

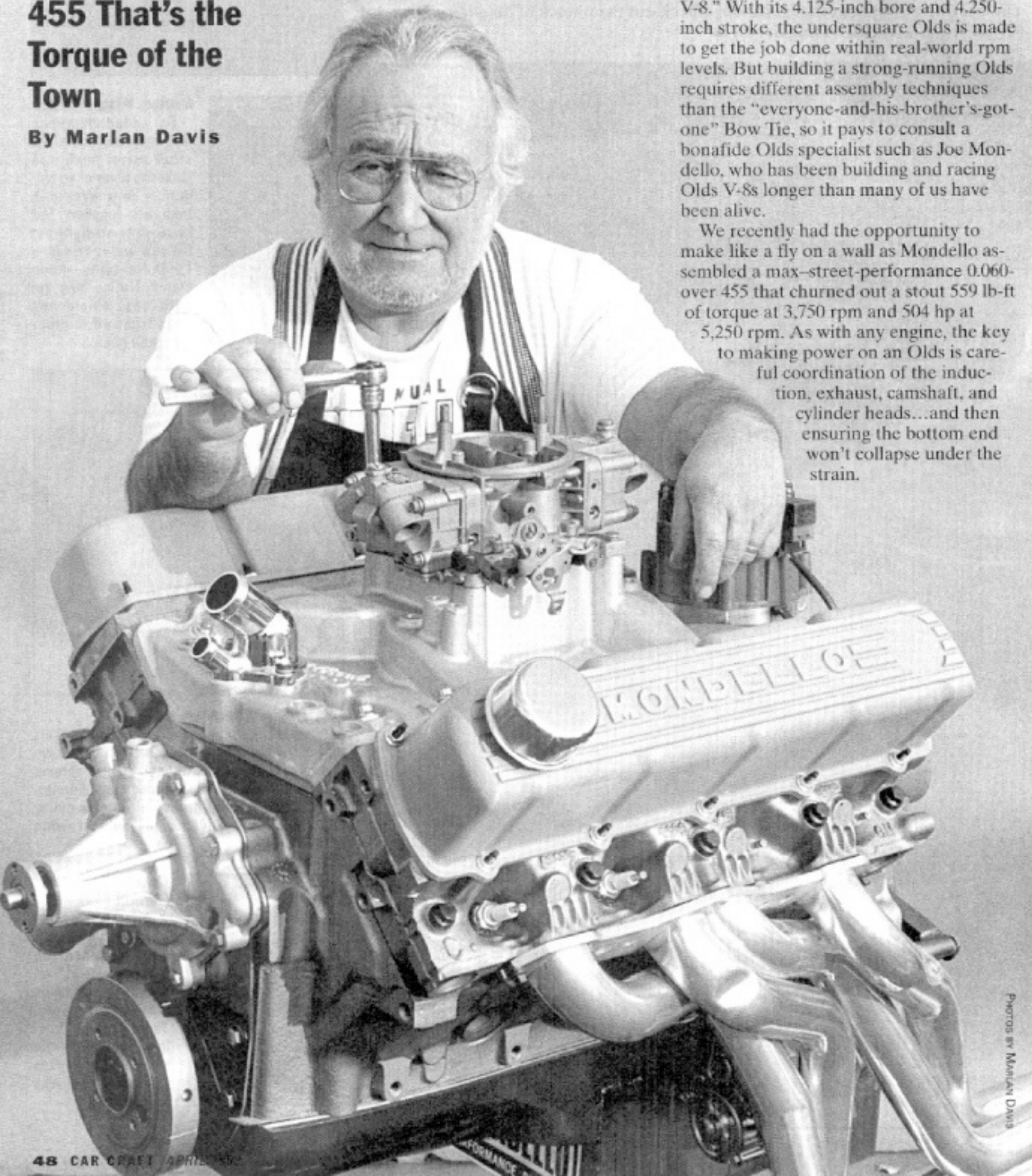
455 Olds to Go

**Joe Mondello
Builds a
500-Horse
455 That's the
Torque of the
Town**

By Marlan Davis

Because horsepower is a function of torque multiplied by rpm, making really big power numbers requires revving the snot out of an engine. Realistically, that's not the ticket for a good street/strip engine that spends most of its time under 6,000 rpm. Besides, the loads on an engine's reciprocating parts increase geometrically with each incremental rpm gain. Maximizing torque is the real key for building a successful dual-purpose mill. And if there's an engine that's a natural for making gobs of torque, it's the big-block Oldsmobile "Rocket V-8." With its 4.125-inch bore and 4.250-inch stroke, the undersquare Olds is made to get the job done within real-world rpm levels. But building a strong-running Olds requires different assembly techniques than the "everyone-and-his-brother's-got-one" Bow Tie, so it pays to consult a bonafide Olds specialist such as Joe Mondello, who has been building and racing Olds V-8s longer than many of us have been alive.

We recently had the opportunity to make like a fly on a wall as Mondello assembled a max-street-performance 0.060-over 455 that churned out a stout 559 lb-ft of torque at 3,750 rpm and 504 hp at 5,250 rpm. As with any engine, the key to making power on an Olds is careful coordination of the induction, exhaust, camshaft, and cylinder heads...and then ensuring the bottom end won't collapse under the strain.

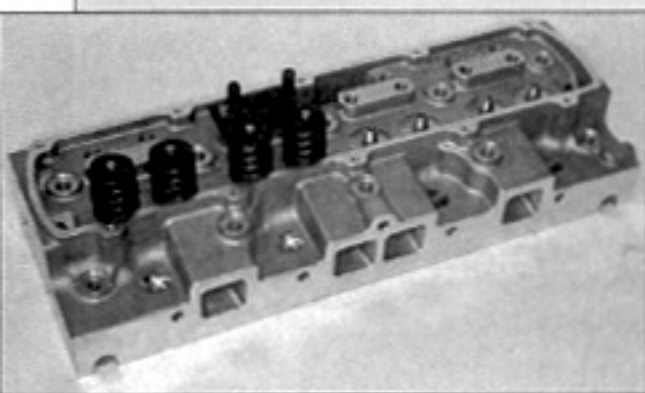


PHOTOS BY MARLAN DAVIS

Cylinder Heads

Mondello recommends any of the following factory cylinder heads:

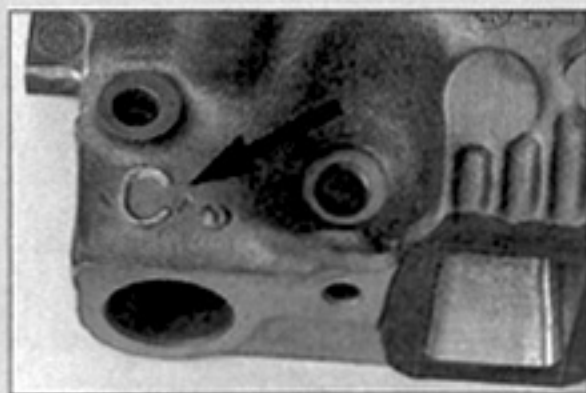
- Type B: '67 425 (80cc chambers)
- Type C: '68-'69 400-425 (80cc chambers)
- Type E: '70 455 Cutlass (77cc chambers)



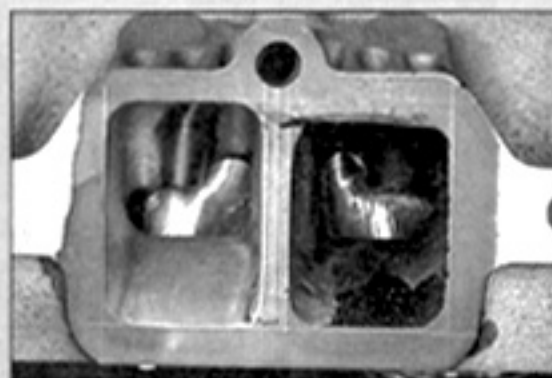
Still under development as this article was written, Edelbrock's new Olds aluminum cylinder heads should be a significant upgrade over any Olds factory head. The radical new exhaust ports are actually smaller than the old factory ports; they eliminate a dead spot that significantly hurts flow potential.

On the intake side, Mondello opens up the mouth around the pushrod bulge, raises the roof $\frac{1}{8}$ inch, completely ports the valve-pocket area, and teardrops the valve-guide boss.

In stock form, these heads have larger ports than other standard-performance heads, and they also flow more air when ported than the '68 Hurst Type D or '70 W-30 Type F heads. The Type C cylinder heads on this engine received Mondello's "bracket porting," as shown in the photos.



Stock big-block Olds heads are identified by the letter cast over the end exhaust port.



Mondello completely ports the weak Olds exhaust runners. Mods include raising the roof $\frac{1}{8}$ inch to better match big-tube (1 $\frac{1}{4}$ -inch or larger) headers and extensive reworking of the short-side radius. The center exhaust port divider is welded and extended all the way to the port exit.



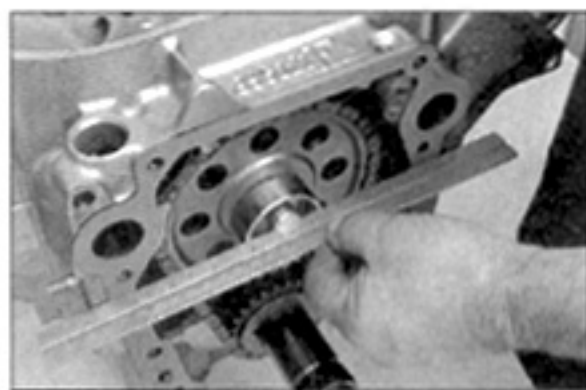
Mondello machines the valve seats to accept oversized stainless steel 2.07-inch intake and 1.68-inch exhaust valves, blocks off the exhaust heat passages, and opens up the chambers as needed to achieve 80cc volume before fully polishing them.

Cam & Valvetrain

This engine uses Mondello's JM 4-5 grind, a stout, hydraulic flat-tappet, dual-pattern cam designed for use in max-performance street musclecars, bracket racers, and jet boats. You'll need 3.90-4.11:1 rear gears, a 3,500- to 3,800-stall converter, 9.0-10.5:1 compression, and a 750-850-cfm carb to complement this cam's 2,000- to 6,500-rpm basic power range. Conversion to an adjustable valvetrain is mandatory. Good through 0.550-inch lift, Mondello's all-steel, roller-tip, adjustable rocker-arm system (PN SAR 455 fits most flat-tappet 455 Olds engines) requires no machine work and fits under stock valve covers with oil baffles. Full-roller rockers are available for use with more radical camshafts.

JM 4-5 Camshaft Specs

Type:	Hydraulic flat-tappet
Valve lift (1.6:1 rocker):	0.542" intake/0.558" exhaust
Advised duration:	285° intake/291° exhaust
0.050" tappet-lift duration:	238° intake/246° exhaust
Lobe displacement angle:	110°
Installed intake centerline:	109°



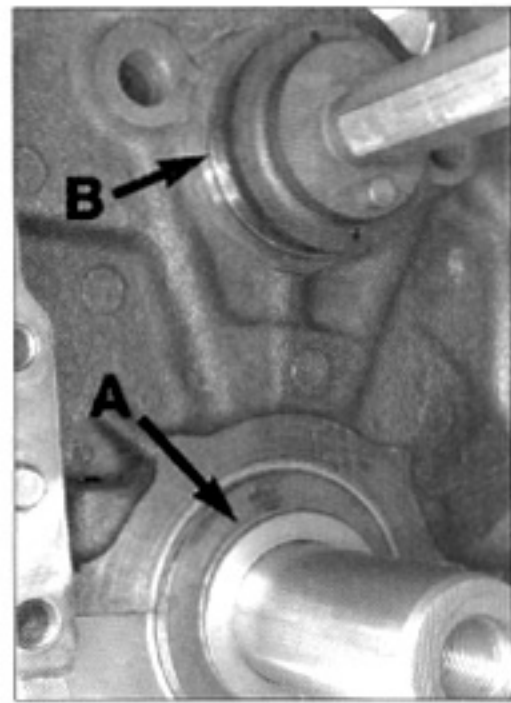
Despite the slight taper ground into the flat-tappet cam's lobes, the rear-mounted distributor tries to push the cam forward. All of Mondello's front cover gaskets are exactly 0.030 inch thick, making it simple to set proper cam endplay by filing the TB 750 thrust button as required.

A CS 120 camshaft thrust washer (B) eliminates front block-face wear. Use a corresponding CS 40 washer (A) on the crank snout to maintain proper upper and lower timing-chain alignment.

Cloyes new Hex-A-Just True Roller timing chain for Olds V-8 engines (Cloyes PN 9-3113A/Mondello PN TR 256) permits infinite cam timing adjustments without the need for cumbersome offset dowel-pin bushings or crank keys. Mondello cams should be degreed using the 0.050-inch tappet-rise method.



Kit SAR 455 includes screw-in studs; $\frac{1}{8}$ -inch, heavy-duty, oil-restricted chrome-moly pushrods; guide-plates; 1.6:1 steel roller-tip rocker arms; $\frac{5}{8}$ -inch rock-er balls; and polylok adjusting nuts. Silicon-vanadium outer and inner springs (330-psi open pressure) work with chrome-moly retainers and heat-treated keepers.

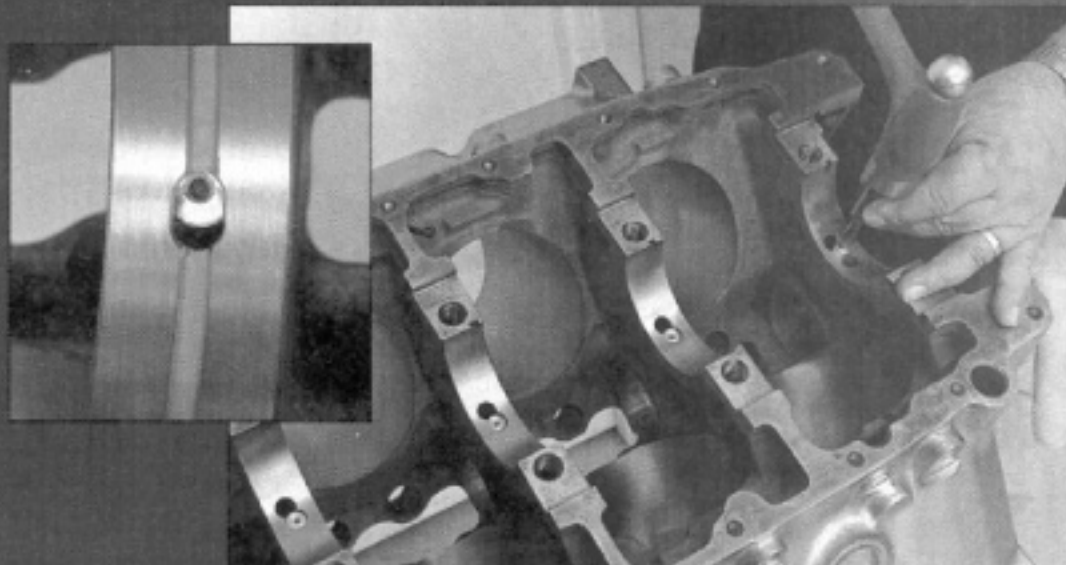


Lubrication

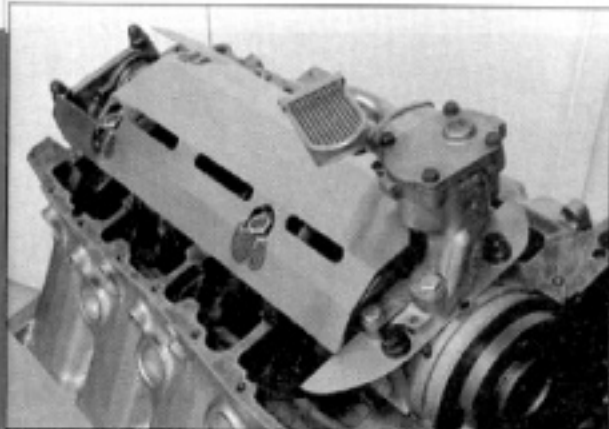
Stock Olds oil systems can't cut it over 5,000 rpm. A 500hp engine requires a better oil pan (such as the 7-quart-with-filter Milodon pan used on this engine), a blueprinted high-volume oil pump, and installation of oil-restrictor plugs in the main-bearing-to-cam-bearing oil passages. A key durability enhancement, the plugs keep the oil downstairs where it's needed to ensure main-bearing longevity. Ideal Olds oil pressure is 70 psi max at cold idle, 40-50 psi at hot idle, and no more than 55-60 psi at 6,000 rpm—higher pressures may lurch the distributor gear.



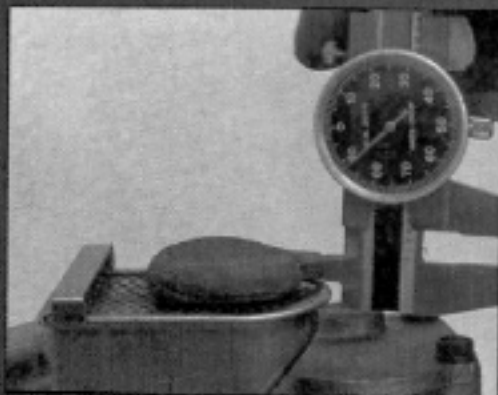
Port the internal oil pump and rear main-bearing-cap oil passages for improved flow.



Restrict the oil passages on main journal Nos. 1, 2, 3, and 4 using Mondello's drive-in restrictor plugs. Hammer the plugs in after coating them with a dab of red Loctite. Drill out the bearing-shell oil holes for these positions to $\frac{1}{8}$ inch. Using a rat-tail file, further elongate the holes as needed so they align with the hole centers in the restrictor plugs.



A PB 300 baffle keeps oil from creeping up the rear of the pan under hard acceleration. Keep oil foam off the reciprocating assembly with a windage tray. The full-length tray shown here (PN CT 850) works with aftermarket deep pans. A short tray (PN WT 200) is available for use with stock oil pans (including Toronado).



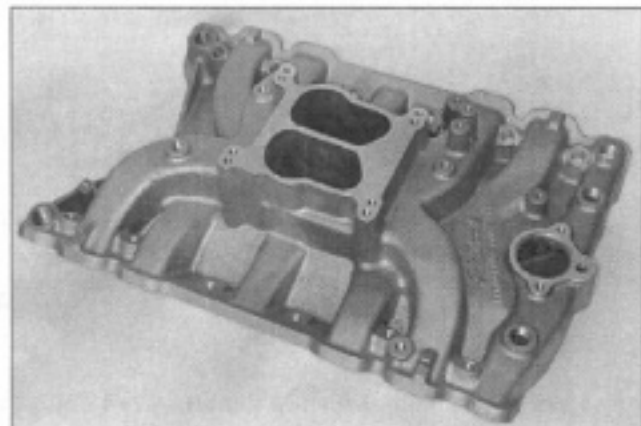
Use a high-volume oil pump only with aftermarket or factory 6-quart (with filter) Toronado oil pans. High-volume pumps can suck lower-capacity pans dry. Install the oil pump pickup 0.200-0.375 inch from the pan floor, retaining it in the pump body with green Loctite.

Induction, Ignition & Exhaust

Intake-manifold selection for the 455 Olds is rather limited. Depending on the application, Mondello likes either the Offenhauser Port-O-Sonic single-plane intake, the Edelbrock Torker single-plane intake, or the Edelbrock Performer dual-plane intake. The forthcoming Edelbrock Victor-style single-plane will be specifically tailored to Big E's new Olds aluminum cylinder heads.

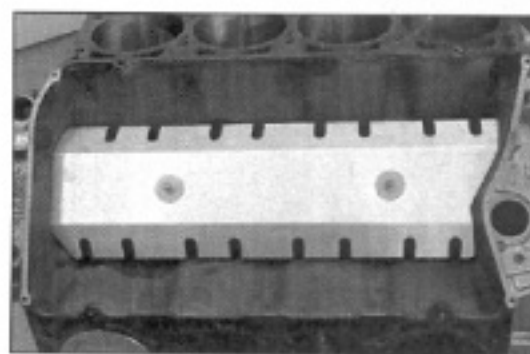
Olds engines rarely see the far side of 6,500 rpm, so a good HEI large-cap distributor filled with genuine GM or Delco internals easily fires the NGK R5670-6 plugs gapped at 0.065 inch.

The port openings on most street-header flanges are actually smaller than the port exit dimensions on the "good" big-block Olds heads. One exception is Hooker 1 $\frac{1}{2}$ -inch-tube headers (PN 3202 fits '68-'75 A-bodies).

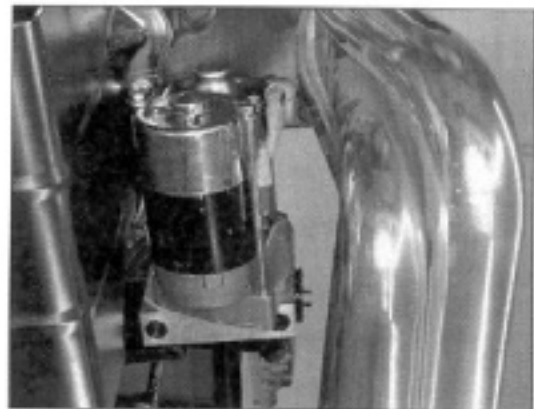


The Performer Olds 455 dual-plane (Edelbrock PN 2151) used for this buildup is preferred for street/strip big-block Olds engines. For best results, lower the center divider 1 inch, then finish it off with a $\frac{1}{8}$ -inch radius to avoid leaving a sharp edge.

Mondello topped off the Performer with a Jones Performance Fuel Systems "Saturday Night Special Stage 2" Holley. Starting life as an ordinary 850-cfm double-pumper, the thoroughly reworked carb now flows upwards of 930 cfm.



A VT 580 adjustable valley tray keeps hot oil off the bottom of the intake manifold. It allows use of conventional-composition intake-manifold gaskets (PN IG 500) instead of the clunky stock one-piece, all-metal "turkey-tray" gasket.



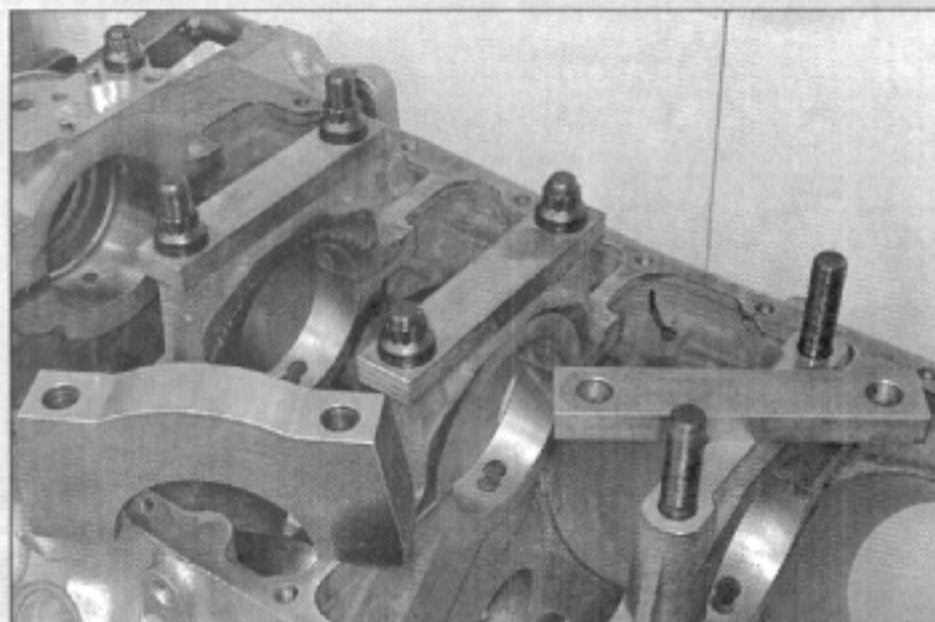
Available from Mondello, the new HTS 460 high-torque ministarter clears even large-tube headers.

Short-Block

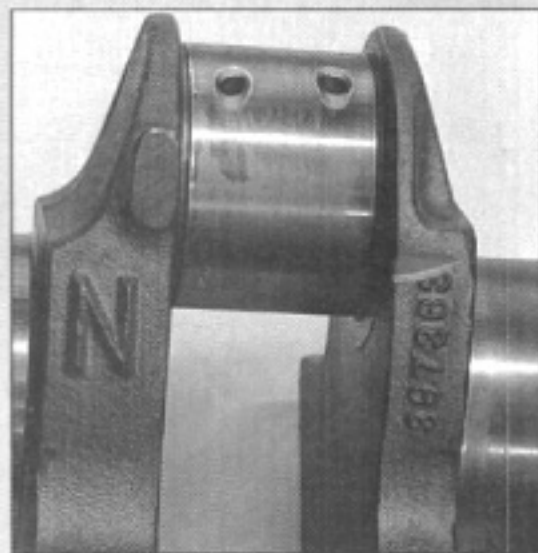
Olds big-blocks have only two-bolt main-bearing caps, so ARP main studs are a worthwhile upgrade for any performance Olds. Engines making 450-500 hp should use studs and Mondello's chrome-moly straps (PN ST 940) installed on Nos. 2, 3, and 4 main-bearing caps. If running both a windage tray and main-cap straps, mill the tops of the stock caps 0.500 inch (milling isn't necessary if not running a windage tray).

Relatively plentiful '68-'72 high-nodular-iron cranks can take 550-600 hp after proper prep: Magnaflux-inspect, shot-peen, index-grind, and micropolish the journals. All factory Olds cranks are cross-drilled on No. 2 and No. 4 main journals; for performance use, cross-drill the remaining journals. All Olds connecting rods are forged and perform adequately up to 500 hp after Magnafluxing, shot-peening, polishing, and big-end resizing. Applications over 500 hp require Mondello's special heat-treat process. Either way, use good ARP bolts. Completely prepped factory rods are available from Mondello (without heat-treat, PN MR 710; with heat-treat, PN MR 715).

Careful cylinder-wall prep is mandatory for making good power and torque numbers. Mondello specifies a "plateau finish" on the CK-10 hone: The walls are first honed within 0.0002-0.0003 inch of the final bore size with a 620 grit stone before being final-kissed with an 820-grit using medium pressure and a 45-degree cross-hatch. Mondello used a Speed-Pro plasma-moly file-fit ring set (PN R5879+65), installing the second compression ring with a wider gap than the top ring to forestall creating a detrimental vacuum condition that could unload the top ring. **CC**



Main-cap straps are sufficient for engines making up to 500 hp. Engines making more than 550 hp require Mondello's billet steel caps.



The good nodular-iron cranks have a "CN" or an "N" cast on the No. 1 counterweight. Chamfer the oil holes in the direction of rotation.



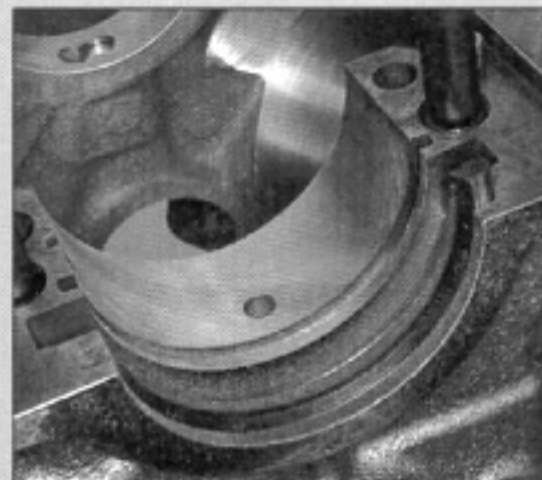
Early blocks had a higher nickel content and thicker cylinder walls. Olds big-blocks are most easily identified by letters and numbers cast into the right side of the rear block-face. The desirable thick-wall blocks are marked F 0, F 00, F 1, F 2, or F 3.



Under acceleration, rod side-clearance effectively goes to "zero," so machining 1/8-inch-wide x 0.010- to 0.012-inch-deep notches in the rods (arrows) lets oil escape, aiding bearing cooling. Heavy-duty applications need notches on both sides; grocery-getters can get by with notches on the inboard side only.



This engine runs pressed-pin Federal Mogul L2323F-60 pistons. Overbores up to 0.060 inch are no problem on the early thick-wall Olds castings. If the blocks pass a sonic check, you can bore 'em 0.125 inch.



Mondello's rubber rear main seal replaces the hard-to-install and leak-prone stock rope seal. Offsetting the seal parting lines from the cap-to-block junction provides added insurance against leakage.

Blueprint Specs

Displacement:	467.7 ci
Bore x stroke:	4.185" x 4.250"
Main- & rod-bearing clearance:	0.0020"-0.0025"
Rod side-clearance (w/notches):	0.010"-0.018"
Crankshaft thrust (endplay):	0.004"-0.008"
Camshaft thrust:	0"-0.015"
Piston-to-wall (skirt) clearance:	0.003"-0.0035"
Cylinder-wall finish:	See text
Piston-ring endgap:	Top: 0.020"-0.022"
	2nd: 0.024"-0.028"
	Oil: 0.020"-0.025"
Piston deck height:	0.020" (below)
Piston volume:	-14.5cc dish
Head-gasket compressed thickness:	0.040"
Head-gasket bore:	4.250"
Combustion chamber volume:	80 cc
Compression ratio:	9.84:1

Source

Mondello Performance Products Inc.

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Catalog: \$9
Tech Manual: \$24