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HOT ROD WHERE IT ALL BEGAN

GETTING A HANDLE

The E-Rod Z28 Finds Its Feet With Key Chassis Upgrades.

> “It was a complete transformation,” says E-Rod build leader Mike Copeland. “The car feels like no second-generation Camaro I’ve ever driven.”



By Bill McGuire

Photography: Bill McGuire and Wes Allison

In the Jan. '11 issue of HOT ROD, we launched the E-Rod project, our effort to create a silk purse from a polyester double-knit Camaro. In the episodes that followed, we detailed the installation of the GM Performance Parts E-Rod crate engine, a turnkey, smog-free LS3 sporting 430 hp (Feb. '11), then described how the wow-grade paint was laid on the '79 Z28's once-scabby sheetmetal (Mar. '11). Now we're back with Ol' Rubber-nose, this time to take you through the chassis,

brake, and suspension modifications.

There was a time when hot rods were asked only to go fast and look good doing it. These days we expect them to turn and stop as well. And if they can handle an afternoon drive without beating their occupants half to death, that's swell, too. With these goals in mind, a Hotchkis TVS suspension package—springs, sway bars, and mounting hardware—was selected. “The target is the upper end of sport,” says Hotchkis engineer Aaron Ogawa. “With this package you can

drive the car on the street comfortably and still have some fun in the canyon and at the track. We want the customer to have it all, the best of both worlds.”

The TVS package is all-new stuff from Hotchkis, representing the company's next generation in chassis science. The front springs are significantly stiffer than the original Z28 coils, 600 lb/in versus 365 lb/in for the stockers, while the rear leaf springs are 150/180 lb/in, versus 127 lb/in stock, and re-arched to lower the rear ride height 1.5

inches (A 3.0-inch drop is also available.) The antiroll bars are lightweight, tubular items fabricated from DOM (drawn over mandrel) mild steel. They're 1.375-inch front, 0.875-inch rear, and include Delrin-bushed D-mounts and spherical-joint attachment links.

Along with the company's spring and bar combination, Hotchkis front control arms, upper and lower, were installed. Fashioned from steel tubing with a glossy black powdercoat, they look really trick. The pieces

also feature revised geometry to allow up to 3.5 degrees of negative camber and 9 degrees of caster for ultimate cornering grip, while the effect on bumpsteer is negligible, according to Hotchkis. However, our build guru, Mike Copeland of Diversified Creations, opted for stock alignment settings on the E-Rod in the interest of good highway manners and maximum tire life.

PSC Motorsports supplied the quick-ratio steering gear, while the brake setup is a complete Wilwood system. Rotors are

13-inch front and rear, using six-piston calipers at the front and four-piston units at the rear. A Wilwood 1.125-inch-bore master cylinder was matched to the company's neat adjustable proportioning valve with integral brake-light switch, while braided flex lines at the front reduce pedal travel and look nice.

After a couple of false starts with our shock selection, Bret Voelkel of RideTech stepped up to provide a set of his company's Select Series dampers with two-step remote adjustment, which is achieved electrically

via a nifty button on the E-Rod's console. Actually, this was the very first set of remote-adjustable dampers released by RideTech. (They're available in airbag, coilover, and stand-alone versions.) And as things turned out, Voelkel was the first to drive the E-Rod on an autocross course when it made an appearance at the Holley LS Fest.

While the Camaro was totally unsorted, Voelkel reports the performance was more than respectable, running course times in the sharp half of the pack. This, despite the pair of drag radials mounted out back for the impromptu laps. From his seat, the grippier rear tires made the relatively unstuck front end "push like a dump truck," in his words. Interestingly, the Camaro was quicker through the cones on the softer of the prototype dampers' two settings, which Voelkel also attributed to the drag radials.

According to Copeland, the E-Rod's real transformation is not in the suspension improvements, but in the structure itself. The second-gen Camaro employs a unit-construction cab bolted to a softly bushed front subframe, an assembly designed to travel down the road like a stack of dishes, more or less. The setup was good enough for its time, offering a decent ride and OK handling, but today we can do better. With a few relatively simple changes, the E-Rod's structure has been made far more rigid. Hotchkis subframe connectors, with solid spacers replacing the original rubber bushings, tie the front subframe directly to the rear floorpan rails. A six-point rollbar (to be covered in a future episode) was also installed, which, while not as stiff as a full rollcage, also imparts much-needed torsional rigidity. Finally, Hotchkis Handle Bars were bolted in to triangulate the front subframe and unibody.

A decade or two ago when the NASCAR boys began to apply analytical tools (read: computers) to chassis development, they quickly identified the most sensitive and profitable area in improving frame rigidity: between the front upper spring pocket and the cowl or dash hoop. Parallel studies (including a series of SAE papers) by Harry Law and Clemson University uncovered exactly the same fact: Fix this part of the structure so it can't flex or bind and you'll get a better, more repeatable car. After all, spring, bar, and damper rates don't mean much if the frame and/or body give first. The Hotchkis Handle Bars for the Camaro address the issue by tying the upper control arm mounts directly to the upper cowl sill.

We haven't yet quantified the E-Rod's handling on the track. The performance numbers will come later when everything is dialed in. But those who have driven the re-constituted Z28 come away impressed with



> The chassis makeover began with the installation of a pair of Hotchkis subframe connectors. To obtain a good fit and a solid basis for welding, old paint and sealant were ground off the mounting areas on the rear pan rails and front subframe.



> The Hotchkis connectors are designed for weld-in installation, though the front mount can be bolted in place to allow future subframe removal if desired. On the E-Rod, rosette and circumference welds were laid in with the MIG rig at both ends of the connectors for maximum strength.



> Designed to follow the body structure without cutting into or interfering with the floorpan, the Hotchkis connectors are formed from 1.5x3.0-inch, 0.120-wall rectangular steel tubing. While it sure is pretty, the brand-new powdercoating must be ground off to obtain sound welds.



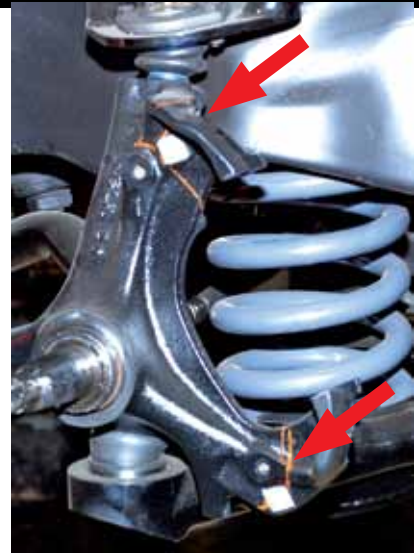
> In the Hotchkis scheme of things, TVS stands for Total Vehicle System. The TVS kit for the '70 to '81 Camaro and Firebird includes front and rear springs, antiroll bars, and mounting hardware, including shackles, links, and fasteners.



> The lower control arms on the E-Rod, also from Hotchkis, use shims and spacers [shown] to allow easier adjustment of the front ride height, a nice feature with LS swaps owing to their significantly lighter weight than traditional iron-block SBC and BBC V8s.



> Like the Hotchkis lower arms, the upper arms are fabricated from 1.5-inch, 0.120-wall tubing, jig and TIG welded. The pieces feature 4130 steel cross shafts and Delrin bushings with integral grease fittings.



> The big Wilwood calipers and rotors are designed to use the original Camaro front spindles, but they will require some trimming around the original caliper mounts, as shown by the crayon marks. Not to worry; Wilwood provides precise hacking instructions.



> Jeremy Salewsky of Diversified Creations attacks the spindle with a portable hacksaw. The final trimming was performed with a cutoff wheel.



> The Wilwood two-piece rotors are 13 inches in diameter to accommodate the company's six-piston calipers. This setup will clear 17-inch and larger wheels. A 14-inch package is also available, along with smaller combinations designed for the stock rotor dimensions.



> PCS Motorsports supplied the Saginaw-style steering gear with billet sector shaft cover. However, drivers report that the 12.7:1 ratio is a bit quick and darty for highway cruising, while the turning circle is also reduced.



> The wheels are retro-ish LT-III models by Team III, 17x8 with 4.5-inch backsparing on the front and 17x9.5 with 5.25-inch backsparing at the rear. The rubber is Continental Extreme Contact, 245/40ZR17 front and 285/40ZR17 rear.



> Hotchkis designed its Chassis Max Handle Bars to provide triangulation for the second-gen Camaro's unit body and front subframe. These supports fasten to the upper control arm mount, lower fender pin and cowl seam on both sides. Due to clearance issues, they're not a bolt-in fit on Pontiac F-Bodies, or in cars equipped with stock upper control arms, the company cautions. Copeland advises that these bars always be used with solid sub-frame bushings.

its overall manners and feel. “In roadability, it’s the best second-gen Camaro I’ve ever driven,” says Copeland, a GM engineering manager when he’s not building hot rods and a purchaser of a new Z28 in 1979. “It feels like one solid piece. I’d love to put the car on a chassis rig and do frequency tests. I think the result might surprise some people.” He believes that in its current form, the Camaro’s structure is closer to that of a contemporary unit-construction vehicle.

In Copeland’s view, rodders working on their own second-gen F-cars might do well to start with the chassis-stiffening mods first, then proceed to the trick suspension hardware, beginning with tires and shocks. “You don’t really have to throw the whole catalog at a car to make it handle well,” he says. “Not everyone needs or can afford all the parts we used, especially on a tight budget. I’d start first with what works the best.”



> The driver side Handle Bar was a tight fit around the Wilwood master cylinder, GM brake booster, and brake lines, but everything worked out. With the factory HVAC module removed, there were no clearance issues on the other side. The master cylinder itself is being sorted out as we write this; the bore is likely wrong based on the pedal feel, and Wilwood is helping sort it out. Report to come.

> In its first real trip to the strip at Milan, Michigan, with only a set of 295/40R

Mickey Thompson drag radials to aid traction, the E-Rod suffered severe wheelhop but still squeaked into the high 11s with the ZEX nitrous setup engaged. But at the Holley LS Fest a few weeks later, Editor-In-Chief Freiburger ran an 11.77, even managing a newspaper-height wheelie. A set of Calvert Racing’s CalTracs traction bars is now in the works. Also, the rear springs have settled after about 2,500 miles so the car sits a little tail-low and the rear shocks are just a bit too long. We’ll share these details in the final installment of the E-Rod buildup.



> Here’s the completed package, including the Strange 9-inch rear with a Detroit Truetrac differential for street-and-track handling without the driveability compromises of, say, a Detroit Locker. **HRM**

SOURCES

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