

CYCLE DIRT TEST

SUZUKI PE175

Suzuki engineers reached into their parts inventory, mixed and matched pieces from three RM125 models, made appropriate modifications, and thus created the impressive new PE175.

● DURING THE FIRST SIX MONTHS OF 1978, Suzuki PE175 riders successfully assaulted the lightweight class in both local and national enduros and in all five ISDT Two-Day Qualifiers. One rider in particular, Drew Smith, racked up an impressive list of wins. He topped the 175 class in the Alabama, Fort Hood, Michigan and Oregon Two-Day events. Additionally, fellow Team Suzuki riders Don Cichocki and Mike Rosso made it a PE one-two-three sweep of the 175 class at Fort Hood. Not content with class wins, Smith humbled the 250 and 400 riders by reeling in the overall victory at the Burr Oak National Enduro and the Oregon City National in May. Clearly, the PE175 has now been recognized as a machine for competitors with serious intentions to win.

Designers saw a potential market composed of dedicated novice enduroists as well as experts, and Suzuki worked to satisfy all levels of riders. The company, trying to build a multi-level bike, has produced a machine which accommodates beginners and intermediates, and the 175 has come within a couple of horsepower of producing a bike which meets the requirements of aspiring ISDT contenders. For experts, the stock 175 is a bit down in power compared to its box-stock competitor, the Yamaha IT175. However, after watching some of the Team Suzuki riders in action and considering their extraordinary success, we think the PE not only has the potential to be *really* fast, but also that a few individual 175s have already been modified to that level.

Four primary factors contributed to the 175's success, real and potential. First, Suzuki designers began with a solid basis



for development: the RM125. For four years the RM has been either the best, or near the best, 125 motocrosser available. And it's no secret that, with just a few exceptions, the major components which make a good motocross bike also make a good enduro bike.

The PE uses parts and designs from the A-, B- and C-model RM125s, including (in modified form) the RM top end, engine cases, transmission and chassis. Developers of the PE did not make the enduro model a direct extension of the RM-C, which theoretically is the most advanced machine, for two reasons. First, though the latest motocrosser is extensively refined, its major components also have their roots in the RM-A. Moreover, most of the C-model's modifications have more exactly defined its role as a motocrosser. Consequently the developers chose the most suitable parts from all RM models in order to assemble an enduro bike.

All the RMs and the PE use the same basic cylinder and head design. The sand-cast cylinder has an iron liner with a bridged intake port, six transfer ports (two of which are debatably functional boost ports) and a large bridged exhaust port. Unfortunately, the cylinder's quality of construction is only average. In the past, Suzukis have had especially high-quality cylinder construction, but the PE cylinder has many jagged port edges and rough port linings; all of this hinders the flow of gas. A two-petal reed valve combines with the piston port induction system to form the hybrid case-reed design. Because the PE has a 57mm stroke and the RM has a 54mm stroke, the port heights are necessarily different. However, the PE's port angles have been intentionally altered to give the 175 a wider power band and more torque.

The cylinder head does not use a squish band for one major reason. In a 175cc engine, the benefit of a band—concentration of the charge to eliminate detonation—comes only with nearly exact machining tolerances, and in mass-produced engines such exactness is rare. And there's nothing really unusual about the piston either. The piston uses two standard rectangular-construction rings. The piston also has a long piston skirt, made possible by the use of the case-reed valve. The long skirt aids reliability by offering large piston-surface contact area, thus reducing the rocking motion of the piston and eliminating a minor degree of wear.

Other PE top-end parts are larger to handle the extra power: the connecting rod is stronger; there's a 22mm crank pin compared to the RM's 19mm pin, a larger big-end bearing, and a 16mm wrist pin compared to the RM's 14mm pin.

The PE's induction system is a good example of the designers selectively choosing components from various RM models. Thanks to its modified reed valves, the 1977 RM-B engine was tor-



quier in the mid-range than the A-model. The PE has the B's reeds, which help to produce power more suitable to enduro riding. Both the PE and the RM-C have 32mm carbs which feed the gas/air mixture to the two-petal reed valves.

The PE engine uses slightly modified RM cases: the 175 has wider transfer-port recesses, and—though both use six cylinder studs—they have slightly different stud patterns. Internally, the PE differs from the RM primarily in its gear ratios, which are wider for enduro work. Com-

paratively, the PE's and RM's ratios are:

	PE	RM
1st.....	34/11	28/12
2nd.....	31/14	28/16
3rd.....	28/17	24/17
4th.....	25/20	25/21
5th.....	23/22	23/22
6th.....	21/24	22/23

The two bikes share the fourth and fifth driven gears, and the third and fifth drive gears. Furthermore, both machines have the same drive shaft and share all bearings. The countershafts on both bikes are





SUZUKI PE175

dimensionally identical; however, because the first gears are in unit with the countershafts, the parts are not interchangeable. Except for two extra plates, the PE's clutch is identical to the RM's.

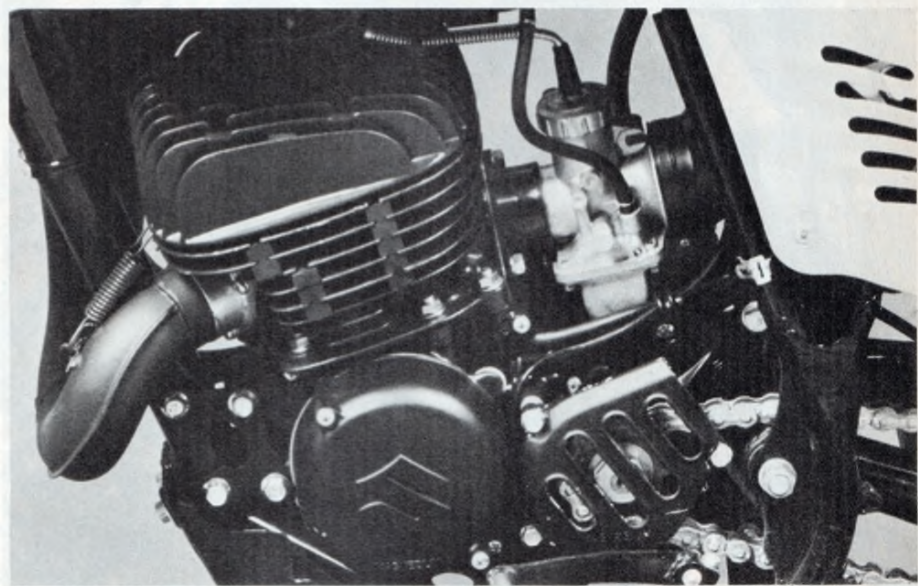
Both bikes use Suzuki's Pointless Electronic Ignition. Though the RM uses an internal rotor flywheel, the PE uses a heavier external rotor to generate more flywheel inertia and consequently provide more low-end pulling power.

Research and development men returned to the RM-A for the PE's basic chassis dimensions. The two bikes share a 30-degree head angle, 130mm trail and overall basic design. The PE differs only by virtue of a rear fender loop and a few extra tabs to accommodate specific enduro items such as a large silencer/spark arrestor. The PE does not use the RM-C's frame dimensions because the new motocrosser has a steeper head angle and less trail, features which produce quicker steering but also detract slightly from high-speed stability. Two significant dimensions of the RM-C and PE swing arms are the same: the center-to-center distance from the swing-arm pivot to the shock mount is 327mm (12.8 inches) and the distance from the swing-arm pivot to the rear-axle slot is 505mm (19.8 inches). Swing-arm bearings (and steering-head bearings) used in the RM-C and PE are identical; however, the motocrosser's swing arm is larger in diameter.

There are substantial differences in suspension between the motocrosser and the enduro bike. Though both machines have the same wheel travel—230mm (9.1 inches) and 224mm (9.0 inches), front and rear—the PE uses a KYB oil/spring fork while the RM uses an air/oil design, and the 175 uses fully contained DeCarbon-design, KYB gas/oil shocks in place of the 125's remote-reservoir units.

The PE175 owes part of its success as a highly functional first-year model to its excellent foundation in the Suzuki part bins. But the PE250 also had an excellent base—the RM250—and, comparatively speaking, the 250 enduro was not as first-rate an effort as the 175 is. And this leads to the second factor behind the 175's success: Suzuki's experience with the PE250 paved the way for more efficient development of the smaller bike. The people involved with making the 250 race-ready were the same people responsible for the prototype testing of the 175, and the man in charge of the effort was Team Suzuki racing manager John Morgan.

Morgan directs the efforts of the 175 and 250 riders contesting both the National Championship Enduro series and the Two-Day Qualifying rounds. For three years, he worked on making the PE250 competitive, and in the process he gained



Manufactured strictly for enduro work, the 175 is easily modified to produce more power for Two-Day riding.

a lot of practical knowledge. He applied this experience to the development of the 175, which was tested in its pre-production stages by Drew Smith, Herluf Johnson and Mike Halpin, in Massachusetts and New Jersey.

But there's more to the production of a competitive machine than the success of a prototype. Often, a pre-production bike has items which never see the light of a production day. John Morgan was adamant that most of the prototype's high-quality and effective items made it into production. In short, he insisted the bike be right or not at all.

The 175's foundation, Suzuki's experience with the 250, the 175's pre-production race-testing and John Morgan's commitment to the product resulted in a machine which performs particularly well.

Generally, the PE's power characteristics can be typified as genial and smooth. In any type of riding, the engine has an abundance of torque and builds revs slowly and predictably. While trail riding, especially on tight, low-speed trails with

logs or switchbacks, the rider appreciates the gradual rise in power. The rear wheel never breaks loose unless the rider wants it to, and this results in a precise, controllable ride. On faster trails, the rider must keep the PE well into its powerband and keep the gear shift lever moving to maintain a higher speed average. If the rider is lazy and doesn't shift, the PE is not quick to regain revs and consequently speed. Cycle test riders found that particularly in cross-country and desert riding, where the speeds are generally faster than in a timed event, it was necessary to keep the 175 revving high.

Other aspects of the powerplant's performance were first-rate. Carburetion was nearly spot-on, with the mid-range running just a bit rich. Gearbox and clutch action is likewise excellent. When you need to hustle you can shift through gears full throttle.

Anticipating the question of any serious 175cc enduro, two-day or cross-country rider, we match-raced the PE175 against the Yamaha IT175. In a straight-line drag

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race, the IT consistently pulled the PE by five to seven bike lengths by the time both bikes peaked in sixth gear. Even with different riders on board, the results were the same. The Yamaha was significantly stronger in third, fourth and fifth gears, and both bikes stayed dead even in sixth, each having the same top speed. In all fairness, it must be said that enduro bikes are not meant to be drag racers, but this run-off brought out a couple of salient facts. First, a stronger mid-range charge would undoubtedly make the PE more competitive with the IT and would make the PE more enjoyable for both enduro and cross-country riders. The problem is getting that power; certainly spot-on needle jetting would produce a sharper mid-range throttle response.

The PE/IT comparison likewise suggested that the Team Suzuki bikes have been tweaked for a bit more power. Machines with horsepower deficits don't win National Enduros overall, even with an excellent rider aboard. We tore down our test bike to see what modifications an owner could easily make and to surmise what the factory may have done to its team bikes. Just polishing and matching the rough ports would certainly improve the gas flow and unleash some power. Further, the cylinder head uses a 0.5mm gasket; replacing it with a 0.3mm gasket would raise the compression slightly and boost the power. Some field experience indicates that this particular engine will stand a bit more timing (18 to 20 degrees BTC) to preserve good low-end power.

The PE, moreover, is super-quiet: stock, it registers a mere 84dB(A). If the bike were to be used strictly in closed-course competition, some power could be gained by reducing the exhaust restriction. With clean ports, slightly higher compression, advanced timing and better exhaust breathing—simple and nearly cost-free modifications—the PE would undoubtedly be among the fastest 175s available. And with that kind of performance, a PE175 owner might have a machine capable of winning an ISDT Qualifier or a National Enduro.

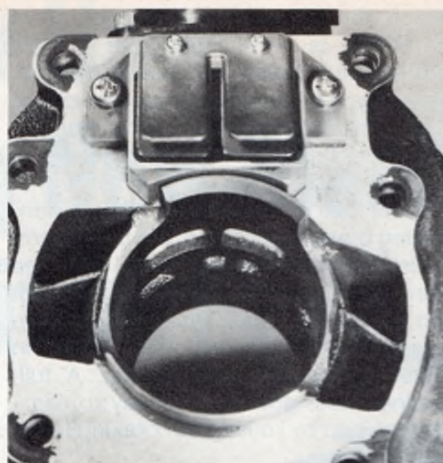
In all types of terrain, the PE's frame geometry and construction result in high-speed stability and overall excellent handling. A 55.9-inch wheelbase, 239-pound wet weight and proper weight bias allow the PE to forge through whoops straight-and-true and wind precisely along high-speed, twisty trails. A 30-degree head angle, which the PE has, theoretically results in neutral steering response, but other dimensions—primarily trail and wheelbase—also affect response. The 175 turns relatively quickly and oversteers just slightly in tight woods. If the rider uses some throttle and body English though, the PE is overall very nimble.



The PE's tractability over rough ground compensated for its peak-horsepower disadvantage compared to an IT175.



Muffler is very quiet but restrictive; heavy-duty rock guard protects chain, tensioner and sprocket.



Cleaning the ports would improve the gas flow and boost power at all rpm; case-reed valves help low-end.



Fork had progressive response; Metzeler tires, though not absolutely necessary, would provide more traction.

Make and model Suzuki PE175
Price, suggested retail \$1149

ENGINE

Type Two-stroke, single-cylinder, air-cooled, piston-port and case-reed induction
Bore and stroke 62.0 x 57.0mm (2.44 in. x 2.24 in.)
Piston displacement 172cc (10.5 cu. in.)
Compression ratio 7.6:1 (trapped)
Carburetion (1) 32mm slide-throttle Mikuni
Exhaust system ..Upswept pipe with silencer/spark arrestor
IgnitionCapacitor discharge, reverse-voltage triggered, magneto
Air filtration Oiled foam, washable
Bhp @ rpm 17.82 @ 9000
Torque @ rpm 11.00 @ 7500

TRANSMISSION

TypeSix-speed, constant-mesh, wet-plate clutch
Primary driveGear, 58/21, 2.761
Final drive 520 chain, 48/12 sprockets, 4.000:1
Gear ratios, overall (1) 34/11 (2) 31/14 (3) 28/17
(4) 25/20 (5) 23/22 (6) 21/24

CHASSIS

Type Single-downtube, full-cradle frame; leading-axle fork, swing-arm suspension
Wheelbase 1420mm (55.9 in.)
Rake/trail 30°/130mm (5.12 in.)
Brake and hub, frontCable-actuated, double-shoe drum
rearCable-actuated, double-shoe drum
Wheel, frontTakasago, one rim-lock rim
rearTakasago, two rim-lock rim
Tire, front IRC 3.00 x 21 in. Volcanduro knobby; 4 pr
rear IRC 4.00 x 18 in. Volcanduro knobby; 4 pr
Seat height 914mm (36.6 in.)
Ground clearance 291mm (11.5 in.)
Fuel capacity 12 lit. (3.2 gal.)/2 lit. (0.53 gal.)
Curb weight, full tank 108 kg (238 lbs.)
Test weight 185 kg (408 lbs.)

ELECTRICAL

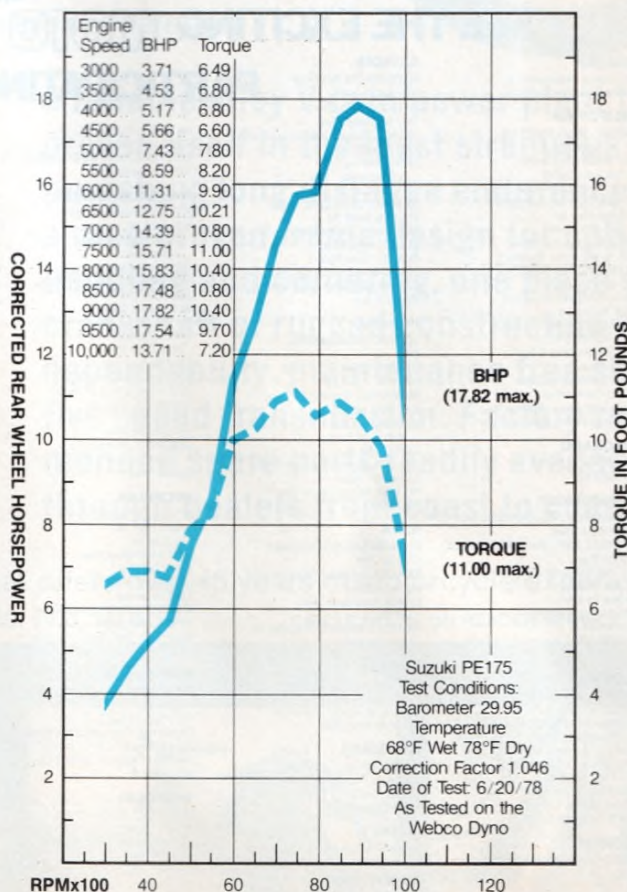
Power source Flywheel magneto
Headlight beams, high/low 15W/15W
Tail/stop lights 5W/no stop light

INSTRUMENTS

Includesresettable odometer

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Though nothing trick, the front and rear suspension units do a good job of handling the terrain. Most of all, the PE's ride is plush. The suspension is set up a bit soft for typical hours-long enduro work, and the resulting comfort is pleasing. Especially commendable is the fork's smooth, progressive and fade-free damping action. The fork comes stock with 10-weight KYB fork oil, which worked well in all of the test riding. The front fork has sufficiently stiff springs to avoid bottoming, yet the initial spring response allows the fork to respond quickly to small and intermediate bumps. With three pre-load positions, the gas/oil shocks performed acceptably well. For a 170-pound rider, the shocks were a bit soft and bottomed often, especially over high-speed whoops. Adjusting the pre-load (a time-consuming procedure) helped, but the shocks are better for comfort than for high-speed handling.

The PE's wheel assemblies roll on IRC tires which provide good traction for a generally dry climate. The Takasago rims held their spoke adjustment and did not ding even though we rode through many rocky areas. At the Two-Day qualifiers most of the PE riders showed up with Metzeler or Hi-Point tires wrapped around Sun rims, but the change is unnecessary.

Both front and rear cable-actuated brakes stopped the bike quickly and progressively. Unlike the RM-C's full-floating

design, the PE's rear brake set-up (from the RM-B) is non-floating; the brake's torque arm attaches to the swing arm. Generally, a full-floating brake is superior to a conventional setup. When a full-floating brake is activated, pressure is exerted on the torque arm, which transfers that load to the chassis. When a non-floating brake is activated, the torque arm feeds the load into the swing arm; the swing arm is pushed down at the pivot and up at the axle. This action compresses the rear suspension and results in wheel hop under hard braking. A full-floating brake goes a long way to eliminate the hop by routing the braking loads to the chassis.

However, there's no free lunch: the RM's torque-arm bracket extends downward from the backing plate, a position fine for motocross but vulnerable to rocks in an enduro situation. The bracket's positioning on the PE is not required by any mechanical principle; the bracket is simply an RM/PE shared component, because it would be far more costly to build an entirely different free-floating arrangement for the PE.

Overall fit and feel of the PE is excellent: the 175 feels like a big bike. The seating position is natural and comfortable, though the rear fender can be felt occasionally through the seat's foam. Handlebar positioning is somewhat forward, with the bar mounted directly above the triple clamps in contrast to the RM's rear-

set bar. The rider finds himself in a comfortable, serious, go-fast crouch. But when just plonking along and standing straight up, the shocks will chafe at the rider's legs. The 13.5-inch-high pegs provided good ground clearance for Cycle's test riders. However, some of the factory riders have mounted PE250 pegs which give an extra three-quarters of an inch clearance. An extra rock and brush guard for the chain extends down from the swing arm, protecting the lower and forward portion of the rear sprocket. An RM-type chain tensioner functioned well.

There is a clever combination tool that attaches to the right side of the triple clamps. It has 12, 17 and 24mm box sections, which fit the spark plug, chain adjusters and front and rear axles.

A large, accessible foam air cleaner rests in the air box below the seat. The top of the box attaches via two clips, and the breather hole is the only place water can enter the induction system. Though test riders crossed a two-foot deep stream again and again, waterlogging did not pose a problem.

When designers of the PE were still developing the bike, they asked for quick-release axles and sprockets. Because the bike is intended to be a pure enduro machine rather than an ISDT bike, those features never reached production. Suzuki also wanted a folding brake lever and gear shift lever, but Yamaha holds the

(Continued on page 122)

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motorcycle manufacturers' patents on these items. As a result, most Team riders have added aftermarket folding levers.

In all respects, Suzuki designers have executed nicely the finishing touches. Both fenders are extra wide for particularly muddy areas. The 15-watt headlight has a high/low beam and a rock guard to protect the lens, and the light was sufficient for play riding at night though more light would be needed for night racing. An austere-looking but functional odometer/trip meter is provided; no speedometer is attached because it's not necessary for competition. Additionally, the designers developed an excellent quick-change throttle assembly which allows installation of a new cable in little more than a minute.

A large skid plate that's stock on the PE is especially effective in rocky terrain; in muddy areas, the plate shovels up a pound or two of dirt, and owners may opt to weld on a bar-type case protector.

With the PE175, Suzuki has proven that it has the capability of producing a bona fide enduro bike. For most enduro riders the amount of power is perfectly acceptable, and its wide powerband and gradual throttle response makes the bike easy and enjoyable to ride. Other owners who want more horsepower can find it in the powerplant's internals, ready to be tapped. Above all, the PE's first-rate handling characteristics make it easy, fun and safe to ride fast.



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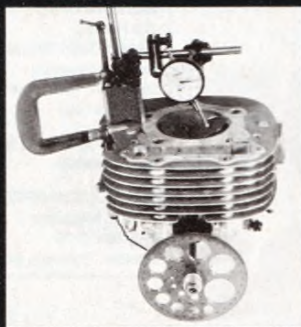
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This Month's Cover: It's a bird, it's a plane, it's an Italian. Actually it's an Italian Bimota rolling chassis powered by a Suzuki GS-750 four-cylinder. The Bimota SB2 is the most glorious kit bike ever devised by welders of tubes, beaters of panels and officers of loan. For attracting attention, the SB2 is the best thing since sparkler-equipped handlebar streamers and flaming parrots. And for going fast, the Bimota SB2 is the best thing the money of most of us will ever buy. Feature begins on page 28.
Cover Photography: Dave Hawkins.

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