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CAR DRIVER

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The Big Squeeze

We give RENNTech a Mercedes E320 with 40,000 miles on the odo, and we get back a remarkable V-12 beast.

BY STEVEN COLE SMITH

This is embarrassing for me," said Hartmut Feyhl, 37, founder and president of RENNTech Performance Tuning, a company in Lake Park, Florida, that customizes Mercedes-Benz vehicles.

We had just returned from the 7.5-mile oval track at Honda's Transportation Research Center in Ohio where we had driven a Mercedes E-class that Feyhl had created for *Car and Driver*. It went 185 mph. With two people aboard. Listening to the 10-speaker stereo. With the air conditioning on.

"This is embarrassing for me," Feyhl said again, and shrugged. The car had been expected to go faster than 185 mph. And it would have, were it not for a line of computer code, unknown to Feyhl until it reared its encrypted head, buried in a black box somewhere in the car. Once we hit 185 mph, that computer told a speed limiter to cut off all power—apparently, by instructing the fuel pump to stop doing its job. We'd coast maybe 300 feet, then the power would come back on, then we'd hit 185 again, and while the stereo and air conditioning continued to operate

like the reliable Mercedes products they are, the sleek, low-slung car just wouldn't go any faster.

There's a lot more to the story—and another visit to the big oval track—but let's back up to the beginning. Which, for *Car and Driver* readers, began with the May 1997 long-term report on a Mercedes E320, a Smoke Silver sedan that listed for \$48,537, with which we'd just spent 12 months and 40,000 miles.

That E320 had been a solid steed and a good companion. At the end of our test, it went from 0 to 60 mph in a commendable 6.7 seconds, turned the quarter-mile in 15.1 seconds at 93 mph, and recorded a top speed of 133 mph, limited by a governor.

But—you know us—we wanted more than the 217-horse, 3.2-liter six-cylinder could offer. For a nominal fee, Mercedes-Benz sold us the car, and we turned it over to Feyhl after a high-level technical consultation that went something like this:

C/D editors, peering under the hood of the E320: "Think a V-12 would fit in there?"

Feyhl: "Sure!"



Our initial run around TRC's big oval (above) led to tire failure of three of the four Pirelli radials—our fault, we learned, for not heat-cycling the virgin tires before we went for it.



The RENNTech E7.4RS felt rock solid and stable around the high-banked oval as we clicked off a 184-mph top speed on an early run (below).



PHOTOGRAPHY BY JIM CAIOZZO AND AARON KILEY



So our E320 went off for an operation in Florida.

When it returned, the editor who knew it best, Brad Nevin—he'd chaperoned the car and written the long-term test—didn't even recognize it. "That's it? That's my car?"

Well, actually, it now belongs to a plastic surgeon in Savannah, Georgia, but the deal was that we'd get the car for an extended test.

And it isn't surprising that Nevin didn't recognize it. Feyhl's résumé, after all, includes a 10-year stint at the AMG *wunderwerks*, the Mercedes aftermarket tuner in Germany where he helped build the very first AMG Hammer, which we dubbed "the hottest passenger sedan in history" in our December 1986 issue. It began life as a 230E but had been given a 5.5-liter V-8 transplant that propelled it to a top speed of 178 mph.

Not long after that, Feyhl set out on his own. He founded RENNTech (*renn* is German for "race") and has since offered up some of the most satisfying cars we've ever tested. Among them: the RENNTech SL700, an SL600 with a 526-horsepower, 7.0-liter V-12 (July 1995). And just last August there was the RENNTech SLR7.4, another SL600 with a 7.4-liter V-12 stuffed under the hood. Although it didn't have the winning 0-to-150-to-0 time in our August shootout against some other heavy metal,

it knocked out the quarter-mile in 12.1 seconds at 119 mph, had the shortest braking distance, and was the only tuner car to receive the highest possible ratings for durability and drivability.

So it was natural for us to think of Feyhl when we went looking for a hotted-up Mercedes.

And that's what we got. Officially dubbed the RENNTech E7.4RS, our E320 got an aluminum 7.4-liter V-12 with titanium connecting rods, ported and polished cylinder heads, bigger valves, more aggressive camshafts, and modified intake manifolds. The big V-12 sucks air through two custom-built carbon-fiber air boxes that contain K & N filters. The RENNTech stainless-steel exhaust feeds twin catalytic converters—after all, we specified that the car had to be emissions-legal, seldom a problem for Feyhl.



BRADLEY NEVIN

Our long-term E320 (above) was in for an extensive makeover, especially in the engine compartment, where RENNTech shoehorned in a potent 7.4-liter V-12 (right).



Fitting the engine in was not a trivial pursuit. Yes, the V-12 could have easily fit the hole left by our in-line six, but doing it the easy way would wreck the weight distribution and limit the power that could be put to the rear wheels. Achieving a 53/47-percent front/rear weight bias required surgery to the fire wall to allow the engine to move aft.

The transmission is a much-modified five-speed automatic connected to a beefy rear end from an S-class and fitted with a Torsen limited-slip differential. Although it never really seemed to need it, Feyhl added a big transmission cooler with an external fan and a thermostat.

The suspension was lowered with shorter, stiffer springs, and it got larger-diameter front and rear anti-roll bars. The front suspension includes custom-valved, fully adjustable Koni coil-over shocks. Feyhl modified the rear subframe with alu-

minum links and Heim joints, and he beefed up the front subframe.

As for brakes—well, Feyhl is becoming famous for his use of monster RENNTech-modified Alcon units, not much different from those used to haul down a NASCAR Winston Cup car. Six-piston calipers pinched the 14.5-inch rotors up front; the rear got four-piston units on 12-inch rotors.

The tires were Pirelli P Zeros on O-Z Racing F1 Cup wheels: Up front, 18-by-

9-inch wheels wore 265/35ZR-18 tires, and in the rear were slightly plumper 285/30ZR-18 radials on 18-by-10-inch wheels. The fenders were flared to envelop these big shoes.

Feyhl also modified the hood to contain two big rear-facing air outlets that allowed a much freer flow into, and out of, the engine compartment, and that also likely provided a modest amount of downforce. Adding to that downforce was a complete body aero kit, including rocker



RENNTech stripped our E320 down to bare metal (left), leaving little more than the original shell intact. The O-Z Racing wheels were a tight fit over massive RENNTech-modified Alcon brakes (above).

extensions and mild front and rear spoilers. Anticipating our top-speed run, Feyhl fashioned a smooth belly pan to cover virtually the entire underside of the car so none of that high-speed air would get snagged on the car's hangy-downy bits.

Add to all that the lovingly applied Standox "Polarized Silver" paint—a Porsche color—and it isn't surprising that few among us recognized the car in which we'd spent 40,000 miles.

The makeover didn't stop there. Inside, front power Recaro seats were added, and the whole interior got a leather treatment guaranteed to raise the hackles of PETA members. It took eight hides—at 55 square feet per hide—of special German automotive nonshrink leather to cover the seats, the dash, and the door panels. Lightweight carpet with leather binding

allowed Feyhl to save 28 pounds over the standard carpeting. The leather was dyed blueberry and silver, with blueberry-stained bird's-eye-maple trim on the steering wheel, dashboard, and door panels.

There's more, but you get the idea. And you are likely also beginning to understand that the project was not exactly done on the cheap. Feyhl figures the car is now worth \$240,000, not including the donor, so add maybe \$50,000 for a nice loaded E320, and we'll put the price at \$290,000. (Order one today, though, and we'll bet Feyhl will give you the special *Car and Driver* price of \$289,000. Call now! Operators are standing by!)

It is worth mentioning here that what Feyhl does is different from what most other tuners do. He is customizing

Mercedes cars, and his customers are Mercedes customers. They want their cars to be blindingly fast, but quiet. They want them to stop on a dime, but have a smooth-shifting automatic transmission; to have air conditioning that works; to have quiet, smooth-idling engines that won't overheat in the worst traffic jams. And above all, they want them to be safe and reliable. You can buy tuner-tweaked Chevrolet Corvettes and Dodge Vipers that might go faster than the RENNTech but would make lousy day-to-day transportation.

"My customers are demanding," Feyhl said. "They can hear grass grow. One drop of oil on the garage floor, and I get a phone call. But I give them what they want, and they keep coming back." Those customers include bizillionaire comic Jerry Seinfeld, actor Sylvester Stallone, country singer



The stock hood (upper left) grew vents to allow for a free flow of air through the engine compartment. Leather-covered Recaros were superb; even the trunk hinges (above) got the leather treatment.

Alan Jackson, and race-car driver Jim Matthews. "But celebrities aren't my core customers," Feyhl said. "They're businessmen, many of them self-made, who simply want to own the best."

Enough about the car's origin. You want to know how it runs.

Which brings us back to the TRC test track and its 7.5-mile, high-banked oval, where you can drive 150 mph in the top lane with your hands off the steering wheel.

Feyhl had tested the E7.4RS on a chassis dynamometer; the maximum horsepower measured at the rear wheels was 480.7, and the maximum torque was 482.9 pound-feet. Figure about a 23-percent loss of power as it travels from the engine to the wheels, and we estimate the engine output to be 620 horsepower and 625 pound-feet torque. Given the weight (4064 pounds with the 33-gallon fuel cell full) and the frontal area, Feyhl was confident the car could easily run between 200 and 210 mph.

Our initial tests certainly gave us no reason to doubt that. Zero to 60 mph blew by in just 3.9 seconds; the quarter-mile flew past in 12.1 seconds at 120 mph. The E7.4RS circled the skidpad at an impressive 0.92 g. Braking was good at 159 feet from 70 mph, but we had expected better, considering the same car needed just one foot more at the end of its life as an E320.

When we tested the E7.4RS, the ABS was not hooked up, and we experienced some lockup that ABS likely would have cured.

So we were hopeful as we made the four-hour drive to TRC. The E7.4RS is a very satisfying road car, offering up a good ride on even relatively rough pavement. Hit a big bump or a pothole, though, and the suspension's stiffness suddenly makes itself known. The Recaros were comfortable for every driver who tried them, and everything inside worked as it was supposed to. Only when you punched the accelerator was it apparent that you had awakened a 7.4-liter monster that previously was content to purr.

On our first visit to TRC, we mounted a new set of super-soft Pirelli P Zero C Dry racing tires, and then with senior technical editor Don Schroeder behind the wheel, and yours truly in the passenger seat, we took one quick lap at about 150 mph and then pulled into the pits. All looked good—no leaks or hissing air—so we went for it.

And about a third of the way around, already at 185 mph, we hit that cursed speed limiter. We returned to the pits and told Feyhl. Did it matter that we had the air conditioning on? No, he said, the problem was just a phantom limiter that he thought he had successfully bypassed. But there was no way to know for sure

until we got to the track.

Later, Feyhl would say that trying to get official information out of Mercedes and engine-management-supplier Bosch was simply impossible. No one—if, in fact, they even knew—would tell him exactly where the limiter, or limiters, were. (In the engine-control computer? Reading off the wheels' speed sensors? Or the rear end? Or the transmission? Or the instrument panel?) Adding to the problem was the fact that to get the strongest, best-performing parts available, the car was, in essence, a mutt.

So we went back to make a couple more full-speed laps for the cameras. As we neared the end of the second lap, we felt a vibration. "It feels like it's on my side," Schroeder said after backing off the throttle.

"No, it feels like it's on my side," I said.

We were both right. The left front tire had lost a chunk of rubber the size of a silver dollar. Both rear tires were shredded in an inch-wide band at the inside edge of the tread. The right front tire was intact but swollen on the inside of the tread.

Testing was over. With the street tires back on, we returned to Ann Arbor. Feyhl sat in the passenger's seat, pulled up the carpet from the floor to reveal a computer plug-in, and attached his handheld analyzer. He was not going to let the car get away with this. He took readings, made notes, then flew back to Florida and spent the next two weeks mailing us parts and installation instructions.

We mounted a different engine computer that, hopefully, did not contain the speed limiter. We added a switch that would keep the fuel pump working, no matter what the computer told it to do. And we consulted with Pirelli about what went wrong with the tires.

Pirelli determined it was a temperature problem. Tires need to get hot, then cool completely, at least once before extended high-speed runs. We had not heat-cycled the Pirellis. And once at the track, we should have brought them up to tempera-

ture slowly, and we didn't. (Some tire suppliers, such as the Tire Rack, will even heat-cycle high-performance tires for you on a special machine.)

So we got another set of P Zeros and proceeded to put a few hundred street miles on them and the E7.4RS. We also specified tires that were about 1.5 inches bigger around. Perhaps, Feyhl figured, tires with a larger outer diameter could fool the speed limiter into thinking we weren't going quite as fast as we were. Editor Csere, the MIT graduate, whipped out his calculator and figured that might be good for another 10 mph, anyway.

Back at TRC, I took the car out and ran some steady laps at 110 mph, then 130, then 140, warming the tires while Schroeder set up the timing lights. One thing was immediately obvious: Whereas before we had bottomed the tires into the front plastic fender flares in only one bad dip on the track, now the taller tires were giving me tire-to-fender contact in at least a half-dozen spots on the track. It was an attention getter. Ah, well, that's why we make these exorbitant salaries.

With Schroeder behind the wheel, we built speed quickly into the first turn, and it became clear that we wouldn't be able to make flying laps at top speed without risking some damage to the fender flares, tires, and possibly ourselves.

But something else was soon obvious: That speed limiter was gone. The E7.4RS was such a locomotive that by going full-throttle coming out of the turns, the



smooth, long straights would give us plenty of time to reach a maximum speed.

Which we did almost immediately. The speedometer stopped a tiny bit shy of 200 mph, and the tachometer froze at 5400 rpm, at least 300 rpm less than we wanted.

Damn it, we had found another limiter. This one was a "soft" limiter, though—rather than shutting down the fuel pump all at once, the way the hard limiter had, this soft limiter retarded the ignition timing ever so slightly, maintaining an almost constant speed.

Runs in both directions averaged 198 mph, with our best run being 198.7 mph.

There was not much else to do, as our time at TRC—at more than \$1000 an

hour—had run out. The Pirellis, at least, showed zero wear, excellent temperature distribution across the tread, and not even a scuff mark where we had been jamming them into the fender flares. Clearly, the previous tire problems were our fault.

On the way back to Ann Arbor, Feyhl was again calculating how to bypass this newly discovered speed limiter. "With 100 less horsepower, that car will go 200 mph. With the power it's making now, it should go 212 mph. There's one more guy in Germany I can call..."

We just smiled and figured that we might be making one more trip to TRC's big oval. Feyhl doesn't give up easily, and neither do we.

C/D TEST RESULTS

ACCELERATION

	Seconds
Zero to 30 mph	1.8
40 mph	2.3
50 mph	3.1
60 mph	3.9
70 mph	4.8
80 mph	6.0
90 mph	7.2
100 mph	8.6
110 mph	10.2
120 mph	12.1
130 mph	14.4
140 mph	17.0
150 mph	19.9
160 mph	23.3
170 mph	28.7
Street start, 5-60 mph	4.1
Top-gear acceleration, 30-50 mph	2.2
50-70 mph	2.4
Standing 1/4-mile	12.1 sec @ 120 mph
Top speed (governor limited)	198 mph

BRAKING

70-0 mph @ impending lockup	159 ft
Modulation	poor fair good excellent
Fade	none light moderate heavy
Front-rear balance	poor fair good

HANDLING

Roadholding, 300-ft-dia skidpad	0.92 g
Understeer	minimal moderate excessive

FUEL ECONOMY

C/D-observed fuel economy	12 mpg
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INTERIOR SOUND LEVEL

Idle	.64 dBA
Full-throttle acceleration	.99 dBA
70-mph cruising	.78 dBA
70-mph coasting	.75 dBA

RENTECH E7.4RS

Vehicle type: front-engine, rear-wheel-drive, 5-passenger, 4-door sedan

Price as tested: \$290,000 (includes an approximation of \$50,000 for Mercedes-Benz E320 donor)

Price and option breakdown: base RENTech E7.4RS (includes engine and driveline modifications, \$140,000; exterior modifications and paint, \$25,000; suspension, brakes, wheels, and tires; \$25,000; chassis reinforcement and weight removal, \$15,000), \$205,000; custom interior, \$35,000

Major standard accessories: power steering, windows, seats, locks, and sunroof; A/C; cruise control; tilting steering wheel; rear defroster

Sound system: Mercedes-Benz AM/FM-stereo radio/cassette/6-disc CD changer, 10 speakers

ENGINE

Type	V-12, aluminum block and heads
Bore x stroke	3.58 x 3.74 in, 91.0 x 95.0mm
Displacement	452 cu in, 7414cc
Compression ratio	10.0:1
Engine-control systems	2 Bosch Motronic ME 1.0/RENTech with port fuel injection
Emissions controls	3-way catalytic converters, feedback air-fuel-ratio control, EGR, auxiliary air pump
Valve gear	chain-driven double overhead cams, 4 valves per cylinder, hydraulic lifters, variable intake-valve timing
Power (C/D estimated)	620 bhp @ 5800 rpm
Torque (C/D estimated)	625 lb-ft @ 4600 rpm
Redline	6000 rpm

DRIVETRAIN

Transmission	5-speed automatic with lockup torque converter
Final-drive ratio	2.65:1, limited slip
Gear	Ratio Mph/1000 rpm Max. test speed
I	3.59 7.5 45 mph (6000 rpm)
II	2.19 12.3 74 mph (6000 rpm)
III	1.41 19.1 115 mph (6000 rpm)
IV	1.00 26.9 162 mph (6000 rpm)
V	0.83 32.4 185 mph* (5700 rpm)

* On 255/45ZR-18s, ran 198 mph @ 5400 rpm.

DIMENSIONS AND CAPACITIES

Wheelbase	111.5 in
Track, F/R	62.6/61.5 in
Length	189.4 in

Width	70.8 in
Height	54.7 in
Ground clearance	2.9 in
Curb weight	4064 lb
Weight distribution, F/R	53.0/47.0%
Fuel capacity	33.0 gal
Oil capacity	9.5 qt
Water capacity	12.3 qt

CHASSIS/BODY

Type	unit construction with a rubber-isolated rear subframe
Body material	welded steel stampings

INTERIOR

SAE volume, front seat	51 cu ft
rear seat	44 cu ft
luggage space	12 cu ft
Front seats	bucket
Seat adjustments	fore and aft, seatback angle, front height, rear height, lumbar support, thigh support
Restraint systems, front	manual 4-point harnesses, driver and passenger front and side airbags
rear	manual 3-point belts
General comfort	poor fair good excellent
Fore-and-aft support	poor fair good excellent
Lateral support	poor fair good excellent

SUSPENSION

F:	ind, unequal-length control arms, coil springs, anti-roll bar
R:	ind; 3 lateral links, 1 diagonal link, and 1 toe-control link per side; coil springs; anti-roll bar

STEERING

Type	rack-and-pinion, power-assisted
Turns lock-to-lock	2.9
Turning circle curb-to-curb	40.7 ft

BRAKES

F:	14.5 x 1.4-in vented, grooved disc
R:	12.0 x 0.9-in vented, grooved disc
Power assist	vacuum with anti-lock control

WHEELS AND TIRES

Wheel size	F: 9.0 x 18 in, R: 10.0 x 18 in
Wheel type	2-piece cast aluminum
Tires	Pirelli P Zero C Dry, R: 265/35ZR-18, R: 285/30ZR-18
Tires (for 198-mph top-speed test)	Pirelli P Zero Asimmetrico, 255/45ZR-18
Test inflation pressures, F/R	.28/.28 psi