

BELL PERFECT

MODERN DRIVELINE SHOWS HOW TO ACHIEVE SPOT-ON CLUTCH, BELLHOUSING AND TRANSMISSION ALIGNMENT FOR REDUCED WEAR AND TEAR AND INCREASED PERFORMANCE

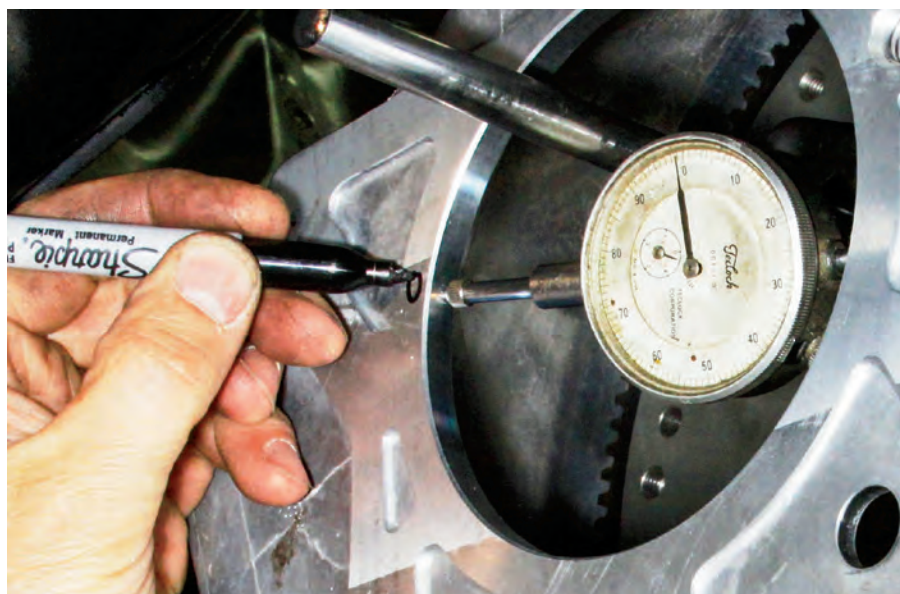
BY JIM SMART | PHOTOGRAPHY BY THE AUTHOR

Bruce Couture of Modern Driveline (MDL) is quite familiar with five- and six-speed swaps for vintage Vettes because he's been in this specialized industry longer than anyone. Modern Driveline was originally founded via the demand for five-speed conversions in classic Ford Mustangs. Classic Mustang enthusiasts saw five-speed overdrive transmissions in late-model Mustangs and wanted a piece of the action. Bruce responded with complete five-speed conversion packages for classic Mustangs. It wasn't long before Modern Driveline turned its attentions to Chevrolet and all of the popular Bow Tie nameplates, including classic Tri-Fives, Camaros, Chevelles and Corvettes. Modern Driveline has a complete line of five- and six-speed conversion packages and parts for C2 and C3 Corvettes.

During one of our visits to Couture's suburban Boise, Idaho, facility he addressed the issue of proper bellhousing alignment and its benefits. Have you ever performed a bellhousing alignment check during a clutch and transmission replacement? Not many of us have, or know anything about this subject.

It can be asked, Does anyone perform a bellhousing alignment during a clutch replacement or transmission swap? Racers do. The rest of us don't. Couture addresses this issue because he wants MDL customers to get the maximum service life and performance from its Superior clutches and flywheels. MDL offers QuickTime steel and reproduction aluminum bellhousings, and TREMEC five- and six-speed transmissions for virtually all Bow Tie nameplates.

"Because engines, bellhousing, transmission cases and other related parts are mass produced, they're imperfect components by design," Couture comments. "They're not all manufactured to exact specifications. There's core shift in castings. Tooling wears out. Factory workers have bad days and get careless. Tolerances can slip," he adds. "What's more, figure in rebuilds, line-boring/honing, overheats, and even normal operation (heat cycling and other stresses) will change casting dimensions. It all adds up to potential bellhousing



alignment issues that can cause premature wear and tear," Couture tells us.

When you add up all the variables in manufacturing you can wind up with an engine, crankshaft, bellhousing, and transmission out of alignment to where there are excessive side-loads and a poor clutch-to-flywheel alignment. The result becomes poor power transfer (due to friction and side-loading) and excessive wear. Clutches and transmissions that wear out prematurely aren't just a fluke. There's a physical reason for every failure.

"Engine block, bellhousing, flywheel, clutch and transmission input shaft must all be in perfect alignment for optimum performance," Couture tells us. To ensure everything lines up, he suggests beginning your fact-finding mission with a dial indicator, which can be found at most auto parts/supply stores, including Harbor Freight. Dial indicators are reasonably priced and are a must for every toolbox.

BELLHOUSING ALIGNMENT SIMPLIFIED

Always perform a bellhousing alignment with the block plate and flywheel installed and torqued to proper specifications. The clutch

does not have to be installed for this procedure; only the flywheel you're going to use. You must have perfectly clean contact surfaces. No paint or any debris. There cannot be any imperfections in contact surfaces, such as scratches or gouges. Believe it or not, these flaws—no matter how small—will alter your measurements.

Mount the dial indicator on the flywheel as shown. You must have steady, continuous rotation for 360 degrees around the inside of the bell-to-transmission inside diameter. Zero your dial indicator where it just touches the bell's inside diameter and slowly rotate the crank. Turn the crank slowly while observing the needle. You will be amazed at how much needle movement actually occurs.

As you make your way around the inside circumference for a complete 360 degrees, look for needle movement outside of proper limits. This really is about diameter, not radius, where you take the 0.010-inch figure and divide it in half to achieve the correction number. Needle movement must be less than 0.010-inch. Anything outside of 0.010-inch calls for the use of offset dowel pins, which get the bellhousing within



01 Begin your bellhousing alignment with a Superior clutch from Modern Driveline (MDL). Superior clutches with organic and Kevlar friction materials are engineered for maximum wear and long life. Extended life comes from proper driving technique and bellhousing alignment. We're going to show you how.

02-04 MDL inventories a wide variety of flywheels in steel and aluminum for all Chevrolet applications. Begin your alignment process with a new flywheel for pinpoint accuracy. Opt for ARP flywheel and clutch bolts while you're in there using a thread locker before torquing the bolts in a crisscross fashion to Chevrolet's specifications. Tighten bolts in one-third values, then recheck your work.



05 The clutch pilot bushing pocket at the crank flange should be dressed with 180-grit paper as shown and cleaned up for the pilot bushing or bearing.



06 The clutch pilot bushing is dressed on a sanding belt to give it a taper for easy installation.



07 The bushing is inserted and centered for installation.



08 A transmission input shaft makes a nice clutch pilot bushing driver. You can even use it as a clutch alignment tool. The bushing is driven until seated in the crank. It is suggested you spend the money and opt for a clutch pilot bearing, which delivers smooth operation.



proper limits as it relates to the flywheel and transmission.

Offset dowel pins are generally available in 0.007-, 0.014-, and 0.021-inch sizes from Modern Driveline. Look at how much misalignment you have, then determine which offset dowel pin you're going to need to get alignment inside the 0.010-inch limit window.

CLUTCHES

Organic Clutch

The organic clutch is your basic stock replacement in either 10- or 10 1/2-inch and with either a standard pressure plate or King Cobra plate. The King Cobra plate is economical and well suited to the daily driver or show car. The Super King Cobra features steel backed facings to ensure none of the disc separation that is common with King Cobra clutches under heavy use.

Kevlar/Organic Clutch

This clutch is a multi-friction type with Kevlar and organic surfaces designed for extra grab and high heat tolerance from high-performance applications. Available in 10- or 10 1/2-inch. Kevlar/organic is a great solution for a street/track car.

Kevlar/Kevlar Clutch

The Kevlar/Kevlar clutch is designed for long life and minimal wear. These clutches are preferred for high-performance, high-torque applications where failure is not an option. Kevlar/Kevlar clutches are available in 10 1/2-inch, and is preferable for use in light-weight cars to eliminate clutch chatter. This clutch combo is best for hot rods and other high-performance applications. It was born for competitive high-performance Corvettes.

Proper bellhousing alignment, though rarely ever considered, is the final conclusion of your engine blueprinting project. You've paid strict attention to detail from the intake manifold down. It seems only appropriate in the wake of a terrific engine blueprinting to blueprint your bellhousing, clutch and transmission. When you learn how to properly blueprint the bell and driveline, the rest falls into place with startling smoothness. **VETTE**

Sources

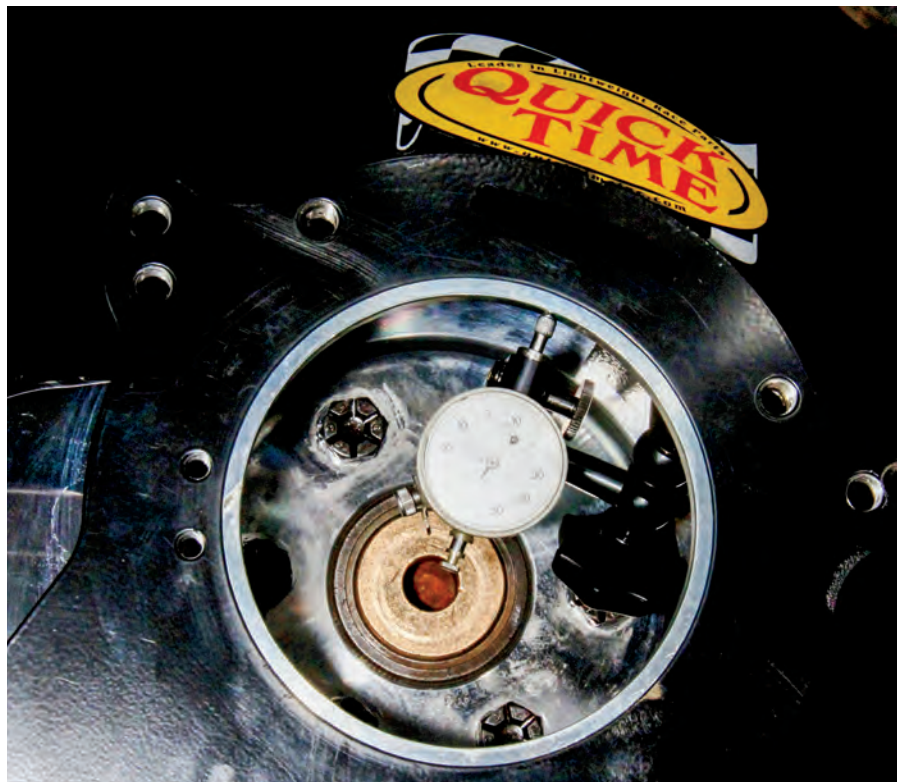
ARP
(805) 339-2200
www.arp-bolts.com

CALIFORNIA MUSCLE CARS
(661) 268-1137
www.californiamusclecars.com

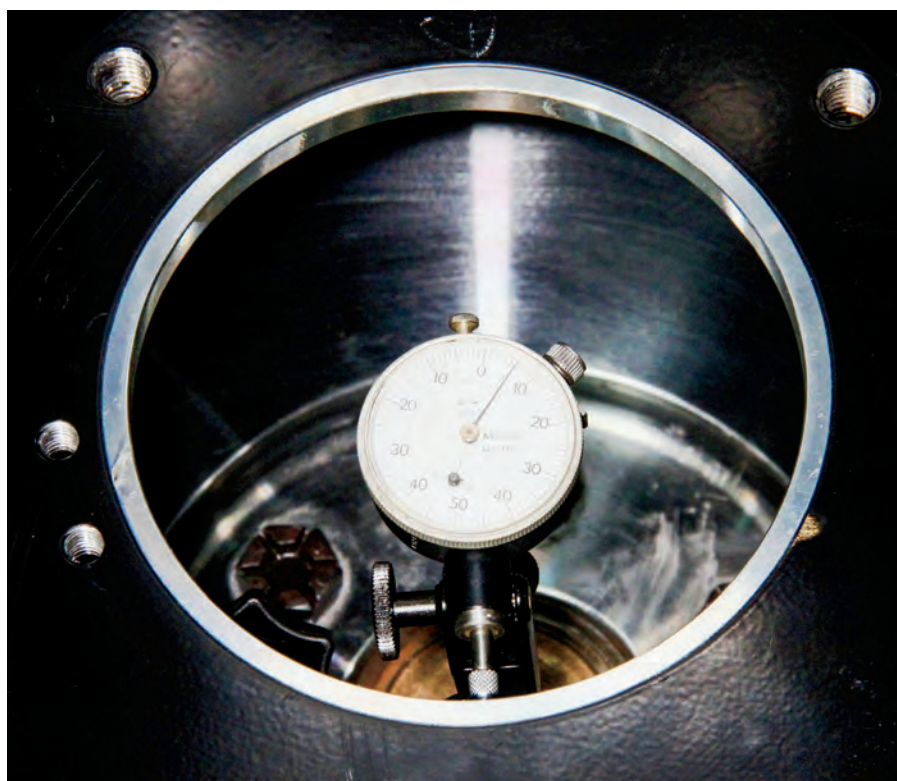
HARBOR FREIGHT
(800) 423-2567
www.harborfreight.com

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(208) 453-9800
www.moderndriveline.com

QUICKTIME (HOLLEY)
(866) 464-6553
www.holley.com/brands/quicktime/



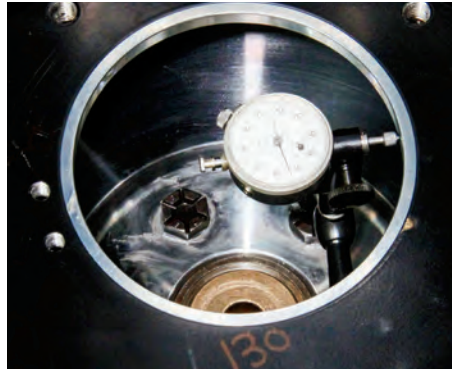
09 Set up your dial indicator with the pin just touching the inside diameter of the bell opening and set the needle at zero. The dial indicator bracket should be attached to the flywheel. Dial indicators are available from Harbor Freight, or any tool store.



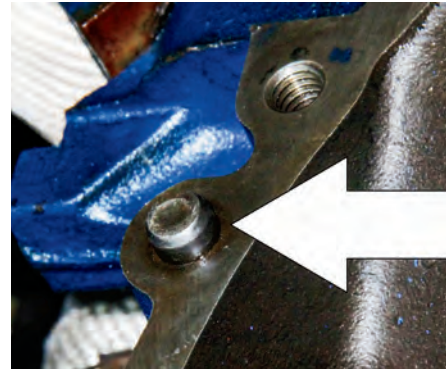
10 Turn the flywheel/crank slowly for 360 degrees and closely watch the needle. Needle movement should be 0.010-inch or under. It's a good idea to repeat this procedure to see if the gauge repeats these numbers. If there's any doubt, repeat the procedure until you are positive of your findings.



11 Note your findings on the bell with a marker each time you make a full pass. If your numbers are inconsistent check the dial mounting and setup.



12 Be very methodical in your measurements and take nothing for granted. This is about accuracy and minimizing wear and tear.



13 Engine blocks are fitted with bell-housing alignment pins (see arrow), which ensure bell alignment with the block. Sometimes these pins are too short or misaligned and must be replaced.



14 When old alignment pins won't come out by conventional means we have to try an unconventional approach. Bruce encountered stubborn alignment pins that would not come out. He welded a bolt to the pin and drew it out with a nut as shown.



15 Standard and offset pins of various lengths are available from MDL for your installation project. Once you have ascertained that offset pins are needed, it's a good idea to discuss your findings with the MDL staff, which will help you choose the pins required.



16 We're installing a Superior diaphragm clutch from MDL on a big-block Chevy. Spot-on bell alignment must be followed by accurate clutch, disc, and pressure plate alignment. You can use the clutch alignment tool MDL provides or a transmission input shaft. Pressure plate and flywheel contact surfaces must be hospital clean, which can be accomplished with brake cleaner.



17 With the alignment tool and disc properly centered, install the Superior pressure plate. Bolts should be snugged in a crisscross fashion for uniform installation, then torqued crisscross in thirds. Then, check torque around the perimeter a final time.



18-19 MDL offers every imaginable driveline part you could ever want for your Chevrolet vehicle. Shown here are two TREMEC TKO five-speed packages for Chevrolet vehicles, including the Corvette. You may opt for a stock bell with the TKO or the QuickTime SFI-rated bell.

