■ QUICKEST AND FASTEST MOPARS ■

MOPAR ACTION

JUNE 2007

MOPAR ACTION™

www.moparaction.com

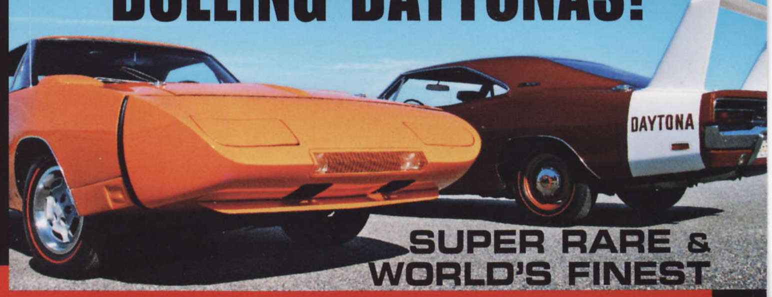
UNBEATABLE CHEATER 'CUDA

TRICK 1970 6.1L HEMI SUPERBEE

CHRYSLER'S 444-INCH MYSTERY HEMI

OUTRAGEOUS '07 FACTORY IR PICKUP

DUELING DAYTONAS!



SUPER RARE & WORLD'S FINEST

$4.95 $5.95 Can

0 6>

0 71486 02586 3

Printed in U.S.A.

TECH

INDY STROKER 6.1L HEMI BUILDUP

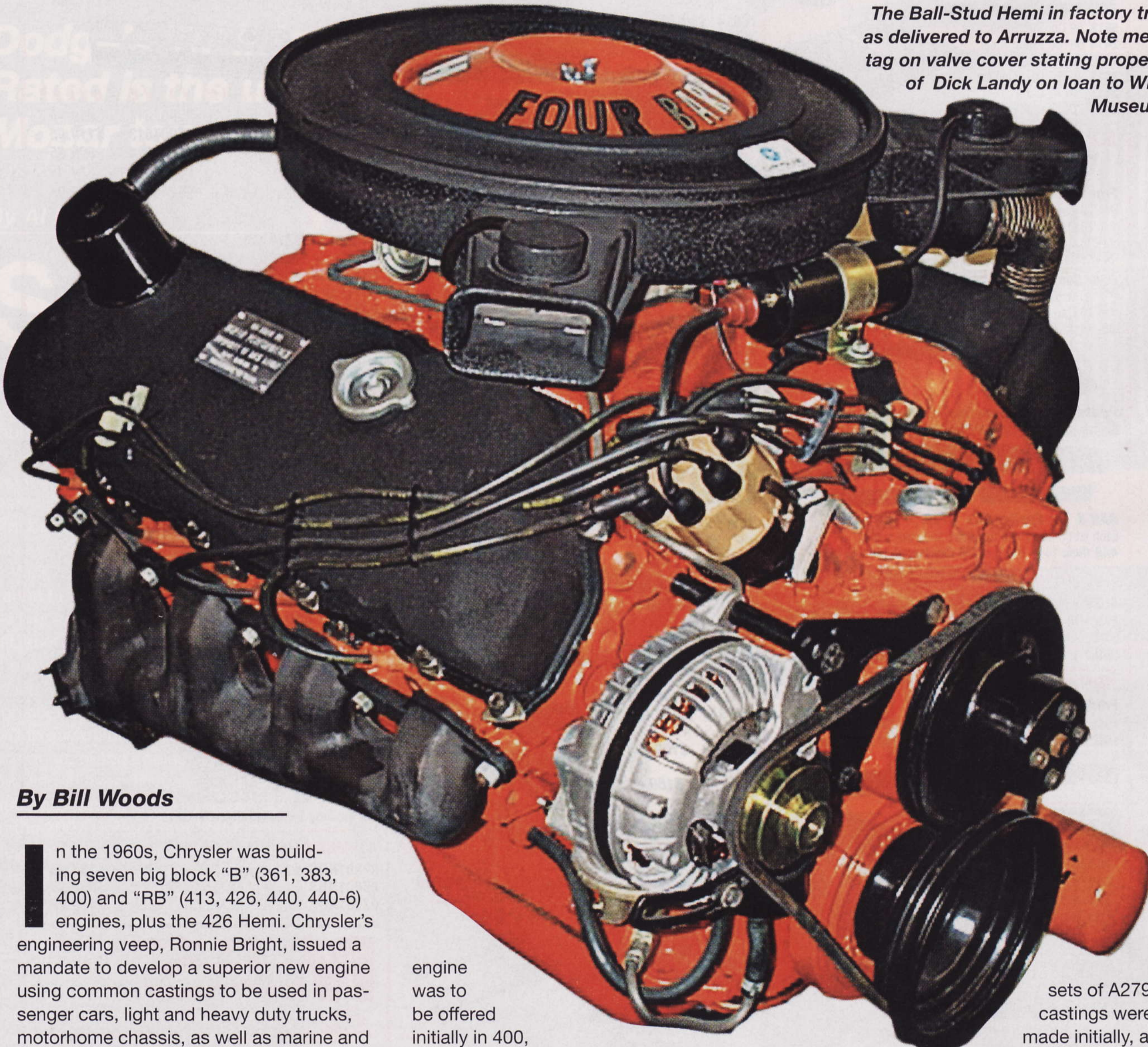
KEISLER ELECTRONIC OD AUTO Install & Road Test

PROJECT 360 SMPI SAVOY HITS THE STRIP

MYSTERY MOTORS DEPT

OF BALL STUDS AND TWISTED CHAMBERS

An engineering tour de force, Chrysler's 444-inch, A279 Hemi was the right engine—at the wrong time.



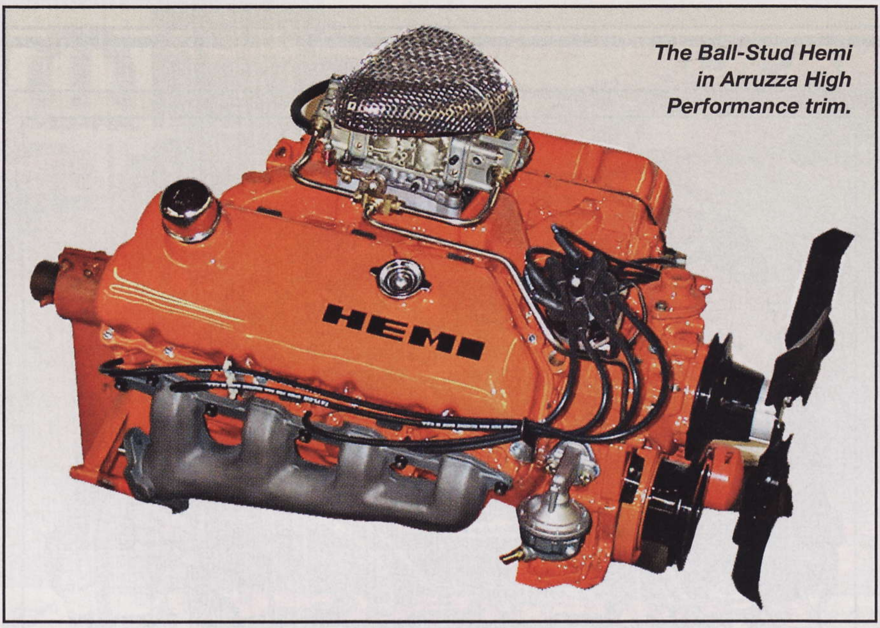
The Ball-Stud Hemi in factory trim as delivered to Arruzza. Note metal tag on valve cover stating property of Dick Landy on loan to WPC Museum.

By Bill Woods

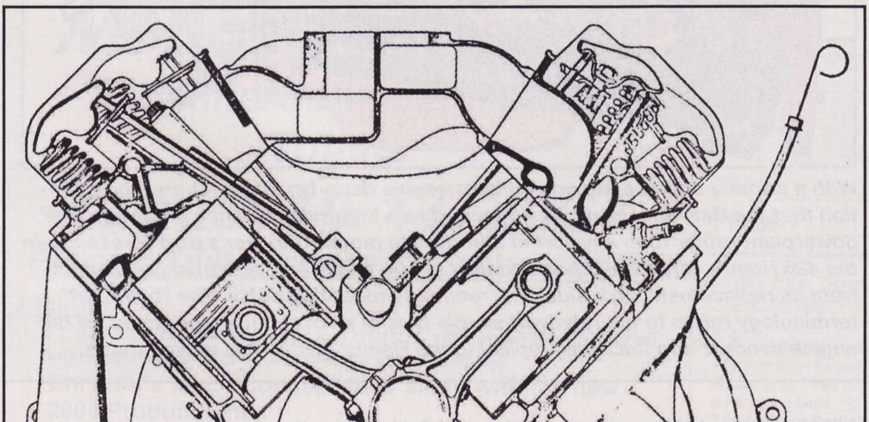
In the 1960s, Chrysler was building seven big block "B" (361, 383, 400) and "RB" (413, 426, 440, 440-6) engines, plus the 426 Hemi. Chrysler's engineering veep, Ronnie Bright, issued a mandate to develop a superior new engine using common castings to be used in passenger cars, light and heavy duty trucks, motorhome chassis, as well as marine and industrial applications. Bright was well aware of Chrysler's engineering and performance reputation, and specified that the new generation engine should be smaller and lighter (to fit into A-body cars), yet be stronger and less costly to build (more like GM's 427-454 and Ford's 427-460). The engine was to be offered initially in 400, and 444 cubic inches.

The engine design approved was the A279. It was 108 lbs. lighter and 6-1/2" narrower than the 426 Hemi, and it had stronger cylinder walls and better intake and combustion characteristics. And, it was less expensive to build than the 426. Twelve sets of A279 castings were made initially, and three lab engines were built for both mule and dyno duty. More castings were made subsequently and a total of 50 A279 engines were assembled. The engine shown here is lab engine G-303.

So why didn't the A279 Ball-Stud Hemi



The Ball-Stud Hemi in Arruzza High Performance trim.



Original Ball-Stud Hemi engineering drawing by Tom Hoover.

ever see production? You have to go back about 40 years, and realize that Chrysler was fighting the union over wages and benefits; the insurance institute over safety, horsepower and speed issues; the government over federal emission standards (legislated but as yet unspecified); NASCAR, NHRA and other racing bodies that were changing their rules to level the playing field by restricting or outlawing Chrysler's 426 Hemi. And then there were Chrysler's own stockholders, lenders and creditors who were not willing to spend untold millions for the new engine.

By late 1978, Chrysler's problems were headline news and everything that could be sold—including the A279 engines was. What wasn't sold outright was then sold for scrap at 5 cents per pound. And that included the A279 engines, pallets of shaker hoods and other stuff that the hobby would kill for today. It would have been the end of the road for the A279, except for the intervention of one of the original Ramchargers and chief technical advisor for Chrysler's special car product planning group—Dick Maxwell. At the last minute, Dick pointed to one of the A279 engines and said, "put that one over in the corner." Maxwell had planned on installing it in a T bucket street rod. That never happened.

Now this is where the story gets a little fuzzy. Dick Landy ended up with an A279 engine. Some say it was the Maxwell engine, but Landy says that he got it from Bob Cahill, who was with Chrysler R&D.

SECRET PASSAGES:
Inside Chrysler's Mystery Hemi

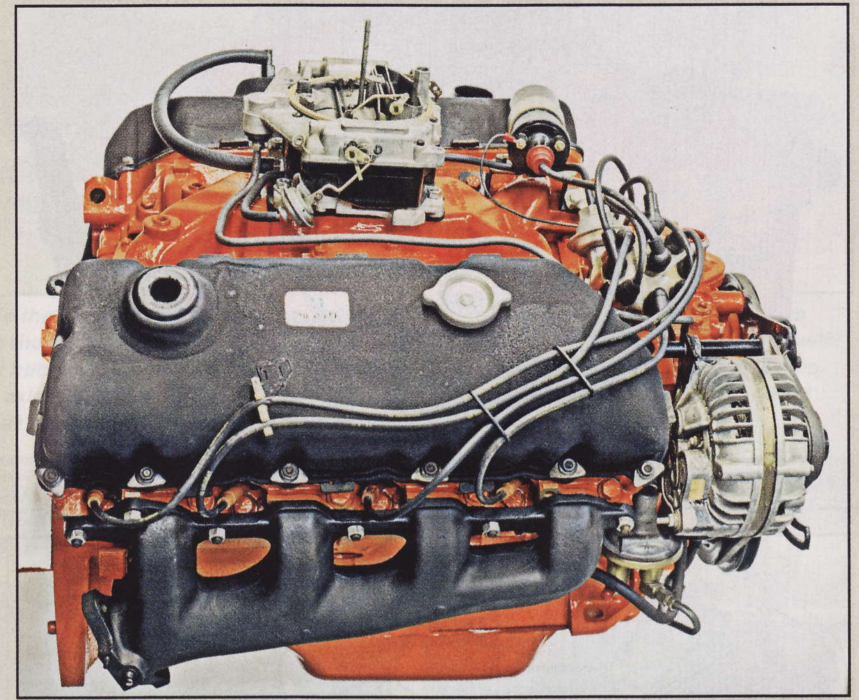
Photos and captions by Al Kirschenbaum

Note: These photos show the factory Ball-Stud Hemi components. You can view the current Arruzza components on our website: www.moparaction.com.

Despite its well-deserved reputation as the undisputed all-time factory horsepower champ, Chrysler's 426 Hemi engine was burdened with a number of drawbacks. The powerplant was big, heavy and difficult to fit and service in even Chrysler's largest body styles. And the Hemi's relatively complicated mechanicals made it expensive to produce in the low volumes that its 1966-'71 production run dictated.

In the late-'60s, supplies of originally limited Hemi parts were running down, and Chrysler had no plans to continue manufacturing the hardware after existing stocks were gone. So when these already-limiting factors were further aggravated by the Federal Government's escalating emissions control requirements, the Street Hemi was scheduled for termination after 1971. And when Chrysler decided to consolidate its entire big-inch V8 lineup by designing a compromise engine, the legendary "Ball-Stud Hemi" was conceived.

(Please turn to page 44)



With a primary engineering goal of inexpensive deep-breathing, there's no question that the Ball-Stud Hemi was intended as a high-performance passenger car powerplant rather than any sort of all-out race motor. Chrysler's plan was to retain the 426 Hemi's established performance image and power potential and benefit from its replacement's considerably reduced production costs. The "ball-stud" terminology refers to the relatively simple type of pivot arrangement used for the engine's rocker arm fulcrums, replacing the Hemis' costly dual rocker shafts.

Maxwell died in a recent motorcycle accident, and Cahill, now 93, doesn't remember. The question this raises is whether two or only one A279 engine survived.

Landy reportedly was looking into drag racing applications for the engine, a project enthusiastically supported by Maxwell. Landy was promised a dual quad intake and a better flowing exhaust manifold, but they never showed up.

Landy says that he dyno'd the engine with the single 4-barrel, and it made slightly less horsepower than a 426 Hemi. The dyno work was done in '68 and '69. The numbers kept dropping off with subsequent dyno runs. Landy pulled a valve cover and noticed a lot of metal sludge and pushrod wear, so he machined new pushrods. Then the rockers wore so much that they changed the cam dynamics and HP fell further. Landy changed the cam and the rockers, resolved the wear problem and the engine came to life and made more power than the 426.

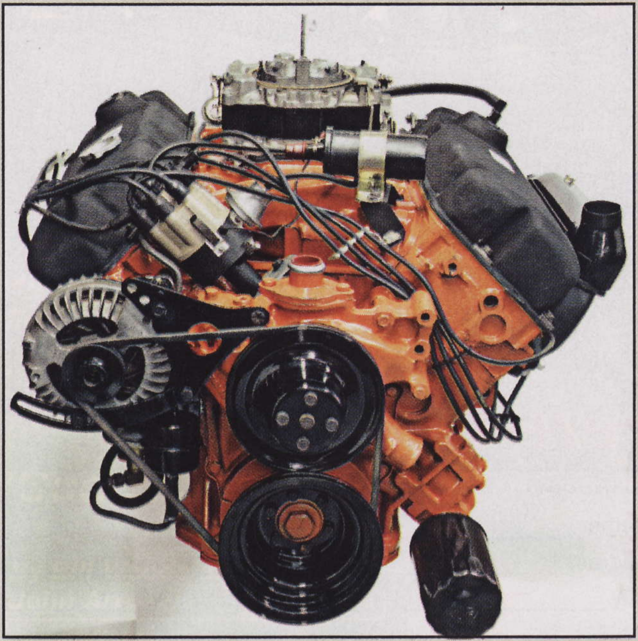
Years passed, and all of a sudden, Chrysler wanted the engine back. Landy told Cahill that the engine was the best thing Chrysler had ever given him, and he wasn't giving it back. Chrysler referred the matter to their legal department. Landy said if Chrysler paid him for the time and work he put into the motor he might consider it. Besides, the statute of limitations had run out. Landy was still hoping the A279 would eventually make it as a corporate engine. Chrysler then offered Landy either 30 or 50 grand for the engine (Landy can't remember exactly). He told them if they came up with 10 times that amount he might consider it.

Landy was then contacted by the Walter P. Chrysler Museum in 1999. They wanted to put the engine on display. Landy agreed—if they would pay for the shipping. But Landy was slick. He machined up a couple of aluminum plates which he attached to the valve covers. They stated that the engine was Landy's property on loan to the museum. He had some paperwork drawn up which the museum unwittingly signed (on behalf of Chrysler), acknowledging Landy as the engine's rightful owner.

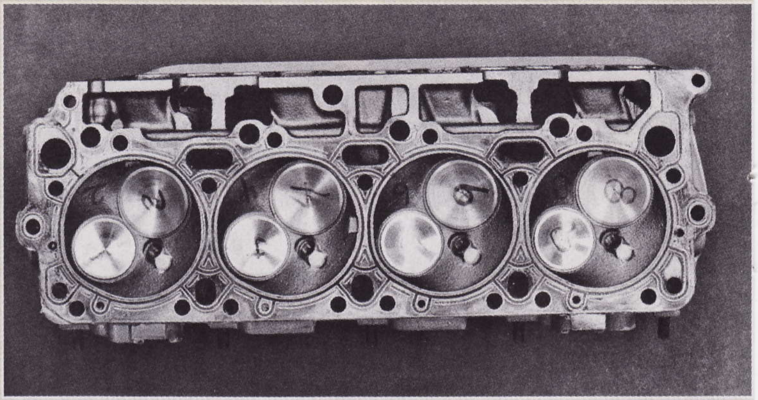
John Arruzza, of Arruzza High Performance had been trying to buy the engine from Landy for 20 years. Now that Landy had some paperwork showing his ownership of the engine, he was in a position to sell.

Rather than keep the engine in its stock configuration, Arruzza decided to build it his way. It was a daunting task with no room for error, as replacement parts for the engine simply did not exist. All the gaskets had to be custom made. The original crankshaft was basically a stock 440 steel 3.75-inch stroke unit. That was tossed in favor of a Callies one-off custom forged steel crank with a 4-inch stroke and 2.2 Chevy rod pin size and a Hemi 8-bolt flange. Why only a 1/4-nch added stroke? Arruzza did not want to have to notch anything. Realize this block was probably the only one surviving, a mistake would be a major problem. A .030″ overbore was required because one cylinder had rust. That brought the cubes up to 481. The compression was kept at a streetable 9.6:1 for pump gas. Ross made custom Boss 429 pistons for the A279, as the pistons for both engines are remarkably similar. The rods are Manley 6.60″ steel H-beam units rated at over 850 horsepower. The intake was totally reworked for plenum volume, and an 800+ cfm Holley double-pumper replaced the T-Quad. A lot of porting work went into the intake and exhaust ports. Cam Motion supplied a custom cam with extra duration on the exhaust side. Because the rocker arms are non-adjustable, Arruzza went with a hydraulic cam rather than use adjustable pushrods so he could run a solid stick.

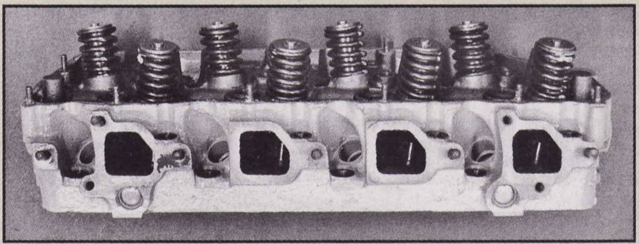
Arruzza eventually installed the engine in the "Hoover's Mover" '69 Barracuda. (also featured in this issue). And that car, with its unique Ball-Stud Hemi motor, ultimately was sold to its current owner, Carl "Skip" Sable. Sable plans to show this important piece of Mopar history at the season's upcoming major Mopar shows.



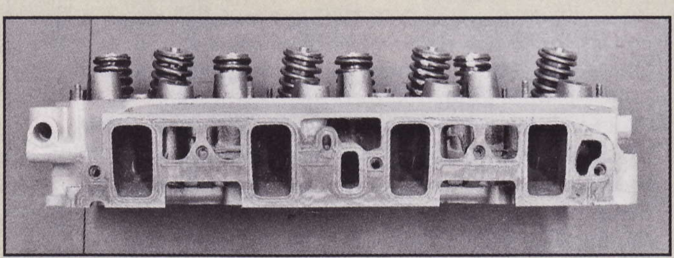
From the appearance of all these finished castings and special stampings, the motor was well on its way to production. Engineers anticipated that the Ball-Stud Hemi arrangement would have been both less costly to produce and lighter in use. A Ball-Stud Hemi would also "come down the line better" and would fit more production car bodies with fewer plant problems than the physically larger Street Hemi.



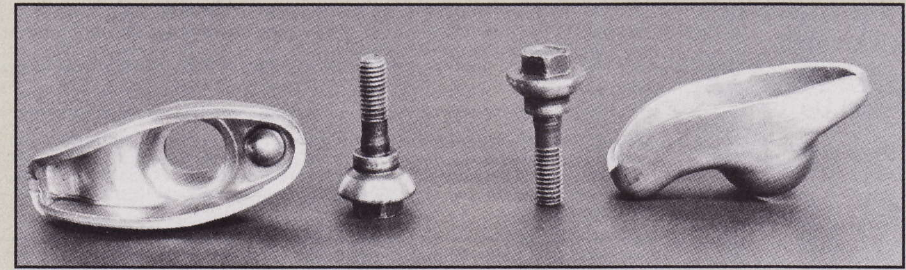
Yep, them's hemispherical-lookin' combustion chambers, all right. But being limited by a B-wedge-like head bolt pattern, efforts to position the valves laterally opposed from each other (like the true crossflow 426 Hemi layout) were unsuccessful. Instead, the valves (2.25-in. intakes and 1.94-in. exhausts, in the unmachined chambers were pretty much stuck in where they fit. Notice how the valves are "twisted" into positions somewhere between the B-wedge and the Hemi arrangements. In this layout, considerable crossflow still occurs during the valves overlap. Sparkplugs are located as centrally as possible. Inside the head, the valves are canted at compound angles to their respective ports as well as to to each other. This "polyangle" layout reduces valve shrouding and eliminates the sharp runner turns typically found in in-line valve cylinder heads, both to enhance airflow. Compared to a B-wedge, each cylinder head has a pair of extra head bolt holes and an added oil drainback passage.



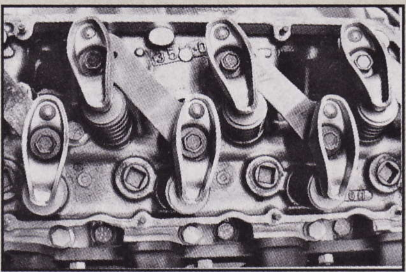
The exhaust ports have unique "modified-D-shaped" exits. Efforts to fit a centrally located sparkplug into the combustion chambers resulted in the use of a "peanut-style" sparkplugs having a 5/8" hex rather than the 13/16" size; these have beome commonplace nowadays. For wrench clearance, some of the 7/16" head bolts along the foot-section row use smaller (5/8" rather than 3/4"), hex heads. Note I-E-I-E-I-E-I-E pattern which is better for exhaust cooling.



Measured off the cylinder bore centerline, the intake valve angle is 15-degrees while the exhaust valves lay at 6-degrees. For reference, a 426 Hemi's valves have a 70-degree angle between them. As in a Hemi, the evenly spaced intake ports allow more equalized manifold runner volumes and more consistent mixture distribution than a traditional wedge's paired port layout.Note the four flat-topped pedestals that the ball studs get threaded into, and the production-style exhaust heat crossover passage

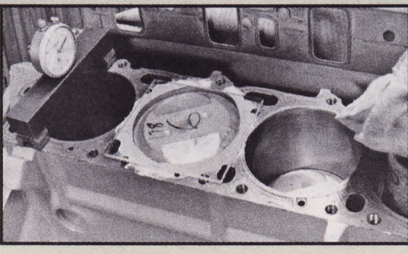


Rocker arm designs were compromises partially dictated by the head's unique combustion chamber, valve and pushrod layout. These arrangements were concessions to a plan to retain the B-wedge head bolt pattern. Although the rocker ratio measures 1.60:1, the pushrod angles and odd rocker geometry result in an effective 1.58:1. During development, there were concerns that the large "bathtub-style" rockers were too heavy and too flexible for acceptable high-rpm dynamics. The pivot studs (which were more like shouldered bolts, no press-in junk), were fabricated by machining the shape and threads, grinding the fulcrum ball, and then heat-treating the whole thing. In order to remain within a non-adjustable hydraulic tappet plunger's preload range, the ground shoulder had to be manufactured to very close tolerances. It made these specially machined studs expensive to make, but the system was still a fraction of the cost of a comparable 426 Hemi setup. Chrysler reportedly had plans for an adjustable setup with a fully-threaded shouldered stud and an extra-long locknut that could accommodate solid tappet cams.



Carried on a series of four pedestals cast into the top of the head, the stamped steel rocker arms' special fasteners are actually positive-locking rounded-shoulder threaded shanks referred to as ball studs. The sides of the U-shaped "bathtub" rockers help maintain proper alignment. If the layout looks familiar, check out the similar (but more complicated multi-piece) arrangements in Chevrolet's big-block, Ford's Cleveland-series V8s, and the straightforward setup in a Chrysler Australia "245 Hemi" Six. Because these exhaust ports are located slightly further outboard, they're shorter than in B-wedges and might offer cooling advantages.

Making their first appearance on a Chrysler V8, stamped-steel guideplates help position the pushrods' tops and align them with the rockers. They also helped guide the rockers' travel through the arcs prescribed by the valves' compound angles.



If you've ever seen a Chrysler Hemi piston of any sort (except those in a modern 5.7L/6.1L version), the ball-stud motor's basic piston dome shape should look familiar, although slightly twisted. Underneath the plexi volume-checking plate shown here, the ball-stud motor's cast-aluminum autothermic pistons have contoured domes with valve reliefs. Again, a heavier piece than a comparable big-block wedge, but way lighter than a 426.