

## TRAIL TEST:

# Suzuki PE400T Enduro

Meet the winner of the All-Midwest Two-Wheeled Tractor Pull:  
It's not Caterpillar Yellow for nothing. BY PAUL DEAN

Two-stroke dirt bikes tend to be an either-or proposition: It's usually a choice between trials-bike low-end grunt or race-bike top-end speed. Rarely, if ever, do you find both qualities built into the same machine.

If you've wondered, though, what it would be like to have both exceptional low- and high-speed performance on one machine, Suzuki's PE400T could be the answer. Because as far as engine performance is concerned, the PE can do it all. It claws up steep hills at such low revs in first gear that you can almost count the power strokes, yet four upshifts later it will zip along a fireroad at better than 90 mph. And between those extremes, the PE accelerates as though someone at the factory had bolted lights on an RM400 motocrosser by mistake.

That's quite an endorsement, and one that could leave you with the impression that the PE400T is the greatest enduro invention since dirt. It isn't. Oh, it's a competent, competitive enduro machine, all right, and a thrilling ride just about anywhere in the dirt, but thrills aren't everything in evaluating world-class enduro hardware. And when all is said and done, the one and only part of the PE400T that

consistently stands above that of the competition is its engine.

If you think you already know all about that engine, if you're of a mind that Suzuki has, in typical model-crossover fashion, simply tweaked an RM400 motocross motor into enduro tune, you're wrong. The PE400's powerplant is, for the most part, an RM/PE250 bottom end fitted with an overbored top end—a combination that yields 397cc of displacement instead of the RM400's 417cc. But the difference is more than just 20cc of piston swept area; the RM's motor is a slightly undersquare long-stroker (80mm bore, 83mm stroke), whereas the PE's is a highly oversquare short-stroker (85mm bore, 70mm stroke).

According to current two-stroke design philosophy, that oversquare design should make the PE a less effective dirt racer than the RM—something about stronger low-end power and increased tractability with those long-stroke engines. But once you mount the tall saddle and dial the 36mm Mikuni wide-open, questioning the engine's performance is the last thing on your mind. Despite having a wider ratio gearbox and more crankshaft inertia than an RM400T, despite being choked by a quieter exhaust system and a more restrictive

airbox opening, and despite being 21 pounds heavier, the short-stroke PE is considerably more tractable and virtually as fast as an RM. Every time we put the bike on the track, it took an aggressive rider several laps on a good Open-class motocrosser to pass it, and only after a bit of full-on berserker riding by the rider on the MX bike.

That wouldn't be so impressive if the PE's engine weren't such a locomotive out on the trails. The extra inertia provided by the large ignition flywheel (in place of the RM's small internal rotor) helps extend the usable rpm range all the way down into the sub-idle basement. The porting, though, is radical enough to produce race-like horsepower in the top half of the rpm range. As a result, the PE can motor along just about anywhere at any time and in any gear. It'll groom its way up any normal hill at an uncommonly low rpm, with a bit of clutch slippage required only when the going gets trials-slow. And that's with the rather tall overall first-gear ratio. If you swap the stock 15-tooth countershaft sprocket for a 14-tooth, the PE will climb near-vertical hills like a refugee from a state-fair tractor pull while still being capable of almost 90 mph on the top end. Our test bike, for instance, scaled hills that foiled most other bikes before they could get two-thirds of the way up. And on upgrades that those other machines just barely conquered, the PE actually accelerated all the way to the top.

What this means, then, is that in its intended woody-trail habitat, the PE has a remarkably flexible engine that allows you to do just about anything you want, and without much gear-shifting. Whether it's climbing outrageously steep hills or doing infinitely long wheelies or simply transporting a fast enduro rider along the trail at warp speed, the PE offers a handful of all-day fixes for the most addicted dirt-riding horsepower junkies.

If there's any drawback to the PE's engine, in fact, it's that making full use of its tree-blurring power demands handling in the world-class league. And while the chassis generally is up to that formidable task,





PHOTO © 1980 HARCOURT JONES

sometimes it just plain isn't. When you get the PE bounding crazily over the nasties at the speeds it's so capable of reaching, you become acutely aware of a few shortcomings that weren't evident at a slower pace.

Prominent on that list is the Kayaba rear suspension; the harder you ride, the worse those unreservoired gas shocks behave. A lack of adequate rebound damping allows the shocks to return too quickly after being compressed, which, in turn, causes them to either kick the back of the bike upward or deliver a hobby-horse ride over rough terrain. That the PE always goes straight when this happens is a credit to the integrity of the rest of its RM-based chassis; but the fact remains that the stock shocks ought to be trash-canned by any PE owner with the intention of entering



any serious competition.

Most other handling-related complaints about the PE are less crucial in nature, such as the tall seat that makes footing difficult for shorter riders, or the 250-pound (dry) weight that is evident during tight maneuvers or when picking up the bike after a fall. Both factors can be compensated for by an experienced trail hand, but those still on the enduro learning curve will often curse the PE's big-man dimensions.

The tall chassis is easy enough to understand, what with around 10 inches of travel available at both ends; but finding out why the PE weighs 21 pounds more than an RM400T isn't as simple. After all, both use nearly identical chromoly frames and aluminum swingarms, and the PE's lights and oversized odometer don't weigh much at

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**Suzuki seat design reaches an elevated plateau**

*Architect-designed with help from the Flat Earth Society.*



**Hub with integral speed drive**

*Wheel removal with no loose ends.*

## Back To Oversquare One

• At first, the PE400T's engine seems like a remnant of Suzuki's past rather than a portent of its future. The PE's bore is more than 20 percent wider than its stroke is long, which is in direct opposition to that company's current predilection for undersquare two-stroke motors in competition dirt bikes. After all, Suzuki claims that its long-strokers deliver more and better bottom-end power for motocross, and it's no secret that enduro bikes are even more dependent on that same sort of low-rev performance. So it's odd that Suzuki would reject the long-stroke RM400 MX motor as a foundation for the PE in favor of a short-stroker built up from a smaller engine.

One could, of course, speculate that Suzuki has developed new technology that allows its short-stroke engines to be superior to long-strokers for enduro riding. But the plain truth is that the long-versus-short stroke controversy didn't have a thing to do with the PE400 getting an oversquare engine. Instead, the single biggest reason for that big-bore configuration is one that certainly won't rock the very foundations of the motorcycle engineering community: primary kickstarting. Yep, you heard it right. More than anything else, the need for in-gear starting is what resulted in a short-stroke PE400.

That's not as far-fetched as it might sound. You see, John Morgan, Suzuki's enduro team manager, insisted from the beginning that the PE400 have primary kickstarting because of the time that an enduro competitor stood to lose if he had to grope for neutral every time the engine stalled. Too many of the special tests in ISDT-type events employ dead-engine starts, and

the second or so that is lost in getting the bike into gear after starting can make the difference between a gold medal and a lesser award. So since the PE400 would be a new and unproven entry in the field, Morgan felt it could achieve sales success only if it offered advantageous features comparable to those of the competition.

The problem, though, was that the RM400 engine had never had primary-kick capabilities and converting it would involve more than met the eye—new gears, added shafts, recalculated engine widths, etc. So the decision was made to use a PE250 bottom end beneath an overbored cylinder.

In the end, that conversion involved an equal number of attendant changes—new gear ratios, a heavier crank and connecting rod, re-cut engine cases and the like. But those modifications were still deemed worthwhile because the engineers also felt they could meet enduro-bike sound-level standards more easily with the short-stroke motor while still maintaining the targeted horsepower level. Further, the short-stroker offered longer piston-ring life merely because its piston speeds are about 12 percent less than the RM400's at any given rpm.

This issue of stroke lengths seems inconsequential, however, once you saddle up a PE400T and experience what the engine can do. It's hard to imagine the long-stroke RM motor as being able to deliver any mere low-end punch or, more to the point, what on earth you would do with it if it did. And that's testimony to neither over- nor undersquare engines, but to Suzuki's ability to squeeze the right kind of power out of any engine, no matter what the length of its strokes.

—Paul Dean

all. Also, the PE isn't burdened with the RM's remote-reservoir shocks, and the tubes in its air-spring front fork are 36mm in diameter rather than the RM's 38mm units. Granted, the Enduro does have an alloy skidplate (which, incidentally, doesn't offer adequate protection for the clutch and ignition covers) and a bulky muffler that the RM doesn't; still, neither are heavy enough to account for the weight difference.

On the other hand, much of the PE's added weight can be traced to its engine. It has primary (in-gear) kickstarting that the RM400 doesn't, a feature that adds numerous gears, shafts and assorted bits of hardware, as well as necessitating slightly wider engine cases. Also, the PE's crankshaft assembly (including the ignition flywheel) is heavier than the RM's and considerably larger than the PE250 crank around which the engine cases were originally designed. So although the PE400's engine has its roots in a 250cc motor, necessary modifications have made it account for about half of the weight differential between the PE and the RM.

Thankfully, the PE's weight isn't so noticeable once you click it up out of first gear. Whether it's bounding through deep, sandy whoops, cutting fast laps around a track or just simply going fast on a bumpy trail, the PE always wants to track straight and true. The shocks allow the back of the bike to buck and hop, but only up-and-down, not side-to-side.

Some applause for that stability must go to the front fork. That air-assisted unit soaks up the terrain in the luxurious manner that has become normal nowadays for Kayaba forks—if not the yardstick for the suspension industry. Naturally, the fork



**Heavy but simple quick-detach wheel**  
*At the hub of an enduro problem.*



**Team Suzuki enduro rider Jeff Fredett at the Jack Pine Enduro**  
*Using tips from the tuner's toolbox in national enduro competition.*

must be properly tuned to be most effective, and to that end we varied the static air pressure from between 5 psi to 12 psi and juggled the level of 10-weight oil from 170mm to 200mm. We found that settings within that range will give first-rate fork action for just about any reasonable off-road riding conditions.

That couldn't happen, of course, if the fork were hung on a substandard frame—which isn't the case on the PE. For all stabilizing intents and turning purposes, an RM motocross chassis is at work in this enduro bike, so handling credentials are not in question here. The steering geometry, which is only marginally slower than an RM's, offers confidence-inspiring straight-line steadiness without impairing the bike's ability to turn; and although the RM-cloned wheelbase is short enough by today's standards to get a lot of lesser bikes in trouble, it causes no end-swapping problems on the PE, while permitting decent short-radius maneuverability in the really tight woods.

If there is a failure in the PE's ability to turn sharply, it's the center of gravity which, because of the long suspension, is unusually high for an enduro bike. Certain turns at certain low speeds bring out the worst in this aspect of the PE, especially if you have to lean the bike over further in the middle of a turn, or if a low-speed corner sneaks up on you by surprise. The PE noticeably resists being tilted over when that happens, and although it's not something that can't be handled, the point is that it *has* to be handled.

A few other negative blips on the PE's performance graph show up in its human engineering. The seat, for instance, looks (and often feels) as if it were designed



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## Notes From The Tuner's Toolbox

• There's no denying that right out of the crate, the PE400T is one awesome piece of enduro artillery. But like most bikes, it can be substantially improved in one afternoon of fine-tuning—the kind they don't talk about in the owner's manual.

A perfect example is the standard jetting. As delivered, it's too rich in certain spots, requiring replacement of the stock No. 300 main jet with a No. 290 and the lowering of the jet needle into one of its two leanest positions. If signs of richness still are evident at smaller throttle openings (usually at higher elevations), replace the No. 2 slide with a No. 2.5 and trade the No. 45 pilot jet for a No. 40.

Once the jetting is spot-on, the PE's throttle response will be razor-sharp, but you'll still notice that the power drops off abruptly just past the horsepower peak. That, too, can be remedied to a certain extent by an ignition-timing change, but you should do so only if you really need more power and are willing to sacrifice a bit of plonking ability at very low rpm. To make the change, first index the stock ignition timing by scribing two reference marks, one on the outer edge of the ignition stator plate and a corresponding one on the engine case. The circumference of the stator plate is, coincidentally, just under 360 millimeters, meaning that one millimeter at its edge is roughly equivalent to one degree of crankshaft rotation. Now advance the timing three degrees by rotating the stator clockwise three millimeters as measured at your reference marks. That small change will allow the PE to rev a bit more freely and powerfully at high rpm.

Once the engine is properly dialed-in, you might want to deal with the shocks, the handlebar and the gearing. Team Suzuki's enduro riders prefer the high-priced speed—Ohlins dampers—but S&W can supply you with less-expensive shocks that will provide much better damping than the stockers. Next, if the OEM handlebar bothers you, try an RM250/400 bar trimmed to an overall width of 29 or 30 inches. And finally, if you're likely to get into some extremely slow, almost trials-like situations, change the 15-tooth countershaft sprocket for a 14-tooth to get all of the crawling ability you should ever need.

Most of these tips are things almost anyone can do and, with the exception of the shocks, are an inexpensive way to wring every last bit of performance out of the bike. Considering what the PE400 is capable of doing, that's a lot. —Paul Dean



#### Angled rear suspension with a radical motocross look

*Underdamping insures that this is not an out-of-the-crate winner.*

using only T-squares and straightedges. It's wide enough and properly padded but perfectly flat on top with sharp-radius corners. After a long day's ride, your sore hind quarters keep reminding you that you've been sitting on something more akin to a park bench than an easy chair. Further, even though the seat/peg/grip relationship is just about right, the bend of the handlebar angles the grips oddly. That's why many of Team Suzuki's enduro riders have switched to RM bars that they've narrowed to suit their tastes.

Perhaps the worst thing about the handlebar, though, is the amount of vibration that comes through it. At high revs our PE buzzed so badly that the grips often felt as big around as water glasses; and that vibration also accounted for the departure of an exhaust-pipe mount, for the engine-mount bolts continuously working loose and for the early demise of the odometer. We've ridden two other PE400s that did not vibrate as badly as ours, however, which suggests

that perhaps the crankshaft in our bike did not get trued as accurately as it should have at the factory.

Other than pieces that shook themselves into submission, the only reliability problem we encountered was sparkplug fouling. Three plugs fouled during a test that covered sufficient mileage to bald-head the stock 5.10x18 Dunlop K290 rear knobby. We finally traced the plug problem to a too-rich fuel mixture—a condition we remedied with simple re-jetting. And no one was upset when the tire wore out, for we were unimpressed with its performance, anyway. There might be places where these Dunlops are suitable for a high-powered Open-class enduro bike, but we didn't ride over any of them.

You can, of course, point to things like the tires, seat and shocks to conclude that the PE400T is not a serious enduro bike, that it's just a quick-and-dirty model disgorged from Suzuki's interchangeable-parts bin. But if you look past those few items you'll see that the PE is not something designed just to use up a lot of leftover RM hardware. Look at the quick-detach rear wheel (the best QD wheel design ever found on a Japanese motorcycle), the 3.4-gallon gas tank (bigger than most Japanese enduro-bike tanks), the straight-pull throttle (the first from Japan), the built-on tool-bag perch on the rear fender (although no bag is included) and even the clever little all-in-one "wrench" clipped to the front fork. Look at them and then *feel* what the engine can do, and you'll know once and for all that whatever its shortcomings, this is no half-hearted effort. This, friends, is a competitive, for-real enduro motorcycle with a magnificently un-real engine.

## Ride Review

• The PE400 has an amazing motor. Anything that will operate at a walking pace and 92 mph must be admired. Unfortunately, it never really worked for me at either speed. Sure, the motor was awe-inspiring, but somehow the rest of the bike never really clicked.

For a machine with only 10 inches of averagely suspended travel, the Suzuki is unacceptably tall in the saddle. Even my 34-inch inside leg measurement was stretched to climb aboard. In the slow trails the same problem persisted, and the PE's 250-pound running weight did nothing to alleviate it.

Fast trails were no more comfortable for me, either. Again, the weight and the height of the machine made slides very difficult. I never forgot for a moment that I was riding a large motorcycle. Making the machine even harder to live with were the vibration of the motor and the familiar Suzuki banging. Some of the vibration might have been peculiar to our motor, but the clatter was not. Combined, they made a long day in the saddle seem even longer. And that is just not what enduro bikes are meant to do. All of which make the PE only half-successful in my mind. With a better chassis I could think of it as an amazing motorcycle instead of just an amazing motor.

—David Deeburst

• Ride a PE400 in the woods and you'll never be afraid of losing your forward momentum against a fallen tree, a mudhole or an impassable hillside again. There's no object that can withstand the irresistible force contained within the PE400's amazing engine. After a few miles on the trail, you get the impression that you're riding the world's most agile battering ram, a big yellow bulldozer capable of cutting a swathe through the roughest country.

But because the Suzuki's irresistible force depends on horsepower rather than agility, it tires me out quickly on the trail. The riding position suits me, although the ground seems as if it's several stories below, but it's necessary to keep a tight rein on the horsepower when there are trees on every side. Perhaps the PE400 motor delivers power predictably for a big bike, but whenever I crank on the throttle, I never know quite where I'm going to land. Suddenly the trail seems twice as narrow as before. There's plenty of power to deal with the obstacles ahead, but I'm afraid to use it.

I guess I'm not totally convinced that such an awesomely powerful engine belongs in the woods, even though I like a reserve of horsepower as much as anybody. For me, riding the PE400 in close quarters is like trying to swing a sledgehammer in a broom closet.

—Michael Jordan



# Suzuki PE400T Enduro



## SPECIFICATIONS:

**IMPORTER:** U.S. Suzuki Motor Co.  
13787 Freeway Drive  
Santa Fe Springs, California 90670

**CATEGORY:** enduro

**SUGGESTED RETAIL PRICE:** \$1650

<b>ENGINE</b>	two-stroke vertical single
Piston arrangement	one piston-controlled intake, one reed-valve-controlled intake, six exhausts, one exhaust
Bore and stroke	88.0mm x 75.0mm
Displacement	397.2cc
Compression ratio (corrected)	7.3:1
Carburetor	one 35mm Mikuni slide needle
Air filter	two-stage washable oiled foam element
Lubrication	pre-mixed fuel and oil
Starting system	primary kick
Ignition	external-rotary magneto CDI
Charging system	none; direct AC lighting

### DRIVETRAIN

Primary drive type	straight-cut gear		
Primary drive ratio	2.280:1		
Clutch	wet, multiple-plate		
Final drive type	9520 chain (1/4-in. pitch, 1/4-in. width)		
Final drive ratio	15.46:3.068:1		
Gear	Internal		
	Overall gear ratio		
	1000/RPM		
I	2.64	16.45	4.14
II	4.00	13.96	5.45
III	1.56	10.92	6.96
IV	1.32	8.54	8.95
V	1.00	6.99	10.91

### SUSPENSION/WHEEL TRAVEL, IN.

Front	air spring, 36mm stanchion tube diameter (9.5 in. (241mm))
Rear	3-way adjustable spring preload (10.4 in. (264mm))

### BRAKES

Front	drum, single-leading shoe
Rear	drum, single-leading shoe, cable-operated

### TIRES

Front	3.00x21 Dunlop Sports K290
Rear	5.10x18 Dunlop Sports K290

### DIMENSIONS AND CAPACITIES

Weight	250 lb. (113kg)
Weight distribution	48.4% front, 53.6% rear
Wheelbase	56.0 to 57.1 in. (1423 to 1450mm)
Seat height	37.0 in. (940mm)
Handbar width	32.5 in. (826mm)
Footpeg length	15.6 in. (397mm)
Ground clearance	12.9 in. (328mm), at skid plate
Steering head angle	29.6 degrees from vertical
Front wheel trail	4.82 in. (123mm)
Frame	subular chromoly steel, single front down tube
Fuel tank	plastic, 3.4 gal. (12.7 l), no reserve
Instrumentation	topmeter, seatable in barrels

### PERFORMANCE

Top speed (clocked)..... 90 mph (146 kph)

All weights and measurements are taken with machine unladen and fuel tank empty.

## COMPARATIVE TEST DATA:

Make & Model	Horsepower	Wheel Travel Front/Rear, in.	Weight (fuel tank empty), lb.	Weight bias Front/Rear percent	Transmission, number of speeds
Suzuki PE400	30.9	11.3/11.3	250	46.4/53.6	5
Husqvarna 420AXC	NA	11.5/11.9	239	45.6/54.4	4
Yamaha YZ465	39.4	11.2/11.8	228	46.5/53.5	5
Can-Am 250 Qualifier III	25.2	9.7/9.8	230	44.3/55.7	6
Husqvarna 250WR	21.9	9.5/9.5	238	44.1/55.9	6
Yamaha IT250G	27.7	9.8/9.8	244	43.4/56.6	6

## PERFORMANCE:

