint **Engine Oil additive*** **4012** $16.00 **Transmission additive***
**2050** $7.00 **Heat Seek*** assembly lube 4 oz. **4032** $24.95 **40 Below*** Water Additive - Quart
**1680** $ 8.99 **More Mileage Plus** carburetor & fuel cleaner * **by Pro Blend** *
**FM-all** $4.00 Permanent Magnet 1-1/4 X 1/4 X 1/4 high strength put in oil filter
**R104** $39.00 Set of 4 oil restrictors to keep more oil in the lower end of engine. For 350 or 455 Olds
**R105** $39.00 Set of 3 as above for the 403
**RCB-all** $69.00 Special restricted set of cam bearings; full round design with .100 hole size for better lubrication of lower end, should also use R104 or R105.
**PP40** $6.00 Rear Oil Galley Plug with .040 hole to eliminate wear of your distributor & camshaft gear. 3/8" located behind the 29/32 drive-in soft plug in rear bell-housing area
**MS160** $23.00 Neoprene rear main seal for the 455. Replaces OEM rope seal. Ford 460
**MS165** $23.00 Same as above for the 350 and 403's
**SP756** $139.00 High volume blueprinted & hand-built oil pump with modified pressure relief spring package & drive gear is supported by protruding through bottom cover of the pump. Fits 403 & 455.
**PU-1** $42.00 Oil Pick-up Tube custom larger-than-stock 3/4", 25% more volume. Use with SP755.
**OD260** $23.00 High strength Chromoly oil drive shaft is good insurance for your new oiling system
**APR403** $189.00 Adjustable (.187 in both directions) 5/16" oil restricted .040 Push Rods allow less oil into lower end of engine for better longevity. A must when using oversized valves to correct lifter pre-load. For 350 & 403 engines. Set of 16
**APR455** $189.00 Same as above for the 455 engine. Set of 16
**SAR455** $379.00 All steel 1.6 to 1 Roller Tip Adjustable Rocker Arm Kit requires no machine work, will fit under most stock valve covers with oil baffles, includes set of 9.800 X 5/16 pushrods, screw-in studs, 5/16" guide plates & heavy duty oil restricted Chromoly pushrods, 3/8" rocker balls & poly lock adjusting nuts. Allows tappet adjustment for mechanical lifters & correct preload for hydraulic lifters. Maximum spring pressure is 330 lbs open & max lift is .550. Most valve jobs are incorrectly done so replacement with an adjustable valve train is essential for maximum performance.
Discuss your engine specs with me before purchasing.
**SAR403** $379.00 Same as above with set of 8.600 X 5/16 pushrods.
**ARK455** $499.00 Aluminum 1.6 to 1 Roller Rocker Arm Kit requires no machining. Roller tip & 3/8" roller trunion. Includes 3/8"Chromolly rocker stud, 5/16" guide plates, Chromoly pushrods, 3/8" poly locks for positive adjustment. We recommend .540 maximum lift & no more than 320 lbs of open spring pressure. Discuss your engine specs with me before purchasing.
**ARK403** $499.00 Same as above with 8.400 X 5/16 push rods.

**IB350** Bolt Kit fits 403 intake manifold, 12 point stainless by ARP $64.00
**IB455** Same as above for the 455. $64.00
**BFPall** Solid Brass Freeze Plug Kit &29.00
**WT190** Windage Tray short steel oil pan for the 455 $69.00
**WT195** Windage Tray short steel oil pan for the 403 $69.00
**MH403** Mounting hardware for the WT195 $24.00
**MH455** Mounting hardware for the WT190 $24.00
**MS403** $74.00 Main Stud Kit for the 403, use with WT190, PSI 190,000, includes nuts & washers.
**MS455** $84.00 Same as above for the 455.
**VT581** $39.00 Aluminum Cam Valley Tray Cover replaces the steel OEM turkey tray, fit all hydraulic cam lifters including the 455, Toro, & 403. Will not work with roller hydraulic cams. Some 403 intake manifold modification needs to be done to clear the roller lifters.
**HB403** $89.00 Head Bolts by ARP, 170,000 PSI. A must because stock bolts stretch too much
**HB455** $89.00 Same as above for the 455
**D755Y** $599.00 Dougs-Mondello Tri Y Headers are built on a large 455 Olds laser cut 3/8" flange eliminates warping & leaking. *See large ad on page 8*

**HG455** $69.00 The Mondello Valve Stem Height Gauge is a must for Olds with the non-adjustable rocker arms and re-manufactured engines, most of the valve jobs were done incorrectly resulting in different valve stem heights giving you different lifter pre-load causing a rough idle & making it hard to start. In some cases there is little or no compression. All valve stems need to be within spec of the HG-455 gauge to eliminate all these problems. If they are not the only cure is adjustable push rods or adjustable roller rocker arms. I recommend the use of adjustable push rods or roller rocker arms as it give you a smoother running engine with more power & torque because the lifter pre-load on a regular hydraulic or roller hydraulic cam is .030 - .040. All my engines have an adjustable valve train. Question your machinist or engine builder if he hasn't built a lot of Oldsmobiles; he just won't know these things. The Oldsmobile is not your typical Chevy, Ford or Chrysler & he most likely will try to assemble your Olds according to those specs. I can't tell you, in my 51 years of learning the Oldsmobile, how many "good" engine builders have totally ruined an Oldsmobile because they think it's like all the others. They don't know what needs to be addressed concerning Olds heads, cranks, rods, areas that need restriction, balancing & nitriding of cranks & flat tappet cams. Joe Mondello has the right combinations to get your engine running & keep it running for a long time. That's why I have written my Olds tech manual. And. . .GM gave me a part number for it! GM12480027 get a copy today.

***By following my BREAK-IN PROCEDURE for all flat tappet mechanical & hydraulic cams you will have an engine that will serve you for many miles to come. Since the removal of zinc & phosphorous from our engine oils in the '90's you can get cam failure by not following these rules. Use Brad Penn 1, Torco with MPZ, or Joe Gibbs 20-40W, 20-50W, or a straight 30W oil & don't let the engine idle or vary the RPM during this break-in. I like to use an oil that states "Racing Only". Never use any oil lighter than stated above during break-in of an Oldsmobile. Always prime your new engine with the correct priming tool. Turn the engine 90° every 30 seconds for two complete revolutions or until all the rocker arms are getting oil.***
***Start your engine, run between 1500 & 1800 RPM steadily for 15 to 20 minutes.***

We are a Penn I dealer and it's hard to move away from a good thing. Penn I is a great petroleum oil containing zinc & phosphorous. I won the 3 Parker 9-hour Enduro boat races with Kendall motor oil & an additive I helped create in the early '70's called Mondello Marine Magic, I don't like synthetics for break in periods. The ZDDP in Cam Shield is 2500 PPM of zinc. This, along with the 1200 or so PPM of ZDDP in Penn I makes a very good break-in insurance policy!

To protect your GMC's engine's flat tappet, lifters and cam in both 403 and 455 you must add zinc to every oil change. As of October 1, 2010 the ZDDP levels is again being reduced in nearly all automotive oils. ZDDP PPM will now be about 600-700 and that is not nearly adequate to keep your OEM style cam from going flat. For maximum protection you need 1600-2000 PPM.

One half ounce Cam Shield per quart of any petroleum or synthetic oil will give you 1600 PPM. In addition to what is already in the oil you will have plenty of protection.
The best buy is Cam Shield CS1S4, 8 oz for $23.95 which treats 16 quarts of oil or three changes.

Let's talk engines. I was hired in 1965 as an outside vendor by GM's Oldsmobile division to work with Dale Smith & his crew of engineers to improve the performance of their new line of big block 400, 425, & 455 engines. They also wanted new ideas & modifications on the very hot, powerful 330, & later the 350 & 403 small block engines. I mention this because many guys have tried over the years to build Oldsmobile engines; I have even tried to teach it all to a few, & all that I know of have failed miserably. They state they can build you an engine that will make much power & torque & stay together. They can't & this failure is felt in all of your pocketbooks. I can honestly say I am the premier Oldsmobile engine builder on this planet because of all my R&D experience with GM. My competitors aren't really in competition with me at all. Oh, they read all the books & articles & even write some; bad ones that other builders take for Gospel. The good articles out there are written by one or two. Number one is me! Some tech writers, the ones that write good stuff, confer with me on all aspects of their story. As Doc Froemotter stated, "I can't imagine writing an Olds story without Joe Mondello by my side!" My Olds tech manual is the one book you should all have in your RV's. When GM contacted me saying they would give me a part number & sell it through their Motorsports Division & all GM Dealerships throughout the world. I can't tell you how proud it made me. It was like getting a brand new grandbaby!! They go for $26 plus shipping but I will sell them at these rallys for $20.

Here is a list of the engine building procedures I take to design & prepare an engine that makes Joe Mondello Engines stand alone in the industry.

All my engines get Neoprene rear main seals. We clean & liquid magnaflux all parts, grind crank, cross drill, nitride surface, shot peen & micro polish, Cryogenically freeze the block, crank, heads, rods, pistons, rings, bearings, cam, & lifters, we Stress Relieve Shake the block, crank, heads, & check all crank strokes with a precision stroke gauge.. All block machining is done on my Sunnen RMC V-30 computerized center which corrects bore centerlines, checks lifter bore location, & decks the block within .0005 in all four corners parallel to center line of mains. CWT balance all rotating assemblies & hone cylinders with torque plates & same fasteners & gaskets to be used in final assembly with our Sunnen V-10 Diamond hone; then final hone with stones for a perfect ring seal. Install oil restrictors. We use special Fel Pro or Cometic gaskets & ACL or Clevite H Series rod & main bearings, Dura Bond cam bearings, Federal Mogul, Speed Pro, KB or Arias custom pistons of 4032 alloy. All rods are side ground, notched .375 X .010 to.012 deep for better rod bearing cooling allowing oil to flow between the rods when they come together at engine acceleration. All our JM-series cams are Nitrided. Heads, oil passages, & returns plus the exterior of the heads & engine block are deburred, stoned & polished where needed. All mains are align honed with the CWT Line Hone machine. All bolts; stainless intake manifold, rod, & head, are ARP & main studs are ARP quality, which we torque cycle. Rods are checked for C to C length within the set, then ARP bolts installed & resized on the Sunnen rod machine. We check the specs of all aftermarket rods for consistency, and use a rod heater to install pins.

All cams are degreed in the engine & check on our Audie Cam Pro Plus computerized checker & valve springs are checked & balanced on our computerized spring tester. All engines are fully blueprinted & double checked before final assembly. Rocker arm geometry is checked & corrected before final assembly. The intake manifold is fitted & resurfaced for exact fit. The camshaft end play is fitted to between .005 & .010 maximum movement. All engines have Total Seal Plasma Moly Ductile rings, not a cheap cast iron set, & we use solid brass freeze plugs. All our tolerances are within tenth of a thousandths (.0001), not the .001 to .004 on a lot of jobs from most builders for crank & bore clearances. I have checked some of these engines when they came in & it's really shoddy workmanship. There is no common ground between a Joe Mondello engine & any other out there. We modify Toro pans putting an additional front oil drain plug in the front sump, use nodular iron cranks in all engines when available, & after an engine is assembled we run it on our NASCAR style 902 SuperFlow dyno for cam & ring break-in & supply a dynomometer sheet.

And finally, I sign all Joe Mondello built cylinder heads & engines before they leave the facility. We have the best, latest computerized equipment equal to the NASCAR shops plus my 51 years experience with GM's Dale Smith group behind me. Dale was the one to dub me "Dr. Olds" back in the '70's, then they put out that lab coated mustachioed ad in honor of me. They couldn't make it look too much like me or they would have had to pay me!

The difference between the lower & higher priced engines are in the crank & rod up-grades, more head work, engine coatings, custom designed & made forged pistons, installation of special Total Seal ring packages.

Engines have all machining & quality parts listed above unless otherwise stated below.

**Stage1-RV403** Engine has SP403 heads, Federal Mogul cast pistons, Total Seal rings, SP756 oil pump with PU1 tube, Crane 1.6-1 stock type rocker arms, APR adj. push rods, studs & straps for lower end support, & your choice of JM cam from list. Piston tops & skirts, rod & main bearings are coated with Cermet $7499.00

**Stage1-RV455** Same as above for the 455 engine $7499.00

**Stage2-RV403** Same as Stage1-403 but with PT403 heads, roller hydraulic cam & tappets, SAR roller rockers, Speed Pro or KB forged pistons, studs & straps on the mains caps for extra support. Piston tops & skirts, rod & main bearings, plus combustion chambers coated with Cermet $9299.00

**Stage2-RV455** Same as above but for the 455 engine $9299.00

**Stage3-RV403** Same as Stage2-403 but with Fel Pro 403 heads, Arias 4032 custom alloy forged silicon pistons, three center forged steel main caps, halo main stud girdle, all components coated with Cermet High Heat oil shedding material, Chromolly connecting rods, & 2151 modified Edelbrock Performer manifold ported to match heads $11,999.00

**Stage3-RV455** Same as above but for the 455 engine $11,999.00

**OB455 $00.00 Mondello 455 Nodular Iron Block** - 2 bolt main - identical dimensions to an OEM block plus it will accept a 4.500 stroke and can be bored to 4.300 over. 4 bolt splayed center main caps optional

Currently we are not removing/replacing any engines or transmissions in vehicles due to our heavy workload.

QuadraJet modifications for above engines, totally rebuilt, air bleeds modified, new float, accelerator pump, needle & seat, electric choke modifications, re-colored. All surfaces are milled, bushed throttle shafts, epoxyed soft plugs, re-plated hardware. No exchange needed.

**Stage1RVC** $379.00 **QuadraJet** for use with Stage1-RV engine

**Stage2RVC** $399.00 **QuadraJet** for use with Stage2-RV engine

**12-801-1** $134.00 **Electric Fuel Pump by Holley** pushes 71 gal/hour at 4 PSI fuel from your tank to flow through the mechanical fuel pump (97 gal. free flow) Needs no regulator.

**HTB-455** $149.00 **Mechanical Fuel Pump** delivers 80 gal/hour at 7.5 lbs. line pressure.

All internal parts made in the U.S.A.

Brands made in China have been known to cause under the hood fires due to ruptured diaphrams.

Joe Mondello Engine Core Rules and Stipulations are very critical because they are no longer making 403's or 455's. I will not accept an engine that cannot be rebuilt to my specs. I require no cracks in heads or blocks. Not accepting cranks that need welding of thrusts or main journals. No 455 blocks that have to be bored .070 over stock or 403's that need boring over .035 as they have a tendency to run on the hot side because of the Siamese bore configuration; flexing will occur. Owners will be charged for blocks damaged by wrist pin failure requiring installation of a sleeve. If a crank will not clean up at .020 undersize I don't accept it.

Good rod & main bearings are not available for cranks .030-.030 so I don't like to use them. When we Nitride our cranks, which is a hardening procedure, we could probably make a .030-.030 crank work but if you bring one to me that is what you will get back. The only other thing is to purchase a Mondello crank. There are no other 350 Olds aftermarket cranks available. My crank core cost on a Mondello 455 (only if it won't clean at .030-.030) is $440.00. A 350 is $300.00. 403 & 455 non re-buildable blocks that need sleeving are $300.00.

Cracked non re-buildable 403 or 455 heads are $200 & I charge $22.00 each on cracked connecting rods for both engine sizes.



Prices in this publication are subject to change without notice.

Are oil additives good, or a bad myth snake oil. . .do they really work? My answer is yes; and no. I have been working with high performance additives & lubricants for over 40 years & know that Pro-Blend Chemical Company uses no Teflon, bleach, or other harmful ingredients in their products. They produce a lot of my signature series products for me & their regular performance products are tried & tested constantly in every situation we can think of; especially where heat is our enemy. We have reduced excessive heat & friction plus protect all parts in our street & strip engines. There was an article recently in Good Sams magazine on a torque converter failure. Heat & oil film breakdown were the biggest causes. We have pulled 100 to 150 degrees out of racing transmissions & converters & more than 55 degrees from engines. Remember this, if your temperature gauge reads hot or near it that is usually not the cooling system's problem. It is coming from inside the engine. Coatings keep heat away from the intake manifold plus there is less friction on bearings, piston skirts, combustion chambers, exhaust ports, & headers. Engine coatings are what reduces heat, not changing out your thermostat from a 165 to 195. A finely tuned engine should run between 190° & 205° to burn off fuel residue in the oil; giving you less oil consumption, better ring seal, with more power and torque.

We offer cam lube break-in products to enhance & fortify today's oils. In case you don't have the scoop on this subject all oils today, including Delco & Rotella by Shell have very small amounts of zinc. GM-EOS is not what it used to be, either. Most off road racing oils still have some zinc, phosphorus, & molyedium in them. I recommend Penn I, Valvoline Racing, Joe Gibbs Racing, Torco, Mobile I Racing, & anything that says "off road use only". My favorite is to use Cam Shield products (more on this product later) for break-in along with the one of the oils approved above.

We also use the Cam Shield cam & lifter paste with the One Shot 4 oz Break-In kit that goes in the oil. Run the break-in oil & lubes for at least 500 miles. Also, put a very high strength permanent magnet (Fm-all) into the oil filter for an extra precaution. We put one in new engines & run about 30 minutes; remove filter & check for any metal. If clean we replace filter & magnet & drive for 500 miles; leaving all additive & break-in oil in the new engine.

On a scale of 1 to 10; one being just so-so & 10 very good, I have rated some of the products I have used in my shops & tech centers. These numbers just go to show you that big advertising does not always mean you will have the best products available.

Cam Shield cam break-in products = 10+
CD2 by Alemite to free up frozen rings, valves, etc = 10+
Justice Brothers sold in shops & gas stations = 7
Kroil Rust Release contains teflon but melts rust like no other = 10+
Lucas does lots of advertising but is a good product = 8
Marvel Mystery Oil has no teflon; this stuff is magic = 10+
ProBlend All their products get my approval = 10+
Pro Long Not one of my favorites = 3
Rislone Great to release all stuck parts in old engines = 10+
Slick 50 Not worth the container it comes in = -1
Wynn's Friction Proofing contains lots of bleach, not so good = 3
Z-Max One of my favorites works very well = 10+
Best **rust release** to date is mix ATF and acetone in a 50/50% solution.

JOE'S HOT TIP
You know, air is free.
Or at the most only a token or two when airing up tires.
But nitrogen in my tires is one free mile per gallon
in my van, truck, & motorhome!
I have nitrogen-filled tires on every vehicle I own.

## Pertronix Ignition Systems

**1181 $85.00 Ignitor II Electronic Module** converts all trap door point type distributors to electronic replacing your old points and condenser. Fits all Olds 1956 - 1974. Cannot use with solid core wires.

**40011 $38.00 Flame Thrower I** Oil filled 40,000 volt coil. Use with PN1181

**D7110710 $299.00 Billet Flame Thrower Distributor** All new electronic phasing multi-spark ball-bearing upper shaft support lower bearing bronze bushing built-in electronic adjustable rev limiter. Comes with/without adjustable vacuum advance unit. Black male cap accepts HEI spark plug wires. Synchronized peak current spark timing reduces heat build-up. Two wire hook-up.

**45011 $48.00 Oil Filled Coil** 45,000 volt. Black. Can be used with the Flame Thrower III distributor.

**D1100 $279.00 Flame Thrower HEI Distributor** All new casting with electronic phasing for performance street and all GMC motorhomes. Comes with four pin module high energy black coil combination, black cap and rotor custom coil cover, adjustable vacuum advance unit, mechanical advance kit, and wire harness with capacitor. Complete ready to run minus the wires.

**D8010 $139.00 HEI Rebuild Kit** Complete high performance containing all the parts listed above in D1100 less housing and internal shaft mechanism.

**D8010 $59.00 Spark Plug Wire Set** HEI style plug-in for cap fits 403 & 455 billet Flame Thrower and HEI distributors. 8mm. Black.

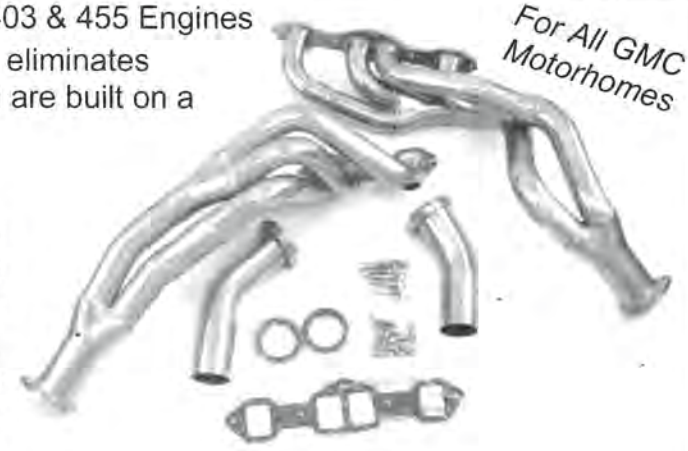
Flame Thrower II
Oil Filled Coil

Billet Flame
Thrower
Distributor
for V-8 Olds

HEI
Rebuild Kit

*Our ALL NEW* Dougs-Mondello Tri Y headers Fit 403 & 455 Engines

Built on a large 455 Oldsmobile laser cut 3/8" flange eliminates warping & leaking, unlike the Thorley headers which are built on a stamped 3/8" 350/403 small hole flange.




Our header flows more air and has a higher velocity to extract burnt and un-burnt exhaust out of your engine. The stock OEM cast iron exhaust manifolds are like wearing old high top button shoes; they are all cracking!! These new headers, complete with metallic ceramic barrier coating, 16 gauge 3/8" mild steel laser cut flange, with 1-3/4" primary tube, 2" secondary tube, merging into a 3" collector Tri-Y design, and a Lifetime warranty are worth 30-40 horsepower with 25-30 pounds of torque plus they allow a cooler running engine which can affect the two riders in the cab. They are well worth the extra dough, like all good things in life! All connector tubes supplied. 0/2 sensor bungs included. $599.00

## Today's Gasoline, A Silent Killer

I have answered hundreds of questions like "Why does my engine ping, detonate, stick valves in the guides, have badly worn exhaust valve seats, run hot, or make less power than it used to?" Well, the answers to the above questions are simple but involved. I will go over everything step by step to help you correct all the problems caused by today's gasoline. It is unstable because the additives; 10% ethanol, gasohol, cornahol, alcohol, etc. cause the fuel to oxygenate. When it sets in your gas tank for more than 7-10 days it separates & accumulates water, leaning out your fuel mixture.

With the introduction of unleaded fuels we lost Tetraethyl lead that lubricated our upper engine parts. Octane that eliminates pinging, detonation, upper cylinder head & engine wear was lowered. We have to go back to square one to correct the problems of today's unleaded gasoline. The octane rating at the pump is not what goes into your gas tank, it is one to three octane less. The use of Sta-Bil (two oz / five gal) & Marvel Mystery Oil (4-6 oz / twenty gal) in the fuel is a good start.

The total fuel curve of your engine is very important & involves everything from the gas tank to the carburetor. I know most people never looked at or check the condition of the fuel sock in the gas tank to see if it is plugged up with years of sediment, rust, sludge, etc; the most common reason of poor fuel delivery, fuel pressure & your engine running lean. Steel fuel lines (5/16 & 3/8) get pinched or dented allowing poor fuel flow to the carburetor. The stock fuel pump, usually worn out but even if it were new only holds 2 ½ to 4 ½ PSI pressure which is hardly enough when you are trying to run 4500 -5000 RPM in your performance street car or 2500-3500 in your GMC coach. I say use a high pressure, high volume fuel pump for today's gasoline. The Mondello HTB455 mechanical fuel pump delivers up to 80 gallons per hour free flow with 8 PSI shut off pressure for maximum street & GMC coach fuel delivery (no fuel regulator is necessary).

If you are running a QuadraJet or Holly carb, always remove the paper fuel filter cartridge from the inlet side & use a Barry Grant, System One, Moroso, etc, in-line free-flowing fuel filter; not a paper cartridge type. If you are running fuel additives, lead substitutes, Octane boosters, carburetor cleaners, etc. the paper will deteriorate. Today's gasoline is leaning your fuel mixture between 8 & 10%. If you own a GMC coach the 8 to 10% leaner mixture is really causing you more problems than in a car because of the 11,700-12,200 pounds you are trying to move, plus the excessive engine heat you are generating in the engine compartment. Changing both primary & secondary jets & metering rods are mandatory especially on Edelbrock & QJ carburetors. If your QJ carb has a 72 primary jet & a .054 primary metering rod, you should go up 2 jet sizes to richen your fuel mixture about 5 to 8% Example: 74 primary jet & .047 primary metering rod. You should continue to enrich your fuel system until all signs of pinging & detonation are gone. I get Pinging now with (72 & .54)

The easiest way to detect detonation (pinging) is to use the 8964 MSD Engine Knock Alert. It's easy to install & easy to see a warning light flashing with an audible beep for the hard of hearing. The use of an 8782 MSD Adjustable Timing Control is best for all cars, stock & performance, as well as coaches so you can fine-tune your engines for an ever changing environment. It will work with all point type Accel, Mallory, Mondello, Pertronix, etc plus GM HEI & electronic distributors. Both are a must for GMC coaches. If you are using an MSD 5, 6, 6-AL etc.box in conjunction with the above distributors, then I say use the MSD-8780. The way you set up the ignition timing is most important with today's gasoline. The HEI is the most difficult, especially if you are using it in a performance application. The stock GM HEI distributor was made for 7.8:1 to 8.5:1 compression ratio which used to require very high degrees of timing. The total timing on a stock 350, 403 or 455 was about 46° to 52° with the vacuum advance connected. Most distributors that are set between 6° & 10° of initial timing seem to have more throttle response for street drivability. The HEI needs to have the mechanical advance portion of the distributor reduced. The slot below the movable counter weights needs to be welded up so the travel is shorter. MSD makes kit 8464 that includes counterweight springs & advance limit bushings which works well if you don't weld up the counterweight mechanical advance slot. This slot is also too long on some point type trap door distributors & can be handled in the same manner as the HEI distributor. The Pertronics D9006 adjustable vacuum advance & timing limit unit is highly recommended to slow down your total vacuum advance, each notch of the limiter will shorten vacuum timing by 2°. This should only be used if you can't reduce part throttle spark knock with the adjustable vacuum advance unit, movement on the HEI & point type GM distributors.

The Pertronics D-9001 HEI kit includes springs, timing limiter plate & adjustable vacuum advance unit. A good advance curve for Delco point type & HEI distributors is as follows. The curve for an HEI, or point, distributor should be 10° or 11°, mechanical advance which is 20° to 22° in the engine, 6° to 10° initial advance & as little vacuum advance as possible, is a good start. This is a starting point & fine tuning adjustments will probably be needed. The use of the MSD timing controls is going to be your best bet after you have reached a happy medium on initial mechanical & vacuum advance settings. On all point type Delco trap door distributors use a Pertronics 1181 Electronic Distributor Module kit that replaces your points & condenser, giving you more energy & spark through your coil to the spark plugs. It is a bolt-in item & can be done in your garage. It retains the stock look of the distributor for show cars. The kit works with all aftermarket ignition parts, MSD, Accel, etc. The stock HEI distributor has a very weak spark signal to the plug between 2000 & 4000 RPM so use a Pertronics Performance tune-up kit that includes 4 pin module & coil, premium rotor & cap (red-D8011, black-D8010, or blue-D8012), custom Flame Thrower coil cover, adjustable vacuum advance unit, wire harness, capacitor, & installation hardware. This kit, in the all new Pertronics HEI distributor (red-D-1101, black-D1100, or blue-D1102) will eliminate poor spark. If you can get away without a vacuum advance, do it for performance street use, the Pertronics D-9011 vacuum advance block off plate replaces the vacuum advance unit. I do like the use of a vacuum advance unit, far better drivability under part throttle acceleration & cruising speeds. Set your spark plug gap at .045 on the HEI & MSD.

All Delco, HEI & point type distributors need to be rotor-phased. Rotor-phasing puts the rotor, cap & module in tune with each other giving you up to fifteen more horsepower. We have free tech bulletin #104 on how to perform rotor-phasing & it's on MSD's website, also. This rotor-phasing is very critical for street & racing use.

Now that we have addressed fuel delivery curve & ignition timing curve of the engine the next most important thing is spark plug heat range & spark plug end gap. All point type, Pertronix, Mondello, etc. use .032 end gaps. If you have a 1973 Olds 455 that has 8.5:1 compression & you changed it to 10.25:1, do not run the AC 46-S or NGK R5670-S spark plug that came with the car in 1973 because they are too hot. You should be using an AC 44-S or NGK R5670-7 plug because a plug that is too hot will cause a lean mixture & detonation.

With today's gasoline I say coat the combustion chambers, valves, & pistons with Cermet & don't run more than 9.5:1 compression with 92 & 94 Octane unleaded fuel. If you are going to use the Edelbrock aluminum heads you can run 10:1 compression. The gas we buy today is some of the worst ever. When rebuilding engines for today's gas, & wanting them to live, you must follow the tech tips I have recommended. Do not use cast iron piston rings as fuel today doesn't have any lubrication so you will experience very fast cylinder bore wear & short piston ring life. I say use a premium cast moly ring or a file-fit plasma moly ductile ring by Speed Pro. Because of the additives in gas, it generates more internal engine heat but gives very little lubrication. You must use more piston to wall clearance, valve guide to valve stem clearance & piston ring end gap. If your piston manufacturer wants .002 piston to wall clearance use .0025 -.0028. The ring end gap must be increased by .002-.004 over recommended end gaps for your cylinder bore size.

Whether the valve guides are cast iron, solid bronze, or bronze guide liners, you must run .0015 to .002 intake valve guide clearance & .002 to .0025 on the exhaust valve guide clearance. If you have any less than these valve guide clearances (regardless of what your engine builder or machinist tells you) you will stick the exhaust valves & kill your engine. I do a light knurl using U.T.P. (United Tool Processes) knurling equipment for both cast iron & solid bronze valve guides. This allows the guide to hold oil for better lubrication & a cooler running valve stem.

The one biggest failure is exhaust valve seats, & many machine shops destroy a lot of Olds heads trying to install small block Chevy hardened exhaust valve seats in them. The big block heads A, B, C, D, E, F,G, Ga, & H; small block heads 1 through 7, 4A & 7A need hardened exhaust seats.
The replacement Chevy exhaust valve seat is 7/32 (.2187) to (.250) thick & usually will hit the water jacket in an Oldsmobile cylinder head. I make two special size Olds exhaust valve seats; both are 3/16 (.1875) thick. Part #31045 is 1.755 OD & #31046 is 1.631 OD so these seats will not hit water. They are a Dura-Bond powder metal seat material which self-lubricates itself for long exhaust

valve & seat life. Always remember detonation & pinging isn't always audible, it is a silent killer. If you follow my advice & do to your engine & tune up as I advise in this article, your engine will live a longer life. Mondello Tech Center now offers the best on the market MTC Stage 1 & 2 QudraJet carbs, carburetor rebuilding & blueprinting. Good distributor blueprinting is hard to find but it is still out there. I recommend a Pertronics HEI or billet multi-spark Flame Thrower "Plug & Play" male cap distributor that will fit your HEI wire sets with a Flame Thrower 3 oil filled coil.

We have found through extensive testing that Pro-blend 40 Below Radiator Coolant additive & Torco motor oil with MPZ will lower your engine & oil temps dramatically. For bullet proof flat tappet cam break-in use 4 oz Cam Shield Zinc based break in lube in the oil & Cam Shield paste on the cam & lifters with the correct Olds valve seats. After break-in period use 1/4 oz per gal with today's oils.

**Performance Engine Failures in Today's World**

Eliminating performance engine failures today is much harder than it was ten years ago. We are confronted with unleaded fuels with additives that make the fuel unstable & also oxygenates it creating it's own water. The cycling of high performance fasteners, which is usually overlooked & not done, plus various different types of head gaskets that are not used during the procedure of cylinder honing, creating out of round cylinders & smaller than previously checked tolerances.

Incorrect piston & piston ring checking & preparation & not properly cleaning the cylinder bores after honing plus using an inferior engine assembly lube like regular 30 weight engine oil will cause piston scuffing. The heat that is generated in today's engines is about 20° to 40° hotter than ten years ago when we had tetraethalene lead in our fuel. Valves, guides, piston rings & skirts, valve seats & valve springs all suffer from lack of lubrication & excessive running temperatures. My "Today's Gasoline" article relates to this problem. I think the aftermarket performance products of today, except those from China & other developing countries, are better than ever. The forgings are better, piston alloys incorporating hypereutectic processes plus a lot of the film & spray-on coatings are eliminating a lot of premature first start up failure. I have been using cryogenic freezing & low frequency stress relief shaking (the vibratory Model 62 unit is under 100 hertz) of all performance engine parts from valve springs to engine blocks. The majority of the cam shaft & lifter failures are caused by too tight of valve to guide clearances, not using a high grade assembly lube, and/or incorrect engine pre-lube before starting the engine. *I am sure that a lot of warranty replacements today are not the builders fault, but the fault of the consumer. There are a lot of people out there who claim to be mechanics or the new word now is "technician". It is amazing how little these people know when they think they know "everything"!* I have spent 51 years in this high performance industry designing, building, pushing to destruction trying to perfect & stop the failures & self-destruction in engines. Through the years I have made my share of mistakes & learned from them. I have run most of the oils, lubricants, additives, engine coatings, etc. on my dyno & track tested them for over 51 years.

**Valve, Valve Guide, Camshaft & Lifter Failure & Analysis** ~ Valve guide reaming versus honing

- The importance of aftermarket new valve check & micrometer use. Mic every 90° top & bottom of valve stem.
- Valve stem RA finish, plating, hard chrome center-less ground hard tip valve stems usually will not fail. Most valve stem finishes are too rough, especially those from developing countries like China.
- Valve alloys are very important especially in high heat & valve spring pressure conditions, plus supercharging & nitrous oxide, inconel & high strength stainless are best.
- A good broached or honed K-Line valve guide liner will give years of service with a hard chromed or highly polished valve stem.
- Use AV&V carbide reamers, available through my tech center, as they are the only reamer you don't get material flow-back with which leaves the center of the valve guide with less clearance than the top & bottom of the guide on solid bronze guides or K-Line bronze guide liners.
- Valve Guide honing, especially when using a stone & shoe type honing unit is very difficult to keep the valve guides from bell mouthing on the top & bottom of the guide.
- The Sunnen diamond valve guide honing process & new Diamond hone from Goodson Shop Supplies, that I helped develop & test, are what I use with excellent results.
- Improper checking procedure for valve guide clearances. A .343 size reamer & .3415 valve stem

diameter is not the end of valve guide preparation until you check after reaming. Our biggest problem in this industry is *assuming instead of checking*

• Always mic your valves, then use a round ball gauge or dial bore gauge to check & verify clearances

• Mondello Heat Seek Assembly lube that withstands excess heat without running off & is attracted to heat is what you need for valves, springs, cams, lifters, followers, etc.

• Always mic & check clearances between camshaft bearings, bushings or cam tunnel & cam journal to make sure your clearances are not too loose or too tight. Some Olds engines will have low oil pressure because of improper clearances.

• The biggest reason BB & SB Chevrolet, BB Ford, 440 Mopar & BB & SM Oldsmobile spin cam bearings is because of lack of lubrication. People store their racecars for two weeks or more & do not loosen the valve spring pressure on a roller cam. The excessive spring pressure squeezes out all the lubrication between the cam journals & bearings which cause heat generation & galling the next time start up occurs. You must always re-prime the engine after storage or have an oil accumulator pressure system on the engine before starting.

• Always check all hydraulic & mechanical flat tappet camshafts for cam lobe taper. It should be .0015 to .003. from front to rear of cam lobe.

• The convex crown on the bottom of the lifter should be .0012 to .002. I use .002 for all large high lift .600 or more mechanical flat tappet cams with a .842 diameter lifter. On all large mechanical flat tappet camshafts, especially ones with over .575 lift, fast acceleration ramps & .842 lifter diameters; I say groove the lifter bores between the main lifter bore oil galley to the bottom of the lifter bore directly towards the cam lobe for extra oiling.

• Always break in cams for 15 to 20 minutes at a steady RPM of at least 1500 to 1800. Do not let it idle. My 2050 Heat Seek & Cam Shield paste are the best cam & lifter lubes out there.

• If dual inner & outer springs have pressure over 300 lbs. open; I say remove the inner spring.

• Coil bind in the valve train is a sure way to have a cam failure. Most think valve springs are the biggest area of coil bind but it's not. Neglect of valve spring retainer to top of valve guide or valve seal; roller rocker arm to valve spring retainer; aluminum roller rocker to poly lock or rocker stud; push rod to back of rocker or push rod rocker cup; push rod to push rod hole in cylinder head & push rod to valve lifter just above push rod cup clearances cause more cam failures than valve springs. The biggest cause of camshaft failures next to incorrectly priming or lubrication of your new cam is valve guide thermal galling. At 180° & 210° operating temperature the valve guide; because of unleaded fuel, too lean a mixture or too tight of valve guide clearances due to unleaded fuel will momentarily squeeze the valve causing excessive valve lash & valve lifter load on the cam lobe causing camshaft scuffing & complete valve lifter failure. Next time you have a cam failure you will be amazed that nearly all the lobes that fail are exhaust. When a customer calls & says when the engine is cold it is quiet but when it warms up it sounds like a diesel about the only thing that can cause this is you are picking up valve lash because of thermal sticking. This sticking grabs the valve but does not usually transfer metal. This sometimes is hard to find when doing an exam when the engine is cold. If you catch this immediately you can usually save the cam. Remove the heads & give it more valve guide clearance. My preference for curing thermal sticking on valve guide clearances in performance engines is using hard chromed stem stainless valves & K-Line bronze valve guide liners .0015 to .002 intake & .002 to .0025 exhaust for unleaded or leaded racing fuel for cast iron heads. With cast iron or steel guides use the same clearance. When using solid bronze guides on cast iron heads use .002 to .0025 intake & .0025 to .003 on exhaust. On all aluminum heads with solid bronze guides use .0015 to .0018 intake & .002 to .0025 exhaust. On all engines running alcohol use .0025 intake & .0035 exhaust. Blown alcohol or nitro methane use .0035 to .0045 intake & .005 to .0055 exhaust.

**Valve Spring, Rocker Arm & Shaft, Push Rod, Rocker Ball & Pivot Failure & Analysis**

• Most engine builders either take a spring out of the box or barrel & install on a set of heads without inspection. If you look closely you will find dirt, grease, grit, Cosmolene protectant, small shot peening balls or glass beads, etc. on your springs. Clean them up! Use solvent, a sonic cleaner, jet washer, soapy water solution, etc. but don't stop there. Most cleaned springs are installed on the heads dry & this is a big NO-NO.

The springs, on initial start up can drop up to 20 lbs. on tension due to heat generation. My main reason for designing Heat Seek was for high pressure roller type valve springs to eliminate the initial shock & form a lubricating heat barrier on the springs & retainers.

• .060 is enough clearance before total coil bind. I check my springs with the retainer installed in a smooth jaw vise for total spring travel. I measure the installed height first. We use a computerized tester on all performance engines. Collapse the gross cam valve lift & measure; then collapse the spring to total stack & re-measure. Subtract cam lift from the installed height & the difference after total stack is your clearance. Example: 2" installed height .750 cam lift coil binds at 1.150 you have .100 clearance. If you stack the spring with less than .060 clearance you will have premature spring pressure loss.

• Always chamfer the top of the springs & the harmonic dampener with a cone shaped sanding drum to eliminate damage to valve spring retainers. Manley makes a neat tool for this. PN 40174.

• With aluminum roller rocker arms, cast steel roller tip rockers with rocker pivot balls, stamped steel rocker arms with steel or aluminum rocker pivots do not use oil for an assembly lube. The heat generation at initial start up is unbelievable. Use Heat Seek on all these parts or other good quality lube from one of the reputable companies like Speed-Pro, Pro Blend, Red Line, Lubriplate, etc.

**Performance Piston Skirt Scuffing, Connecting Rod Wrist Pin Failure & Analysis**

• This is the hardest failure area to explain because so many things are involved. Starting with a green uncured new block all the way to changing head gaskets & fasteners after machining with torque plates has been completed. And of course, today's gasoline is a culprit also. I have a code I try to live by...Machine it Straight, Keep It Straight; Machine It Round, Keep It Round.

• On all performance fasteners like ARP, Manley, Milodon, etc. always torque cycle 4 to 5 times ARP's new Ultra-Torque lube eliminates the need for torque cycling. Just ask me for details.
before any boring, honing or line boring & honing is done. If you don't torque cycle your housing bore or cylinder bore can change, usually getting smaller by .001 to.0012. A lot of engine failures are due to this very overlooked procedure.

• On all performance rod bolts, studs, or cap screws you must torque cycle several times, then use a stretch gauge to achieve maximum rod bolt stretch per manufacturers specs. Always use recommended manufacturers moly assembly lube. You can achieve stretch & yield much faster because moly burnishes the male & female threads which allows you to overcome friction with ease. Motor oil does not burnish threads so more torque must be applied to overcome friction. Torquing is overcoming friction.

• Never use a recommended torque number, even if from the manufacturer, as you cannot obtain the proper rod bolt stretch. If you torque cycle about 6 times you will be close but I still recommend using a stretch gauge. None of this is necessary if you use ARP's new Ultra-Torque Fastener Assembly Lube. Always prep rod bolt fasteners before doing any rod big end resizing, boring or honing.

• On press fit rods always use a micrometer to check pin & connecting rod small end bore size. Never use a rod with less than .001 press. I recommend .0015 to .002.

• Do not press your rods & pistons together. Use a rod heater. When you press them the pin carrys debris through the rod & also can gall one side of the piston pin boss, hindering the full piston rotation on the pin. Most machinists do not mic the piston to pin clearance for a press fit resulting in too tight of a clearance. I recommend .007 to .001 pin to piston bore clearance. If you cannot rattle the piston on the rod by holding the rod by the big end & moving it back & forth it is too tight. *This is one of the biggest reasons for piston skirt galling & scuffing.* With unleaded fuel I recommend .0005 to .001 extra clearance over what is recommended for piston to bore. On free floating pins I like .0007 to .001 with bushings or on aluminum.

• Do not use cast iron rings with unleaded fuel. A cast moly is recommended.

• Always open end gaps .002 to .003 more for unleaded fuel.

• On racing rings plasma moly ductile, C&A, Perfect Circle, Total Seal, Hastings, etc. I recommend on all racing rings, except O gap type to open the clearances. We have found there is a vacuum between the top & second ring & a pressure between the second & oil ring. On a 4.125" bore engine I recommend .022 to .024 on the top ring; .024 - .026 on the second & .020 - .025 on the oil ring rails.

• A big problem is piston ring groove location (90° to the piston skirt) Checking this is recommended .This problem is nonexistent in CNC machined pistons. Some of the older type pistons & pins manufactured by those who do not use CNC methods for cutting ring grooves in the piston can have positive & negative piston ring groove tilt. This must be precise & is measured in minutes not degrees. 60 minutes equal one degree. If your piston has approximately 15 minutes of negative piston ring groove tilt, which was very common in the 70's with Speed Pro, Sealed Power, & Federal Mogul, you can lose up to 25 horsepower. I have designed PGC-150 to check this. You should always check all the pistons, especially when you start chasing an oil consumption problem. It usually is on incorrectly machined ring grooves. If you order custom pistons you may want to order them with a 12 -15 minute positive ring groove tilt. This is what I use in all my engines

• When using torque plates on a cast iron block always use two plates with cycled fasteners & the same head gaskets as being used in final assembly. If not, your cylinder bores can change up to .001 to .0018 smaller. I prove this to my students in every engine blueprinting class. Use aluminum torque plates on cast iron blocks if the customer is going to run aluminum heads. If you use iron torque plates the cylinder bores will change between .0005 & .0008 smaller.

• If you are working on late model engines with torque to yield fasteners & they are used once throw them away & buy new ones or you will have leaky or blown head gaskets. Always replace rod & head bolts, & install main studs in all 403 & 455 Olds engines.

• Piston scuffing may occur on initial start up with an extremely rich fuel mixture or hard starting condition washing down the cylinder bores with raw fuel; removing all the bore & piston skirt lubrication.

• Cooling system air pocketing around cylinder bores creating hot spots also causes scuffing. Thin cylinder bores from excessive over boring contributes to scuffing. I recommend sonic testing on anything more than .065 over on performance engines & .030 over on the 403 Oldsmobile.

• On new green blocks I recommend low frequency stress relief shaking to stabilize the block & also shake the heads & crank. We have seen between .001 to .004 movement in cylinder bores, cam tunnels & housing bores; even total deck height changes from shaking.

I always say shake it so you won't break it!

• If you cannot shake a new block, heads & crank Cryogenically freezing is highly recommended especially on performance engine blocks, heads & other parts before machine work is completed. You will be amazed on how much stronger your engine will be & longer it will last. We offer low frequency shaking & cryo freezing at Mondello Tech Center. If you cannot get these services performed cycle them through your hot water parts cleaner 4 to 6 times or put them in your cleaning oven for several cycles. They must be cooled in between heatings for this to be effective.

• Do not submerge piston/ring assembly in oil. Lube cylinder bores with Marvel Mystery Oil, Tech LIne Power Coat Lube, A.T.F., etc. on ring lands; push piston through tapered piston ring installer; then use my Heat Seek on piston skirts, pins & rod bearings. Use a rod bolt stretch gauge for final rod bolt assembly.

There are so many oils on the market in 2008 with so much questionable advertizing by OE manufacturers of catalytic converters & EPA that it would take a book to clear up all the hype.

• Piston & ring prep has to be done. Totally deburr pistons with a deburr knife, 600 grit wet/dry sand paper then very fine Brite Rite pads doing the last 2 stages in solvent bath. (No need to do this on Federal Mogul film plated pistons.) Rings should be deburred before & after end gapping, then ring lapping is very essential. My RS-103 deburring stone & RL-400 lapping rings are available from Mondello Tech School or Manley Performance Products. Much of the lubrication, sulfur (dio sulfate), & zinc is gone from our automotive oils. Diesel oils like Delo & Rotella used to have a fair amount of sulfur, zinc, & phosphorus until recently but that is now also gone. The new breed of popular oils are advertized as good enough to break in a new cam or reground flat tappet cam but; no way! You could be successful with a roller OEM hydraulic cam but not any high performance or reground; either hydraulic or mechanical tappet cam can be successfully broken in with these lubricants.

You must use Cam Shield's paste lube & 4 oz break-in oil additive with today's oils or the cam will lose some lobes and/or destroy some lifters. Even some of the racing oils, including Mobil 1, are removing most of the zinc so you must be aware.

The racing oils that state they are not for use on highways or with catalytic converters are still good for the break-in period but I still recommend a break-in lube on initial start up; 4 oz of Can Shield in the oil run for 500 mi. I like Brad 1 30W or Joe Gibbs 30W break-in oils for the break-in process. All engines must be primed with oil before starting. Use my OP-100 oil priming tool. Apply oil & break in lube, spin oil pump with priming tool or crank engine with coil wire disconnected & no spark plugs in until oil has reached all parts.

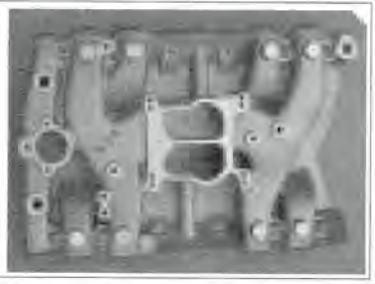
On OHV engines oil must be coming out of all push rods at the rocker arms. Rotate engine 90° clockwise every 30 seconds until all rockers have been lubricated. Now start the engine but do not let it idle under any circumstances. Bring RPM up to 1500-1800 rpm & run steady (do not vary rpm) for 15 to 20 minutes. Your cam is now burnished (broken in). Always put my high strength FM-all magnet in the oil filter before break-in and keep it there permanently in Olds engines.

Several years ago I designed a break in lube with Pro Blend Chemicals in NC. They made it one of my signature products, Mondello Heat Seeker II, & it has many of the properties of my Heat Seek assembly lube with additives for new cam & engine break ins even when running methanol. In early 2008 Pro Blend & I made a new break in lube called Zinc Technology (I also like Cam Shield) because of the continuing absence of essential compounds in automotive oil products. Available in pints, it contains 2% zinc to perform a safe break in. I have not lost any cams in the last ten years using my signature Pro Blend products & the described break in procedure. My R&D over the last few years covers many products, ideas, exhaust systems, super chip kits, nitrogen in tires, light weight & synthetic tranny & differential oils & additives, super axle bearing lube, aftermarket air cleaners & more. Guess what? Most of this stuff really improves mileage! Even removing the roof rack from my minivan & applying a teflon wax to the roof increased over 1 mpg. Doing all the above to my '07 Town & Country (5-20 oil, plus additives) increased mpg from 22 to 26 highway. I made extensive changes on my '02 2500 16 valve 4X4 diesel pick up (Rotella 15-40 oil) & will report the results at the OCA Nat seminar. I have Pro Blend engine oil concentrate in all my crankcases with their gas and/or diesel fuel additive to maintain mpg & keep injectors/carburators clean. The VO Twister, running on methanol, uses Torco 20-50 petrolium base with MPZ & Mondello Heat Seeker II. She has the same pistons & engine bearings for over 200 drag strip runs.

Before you start your old vehicle for the drive home, always check all the fluids, radiator water & antifreeze, transmission & differential oils, brake, etc. as these fluids can go bad over time. It can be a very sad experience to get your new find home & discover you have burned up the tranny or rear end on the trip. Drain old gas from the tank, remove top of the carb & flush out the gummy residue. The fuel sock in most older restorations is usually 75-90% plugged so always replace it. The engine oil & filter should also be changed before starting the vehicle. Check the battery water level & use distilled water only. If necessary change the battery out. Air up the tires & put in 5 gallons of fresh gasoline, then Ladies & Gentlemen, start your engine & take your treasure home. If you are trailering it, still do the above if you start the engine. If you are restoring a 1964 & up muscle car always replace the fuel line; changing out the original 5/16 to 3/8's or 1/2 & run a high volume mechanical or electric fuel pump. One of the biggest problems when restoring a 350 or 455 engine is pinging & detonation which is usually caused from lack of fuel delivery to the engine so from the start replace the fuel sock & change the lines to larger ones. You can have fuel pressure without the volume getting to the engine. Don't run more than 9.2 to 9.5:1 compression in a cast iron engine on the street as it will detonate. Coating the pistons & combustion chambers with Cermet Coating will let you run 9.7:1 on 93 Octane. If you use aluminum heads you can run 10:1 with a good 110° to 112° lobe separation Mondello cam. My cams help eliminate the detonation & pinging. We thermal coat all our 400 plus horsepower street & strip engine piston tops, valves, combustion chambers & exhaust ports to help eliminate the detonation & give us more longevity & cooler running engines. We also use piston skirt coatings inside the pistons for oil shedding & heat reductions. Cranks, rods, cams, lifters, bottom of intake manifolds are all coated with great results. My newest R&D project for flat tappet mechanical, hydraulic, & reground cams is an oil additive called Got Zinc Cam Shield oil treatment & the results have been very good. I am now nitriding all my flat tappet cams for longer life with today's oils & have had no cam failures plus the best part is my cams are made in the good old U.S.A.

**MCAS1200 $389.00 Mondello PosiFlow Cold Air System** developed exclusively for the GMC motorhome & tested on our SuperFlow 1020 flow bench. It is currently being tested in our coach, also. Made of high impact industrial fiberglass with a chrome metal cap and flows over 1200 cfm through your engine. Your engine will breathe easier with fresh cool air flowing in from the grill area through a 6" round metal inlet hose (6 feet supplied) that transcends into an oval shape to straighten out the air flow turbulence. Increases mileage, horsepower, and torque. Comes with an inlet adapter for grill and 2 hose clamps. Although not a bolt-on item it delivers the highest airflow of any system available with it's free flowing washable lifetime K&N inner filter element. You have to replace the left valve cover because the center oil breather cap interferes with the snorkel. The HEI distributor needs to be replaced with a Pertronics D7110710 Flame Thrower ($299.00) and the 45011 remote coil ($48.00). Valve covers can be changed out for our VC465LF set at $89.00 a pair and your coach will be breathing a lot easier.

**ATM455 $599.00 Aluminum Toronado Intake Manifold** made like the OEM original with no heat riser crossover. Has 8 stand-off bungs for EFI. Reduces total engine weight at 23 lbs. and runs cooler giving you a better incoming fuel charge. Fits under stock engine box. Use our IG509 intake gasket and an electric choke.



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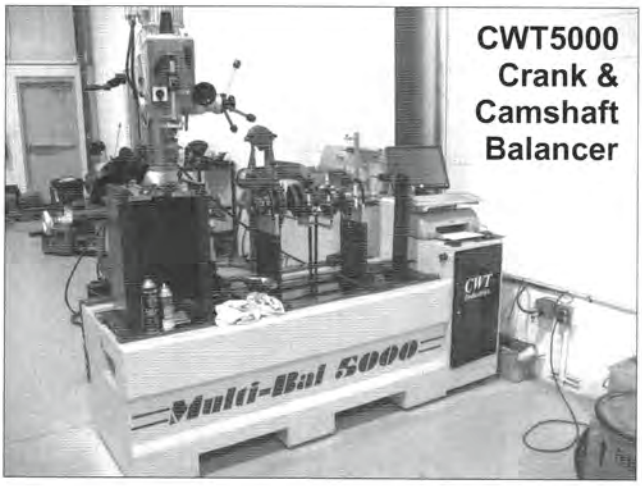


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**Sunnen SV-10 Diamond Hone at work**

Now you can come to one of Joe Mondello's technical classes and learn just about anything you wish relating to your motorhome engine and drive train!!
He holds group sessions for students interested in the same engines or we "rent Joe by the day" in which you will be the only student and have his undivided attention!
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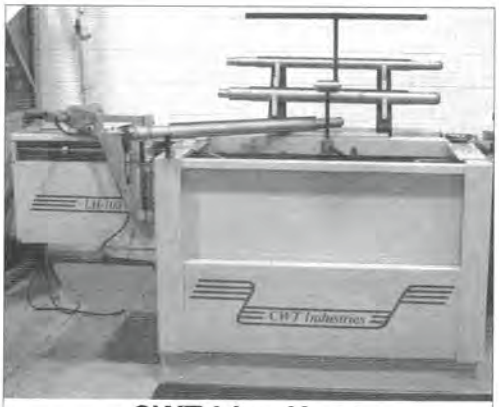


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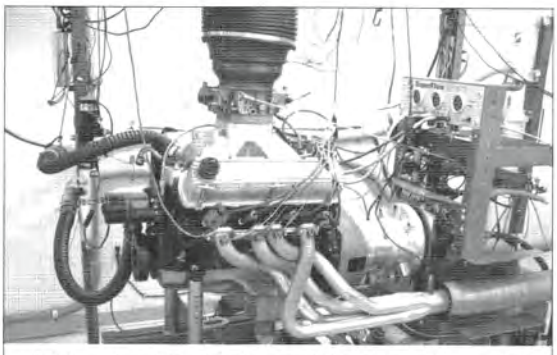

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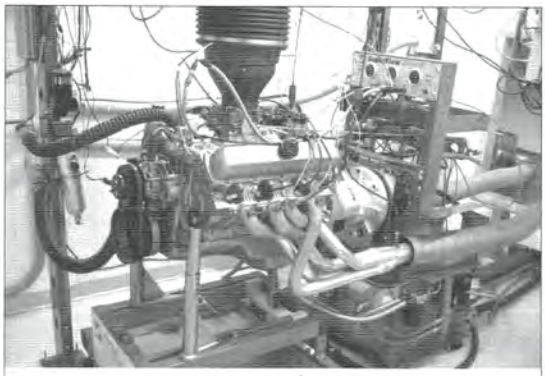

1970 W-30 455 Oldsmobile Restoration Engine

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