

felt that we were promoting the argument that "backyard mechanics have been wasting their time and money." Nothing could be further from the truth. It was never our intention to suggest that hobbyists leave car restoration to the professionals. We have always believed that the individual car restorer is the heart of the hobby, yet there are certain jobs for which he is ill equipped. He may not have the skills required to do a satisfactory job, nor the tools. We felt that watching professionals at work would offer an excellent way of providing much needed information to the backyarder as well as making him aware of "good buys" such as the value of a precision balanced and blueprinted engine. For instance, the estimated \$120 spent balancing a V-8 engine (\$80 for a six; \$70 for a four) is money well spent. Of course, we didn't expect the reader to slip out to his garage and balance his engine after dinner. However, we did consider it worthwhile to tell him about the better performance and fuel economy synonymous with engine balancing.

Balancing an engine is beneficial to longevity. And, it is extremely important to build durability into vintage engines during a rebuild. With replacement parts becoming scarcer every day, it makes

sense to take advantage of every available benefit.

Arguments in favor of balancing are pretty convincing. For instance, a one-quarter ounce of unbalance located four inches from the center of the crank creates a seven-pound force of unbalance at 2,000 rpm. That same force is multiplied nine times when the engine is revved to 6,000 rpm and up to 16 times at 8,000 rpm or the equivalent of 112 pounds. Our hypothetical example realistically could be one piston assembly one-quarter ounce out of balance. Imagine the destructive power of a full pound of unbalance, then translate that to the average hobbyist's wallet. Hundreds or even thousands of dollars can be wasted in no more time than it takes to open the garage door! Certainly, the average hobbyist can ill afford such a whirlwind of misfortune and should be advised of the pitfalls of assembling unbalanced engine components. The wise backyarder will perform the skills within his ability and means and use a competent engine rebuilder for tasks beyond his capabilities.

A basic understanding of engine imbalance will help him determine when the skills of a professional should be sought. Power impulses created by the engine set

up torsional vibrations in the spinning crankshaft. If that imbalance is left uncontrolled, crankshaft failure is almost always guaranteed when the crank is taxed under the stress of high speeds. To control the force of the pistons and connecting rods, balanced counterweights are placed opposite the rod bearing journals and normally a balanced flywheel and harmonic balancer are found at opposite ends of the crank to assist in stabilizing any erratic rotations of the crankshaft.

The machine shop at Classic Car Centre, Warsaw, Ind., is well endowed with skilled personnel and modern equipment. In previous segments of the "resurrection of Vicky" series, the CCC pros performed a precision rebuilding of all major engine components necessary to make Vicky's engine "hum a precision tune" for a second 100,000 miles, or more. Machine shop foreman Terry Hygema has been closely associated with the massaging of the Crown Vic's venerable Y-block from the start, directing the replacement and rebuilding of most engine components. Hygema was anxious to "get Vicky's engine on the balancer and blueprint it."

The balancing machine at Classic Car is the latest model from Stewart-Warner — a 2000-D Dual Digital balance machine capable of reading a tolerance of imbalance (weight x distance) in microscopic amounts. According to Stewart-Warner's amiable service engineer, Gary Hildreth, it will indicate the exact amount of weight (either grams or ounces) to be corrected in a crankshaft. An impressive piece of equipment, the unit is capable of accepting a shaft 10 feet long and features an rpm scale ranging from 0 to 600.

A banner on the wall of the machine shop at Classic Car boasts: "Precision Engine Balancing Service. Up to 100% longer engine life. Unbelievable engine smoothness. Greater horsepower. Better than new performance." Too good to be true? Not really, according to the folks at Stewart-Warner, who work with engine restoration shops throughout the country. Hildreth claims, "We have many shops doing old cars — V-12 Lincolns and many cars from the 1890s even! All have shown smoother running, less vibration and higher gas mileage."

There are two types of unbalance: static and dynamic. Static unbalance involves dead weight while dynamic unbalance occurs only with motion. To balance an engine, weight is taken off the pistons and connecting rods to equalize the weight of each piston assembly.

Another fact that most shadetree mechanics may have never considered is that most engines fall into two general categories. The in-line type, such as an in-line six or straight-eight, requires no bobweights to simulate the crank's hang-on parts. In-line engines have balanced crankshafts. Those cranks can be readily identified by the location of the counterweights on each end of the crank. They are in line and on the same side of the crank. The second classification concerns V-type engines, such as Vicky's Y-block Ford V-8. V-type engines have unbalanced crankshafts with large

