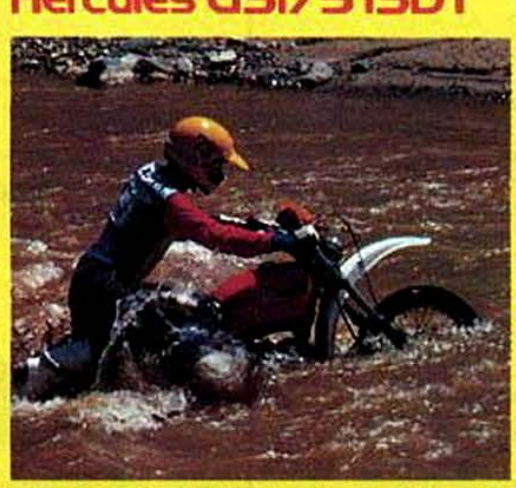
COMPARISON!

Five 175-cc Enduro/IS

Can-Am 175 Qualifier

Hercules GS175 ISDT



Suzuki PE175

DT Racers

A thorough wringing-out of motorcycling's ten-cubic-inch decathlon bikes reveals one surprising new superstar, one well-rounded performer, one qualified success and two returnees to the old drawing board.

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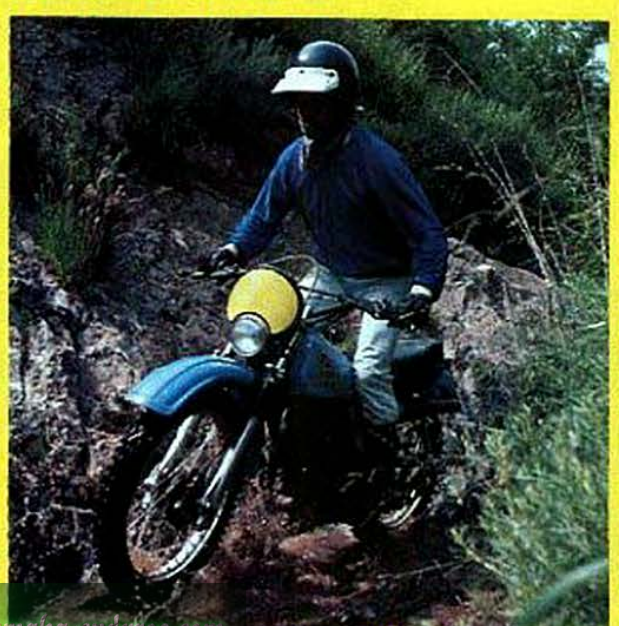
SWM 175 ISDT

Yamaha IT175



PHOTOGRAPHY: ART FRIEDMAN, PAUL DEAN, TIM HICKOX

If an enduro motorcycle or an ISDT bike could talk, it would angrily demand equal time. And with justification, since most people associate high performance with some superbike powerful enough to throw the Earth off its axis or with a motocrosser capable of registering in the neighborhood of 7.5 on the Richter scale while thwacking against a berm.

But despite all the superlatives that speckle any discussion of these attention-getting motorcycles, enduro machines also deserve critical acclaim. They may not be spectacular, but a good enduro/ISDT machine rolls out of the showroom loaded for bear, capable of a versatility unmatched by any other two-wheeler.

In New England, an enduro/ISDT bike may spend much of its time slithering trials-fashion through a mass of boulders on a steep mountainside. In the Pacific Northwest, it might be slalomed through the closely spaced trees in a dense forest during a brisk Sunday trail ride. A novice in Louisiana might use his bike as a submarine while navigating the flat, marshy bayou country of the deep South. A Southern California playrider is likely to take the same motorcycle and spend half a day screaming across the hot, dusty Mojave at 70 mph and the other half day scratching up and down the nearby rugged, snow-covered mountain peaks. And an ISDT rider, regardless of where he is riding, would use that machine for astonishingly fast trail riding punctuated by special tests that range from unobserved trials to grassy motocross.

In other words, an enduro/ISDT motorcycle must do virtually *everything* for almost *everyone* just about *everywhere*.

These two-wheeled decathlon stars come in all the traditional displacement sizes, but the 175-class bikes are probably the most sensible for the majority of riders. State-of-the-art 175s now make just about as much power as the best 250-cc enduro bikes of a few years ago. And a quick examination of the 175-cc enduro/ISDT models suggests that some of the finest machinery available is in that displacement class. So we decided to get 'em all and find out precisely what every prospective new buyer will want to know: Which one is the best?

Only Can-Am and Yamaha properly addressed the too-often-neglected problem of enduro bike tool and spare-part storage. The Yamaha's tool bag is a dual-zippered vinyl unit, while the Can-Am's is a real leather buckle-up model with two long internal flaps to help seal out mud and dirt.

Right now there are six production 175-class enduro/ISDT motorcycles supposedly sold in the U.S. We managed to get five of them. We tried desperately to latch on to a new KTM (formerly also sold under the Penton label) 175 Enduro, but 1978 models are virtually nonexistent in this country. The KTM/Penton name has been one of the most-respected in enduro and ISDT competition for years, so it's regrettable that we couldn't get one of its famous 175s to test.

The five bikes we *did* get therefore represent everything commonly available in the 175 enduro/ISDT class. Alphabetically, here is a brief review of each machine:

Can-Am 175 Qualifier. Introduced early in 1977, the Canadian-built Qualifier series remains totally unchanged this year. Our particular 175, however, had been fitted with a 9.1-inch-travel Marzocchi leading-axle front fork in place of the standard Betor inline-axle fork with only 7.7 inches of travel. The Marzocchi fork is an optional kit that costs $200 over and above the Qualifier's $1299 suggested retail price. The cost of the kit does not include installation, but the buyer does get to keep the Betor fork.

Hercules GS175 ISDT Commemorative. New on the market this year, the West German Hercules looks a lot like a Penton or KTM but it uses a Sachs seven-speed engine and a Ceriani leading-axle front fork. At a mere $1095 it is the lowest-priced of our five test bikes . . . and it isn't even Japanese.

Suzuki PE175. Based on the super-successful RM125 motocross engine and chassis, this newest "Pure Enduro" seems to have benefitted from the lessons Suzuki

TECH

It seems odd that five motorcycles designed for the same sort of task should differ so much from one another. The variations not only indicate different approaches to the design of an enduro/ISDT machine, but they indicate different interpretations of the problems involved and different priorities for design elements.

Of the factors affecting performance, the weights and power outputs of these motorcycles vary most significantly. The 35-pound difference between the Suzuki and the Hercules is remarkable. And the horsepower variations between these five motorcycles are even more extreme.

The Hercules was evidently designed to be bulletproof almost without regard to weight. Furthermore, it was designed to be a bulletproof 250. The GS175 is essentially the GS250 with a smaller cylinder bore. The result of the duplication of parts is that much of the 175 is stronger, and therefore heavier, than it really needs to be.

The Sachs engine in the Herc weighs 67.5 pounds. The cylinder and head alone weigh 20 pounds. Of the five bikes, the Yamaha has the lightest engine at 47 pounds and the IT's cylinder and head weigh only 10 pounds. But there is some evidence that Yamaha may have saved a pound or three too many. On long uphill climbs the IT engine would get very hot and the power would fall off as a result. And this occurred despite slightly rich carburetion on the IT. Certainly the Hercules showed no signs of overheating, but neither did the Rotax engines in the Can-Am or SWM (both of which have more power than the Herc), and the Rotax cylinder and head combinations weigh only 13 pounds. The Suzuki has only a little more fin area than the Yamaha, but it is adequate because the PE produces less power—which means less heat than any of the other engines.

The Hercules has the biggest, widest, heaviest gearbox gears and primary gears, and it has the biggest clutch. But the size the clutch and gears need to be is dependent, among other things, on the primary drive gear ratio. The higher the ratio numerically, the more the engine's torque is multiplied before going through the clutch and gearbox. It is therefore appropriate that the overdesigned Herc also has the lowest primary drive ratio.

The Yamaha and Rotax engines have the highest numerical primary gear ratios and therefore they should have the largest gears and clutches. The Rotax engines have good-size gearboxes,

PROBE

but they have the smallest clutches. The Yamaha clutch is adequate but the gearbox is the smallest of the group. This helps explain why many IT175s have had gearbox problems and why Rotax clutches will not stand up to a lot of slipping.

Some of last year's IT175s suffered gearbox failures when the free-spinning gears seized on the shafts. This problem has apparently been corrected by cutting grooves in the bearing surfaces of the gears to improve lubrication. But, like its cooling fin area, the Yamaha's gears seem barely adequate.

The Suzuki has gears only a little larger than those in the Yamaha, but the PE's lower primary drive ratio transmits less torque through the gearbox. Likewise, the PE's clutch doesn't have to work as hard as the IT's even though both clutches are about the same size. Another point in favor of the Suzuki is its gear-and-ratchet shift linkage. The shift drums of the other four machines are turned by a stamped-steel link that is less reliable.

The Hercules seven-speed gearbox is a very clever design. Instead of seven pairs of gears, the Sachs uses four pairs of gears and a third shaft that carries two additional gears. If it were not so excessively overdesigned, this gearbox could be both narrower than a six-speed and no heavier.

The Herc's gearbox is also noteworthy in that none of the gears slide to engage with other gears. Instead, the shift forks move separate engaging wheels that mesh with dogs on the non-sliding gears. These wheels are lighter than gears, so as a result the mass that must be moved with the gear lever is reduced.

Perhaps the only disadvantage of the Sachs gearbox design is that in certain gears it is less efficient than a conventional gearbox. In a conventional all-indirect gearbox, the power doesn't pass through more than one pair of gears at one time. In the Sachs, the power passes through a single pair of gears when first, third, fifth or sixth gear is engaged. But the power must pass through three pairs of gears when the gearbox is in second, fourth or seventh. The power lost to friction with each pair of gears is about two percent. The Herc's wide, helical primary gears are also less efficient, though stronger, than the straight-cut gears used in the Suzuki and Rotax engines.

While riding the Hercules, everyone noted that shifting between first and second gears was more difficult than shifting between any of the other gears. The problem is that the Sachs gearbox

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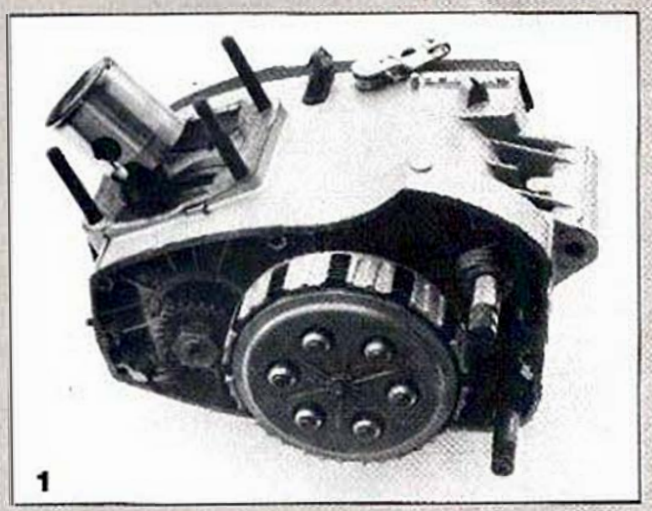
At 67.5 pounds, the seven-speed Hercules engine (1) by far is the heaviest. Since it's simply a de-bored 250, though, it should have excellent reliability. The Yamaha (2) has the lightest, most compact engine (47 pounds), but several areas (narrow transmission gears, short piston skirt, large intake holes in piston, scanty cylinder/head finning) would have been better-off had they been made beefier. The Suzuki engine (3) is also compact and light, but it has a long piston skirt without a hole and a stronger, less-stressed gearbox that should help it live longer than the Yamaha. The SWM and Can-Am use nearly-identical Rotax engines (4) that are competitively light and rugged, as well as very powerful. Their weak spot lies in the small-diameter clutch which won't tolerate much abuse.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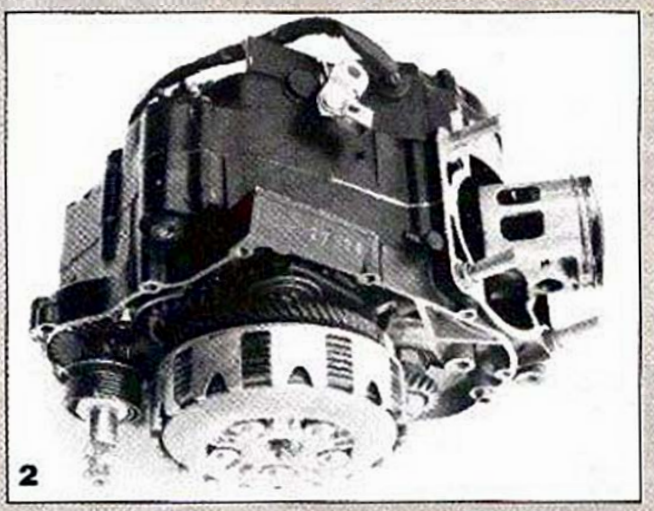
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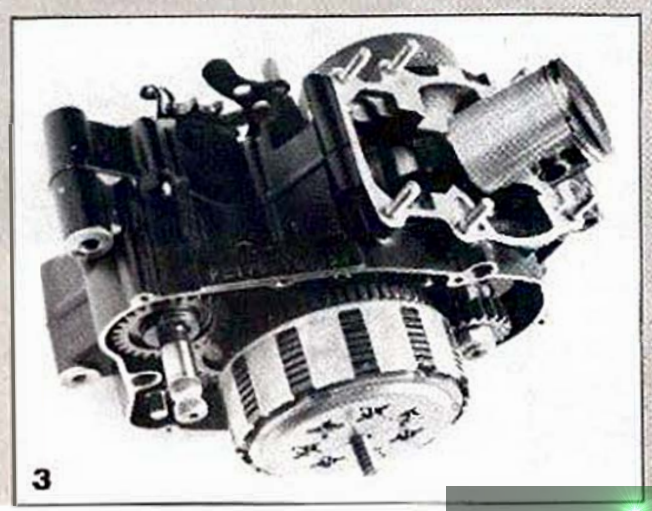
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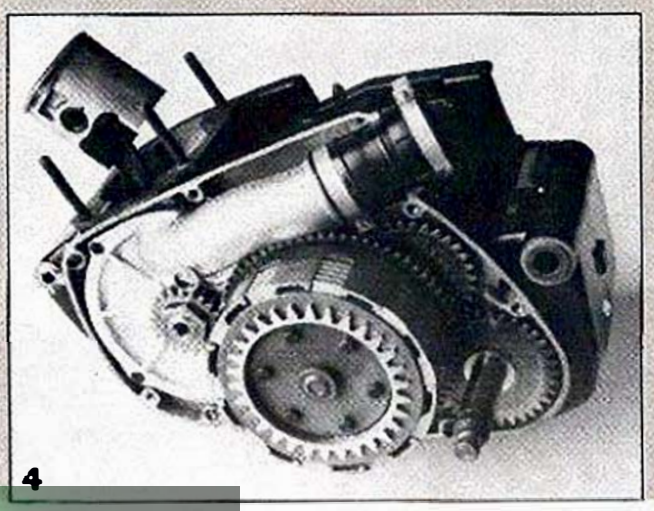
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learned with the PE250. The bright yellow 175 is competitively priced at $1179.

SWM 175 ISDT. What in the world is an SWM? It's a line of Italian-built off-road motorcycles that is brand-new to this country. Imported and distributed by the same people who handle OSSA and Laverda motorcycles, the SWM enduro/ISDT machines have an impressive record in the Six Day events and in various European enduro championships. One of the company's owners—and also the head engineer—is Fausto Vergani, a nine-time gold medal winner in ISDT competition who obviously knows quite a bit about the sport. And you'll pay dearly to take advantage of that knowledge. An SWM with a Marzocchi inline-axle fork will set you back $1909. A Marzocchi leading-axle model with exactly ten inches of travel will relieve you of 1919 big ones.

Yamaha IT175. Spun off from Yamaha's fantastic YZ125 motocrosser, this latest IT175 is nearly identical to previous IT175s. The price on the monoshocked IT (which stands for International Trial, as in International Six Day Trial) has changed, though. It's risen nearly $150 to $1138.

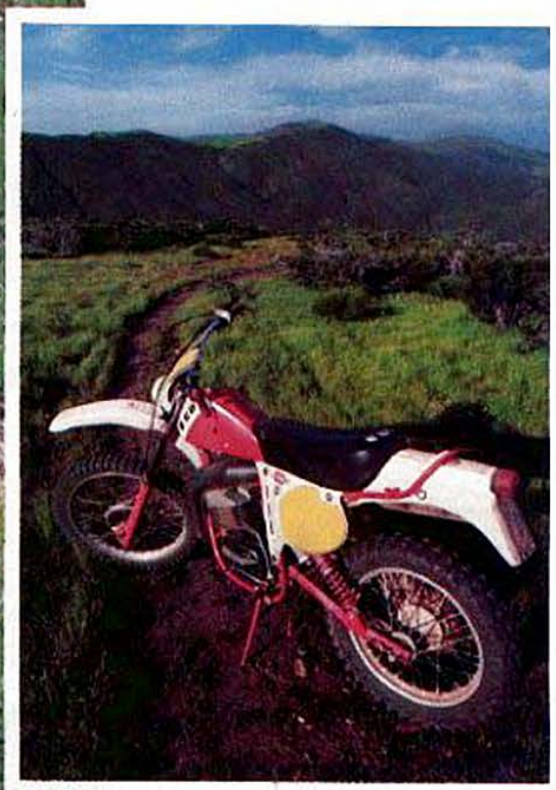
We had an impressive array of machinery at our disposal—31 forward speeds of trail-blazing exhilaration we just couldn't wait to get our hands on. But even though we knew that riding this foursome would undoubtedly be fun, we also were aware that fully evaluating them would not be easy. As we said earlier, an enduro/ISDT motorcycle must be incredibly versatile—which meant that adequately testing our five bikes would require riders with abilities ranging from novice to expert, and test sites carefully selected to represent a broad spectrum of off-road activities.

Among the various locations we selected were some tight, narrow, rocky and extremely difficult loops that would have been fairly easy on an observed trials machine but were a real challenge on our enduro bikes. We found some true horsepower evaluators, too—long, fast uphill trails that climbed thousands of feet in just a few minutes, followed by even longer, steeper downhills that were a superb test of overall braking. We found a few steep, cobby uphills that afforded no approach runs at all, and we included several miles of continual switchbacks tight enough to demand the use of full steering lock on all of the bikes. We forded some streams in knee-deep water. We rode through loose sand, on hard adobe, in mud, on topsoil, over beds of pine needles, on top of little rocks and across smooth rock faces. We couldn't duplicate everything one of these bikes might encounter, but we came close.

Our first day of riding was barely a few hours old when the relative merits of these five motorcycles began to make themselves evident to our testers.

The Can-Am had a number of serious problems from the start. It was geared too tall, the suspension didn't dampen well, the bike wouldn't steer very easily or accurately and the slick Cheng Shin tires found little traction. To put the Qualifier on more equal ground, we installed a 14-tooth gearbox sprocket in place of the original 15-toother, we drained the stock 5-weight fork oil and installed 20-weight; we took advantage of Can-Am's adjustable steering head feature and steepened the head angle from 31 to 29 degrees; and we scrapped the Cheng Shin tires and pried on a pair of tried-and-proven Metzeler knobbies.

The Hercules, too, had a few problems. The engine was incredibly peaky for an enduro motor and it didn't put out enough power at low revs to pull a sick hiker off a Porta-Potty. And the overall gearing was too tall for anything but the back straightaway at Daytona. As a result, getting up a slow, steep hill was a slip-the-clutch affair



at best and a find-a-way-around-the-hill proposition at worst. We fiddled with the carburetion some, but quickly determined that the peakiness must be an inherent problem caused mostly by the cylinder porting. We ordered a larger 59-tooth (55 is standard) rear wheel sprocket from the East Coast Hercules distributor, but it didn't show up until after the test was over, forcing us to endure the Herc's lack of low-speed lugging ability throughout the test.

The Suzuki wasn't so bad off. Its IRC rim-saver tires offered little traction on most parts of our course, so away they went in favor of Metzelers. And the stock jetting was rather rich in spots, so we dropped the Mikuni's metering needle and swapped the 190 main jet for a 170.

The SWM posed a few problems of a different nature. Our particular bike had been built as an inline-axle model and the leading axle fork had been installed over here. (In actual production, the bikes will be available in both configurations.) The leading-axle triple clamps have a different shape than the inline-axle clamps, but the fork stops are the same length on all the production bikes. So, like our test bike, any leading axle SWM will need to have the stops cut by the owner—unless he likes riding a motorcycle that has a turning radius like a Greyhound bus.

Furthermore, our SWM test bike had already been tested once before by another magazine and then ridden in an enduro by SWM's West Coast representative. There were no other 175 ISDT models in the country at the time, so we lacked a clean, photogenic 175 SWM. That's why the bike you see in most of our detail photos is a 250. The 175 and 250 are exactly the same

The Hercules' well-triangulated, massively-gusseted chromoly frame (1) is probably the strongest of the five. The mild-steel Can-Am frame (2) also is quite strong due to its large main backbone and surplus of triangulating tubes, but both it and the Herc frame could be made lighter. The mild-steel PE175 (3) and chromoly SWM (4) frames are light and simple, yet sufficiently strong. The mild-steel Yamaha frame (5) is light but has no direct swingarm-pivot-to-steering-head bracing. A massive, stamped steel backbone gives the structure adequate rigidity.

except for the engine's top end, the exhaust pipe and the size of the rear sprocket.

The Yamaha IT175 was not without fault, either. The bike is very low to the ground to begin with and has soft suspension rates that just complicate the problem. When the rider sits on the machine, he uses up even more ground clearance. The IT spent much of the time bashing the skid plate, shift lever, brake pedal, exhaust pipe header and the rider's feet off half of the rocks in our little canyon. We had to replace the whole exhaust pipe after that first day and straighten the badly disfigured foot-control pedals. None of the other bikes had any clearance problems in those same sections.

Furthermore, the IT's low-profile IRC rear knobby was frighteningly skittery on some surfaces, so we stuck a 4.00 x 18 Metzeler on the rear. The new tire was considerably larger in diameter than the stocker, requiring us to drop down one tooth on the countershaft sprocket to correct for the Metzeler's greater circumference. In addition to better traction, the larger rear tire gave the IT an inch or so more ground clearance and reduced the effective steering head angle (which also shortened the front wheel trail) from 32 degrees to about 31. Since the IT's steering is rather slow for an enduro machine, this alteration helped the bike maneuver a bit more quickly.

After this interlude in the workshop, the SWM rapidly emerged as the bike with the best overall engine/gearbox combination. It negotiated our tough, trialsy section more easily than did any of the other four, yet the bike flew up the long, steep climbs fast enough to turn some 250s green with envy. The rotary-valve SWM seemed to have tractable power on tap in every conceivable enduro and ISDT situation we got it into. First gear was low enough and the engine lugged down sufficiently to deal with the super-slow plodding, and yet sixth gear was so fast that it was unusable on anything other than a smooth, wide-open, freeway-like trail.

Even though the SWM's Rotax engine has incredibly small crankshaft flywheels, it lugs down to ultra-slow rpm much better than we had expected. In all probability, this is caused by the rotary valve intake system's efficiency at low revs, aided by the Bosch CDI's hot low-rpm spark and the rather heavy, large-diameter ignition flywheel which helps offset the crank's lack of rotating mass.

The Can-Am engine, being almost identical to the SWM's powerplant, was ranked second by most of our testers, and it possessed some of the same basic characteristics. It too would lug the Qualifier through all of the enduro rigors we subjected it to, but it didn't perform on the whole quite as well as the SWM engine. The Can-Am is about 15 pounds heavier than the SWM and its chassis is not nearly as good, so the Qualifier's power isn't as easy to use and

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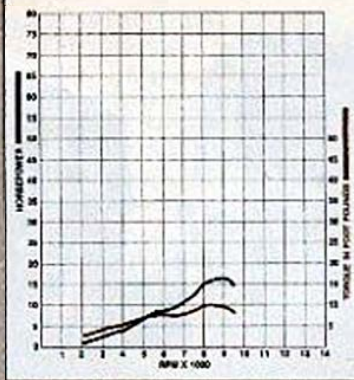
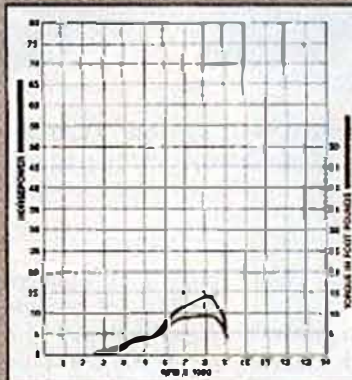
Can Am 175 Qualifier



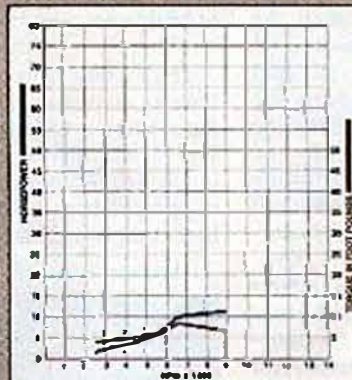
RPM	HORSEPOWER	TORQUE
2000	0.8	2.5
2500	1.6	3.4
3000	2.5	4.3
3500	3.3	4.9
4000	4.0	5.2
4500	5.3	6.2
5000	6.5	6.8
5500	8.1	7.7
6000	8.8	7.7
6500	9.2	7.8
7000	10.7	8.0
7500	12.3	8.6
8000	15.0	9.9
8500	16.0	9.9
9000	16.4	9.6
9500	16.5	8.8

Hercules GS175 ISDT



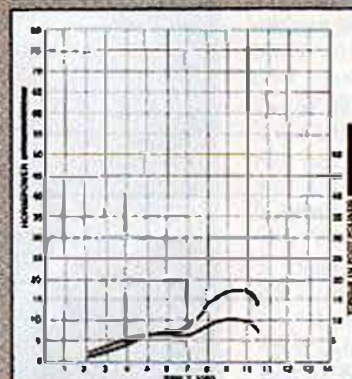
RPM	HORSEPOWER	TORQUE
2500	0.5	0.7
3000	0.6	1.0
3500	0.9	1.4
4000	1.8	2.4
4500	3.2	3.8
5000	3.9	4.1
5500	4.6	4.4
6000	7.4	6.5
6500	10.6	8.5
7000	12.0	9.0
7500	13.1	9.2
8000	14.3	9.4
8500	13.8	8.5
9000	8.4	3.6

Suzuki PE175



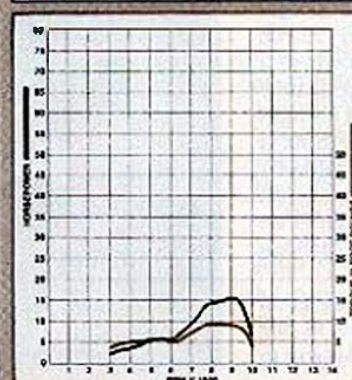
RPM	HORSEPOWER	TORQUE
2500	1.8	3.9
3000	2.4	4.2
3500	3.1	4.5
4000	3.6	4.8
4500	4.3	5.1
5000	5.1	5.4
5500	5.9	5.7
6000	7.5	6.0
6500	9.9	8.0
7000	10.3	7.7
7500	10.5	7.4
8000	10.9	7.1
8500	11.1	6.8
9000	11.2	6.5

SWM 175 ISDT

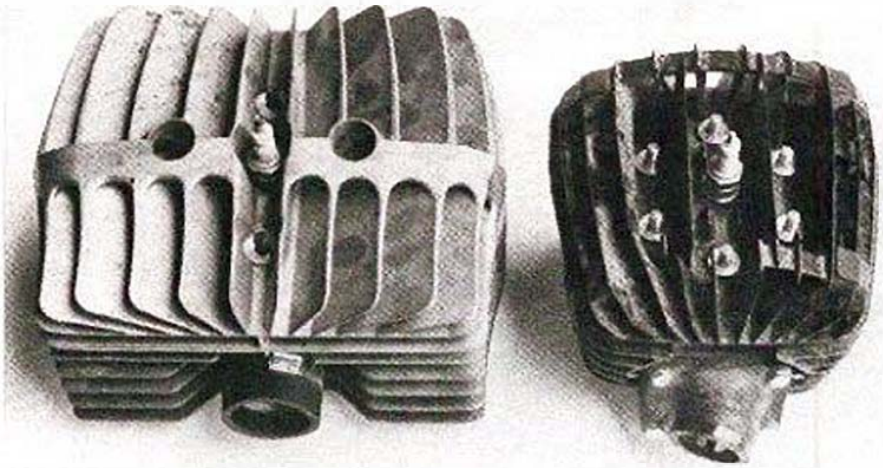


RPM	HORSEPOWER	TORQUE
2000	0.7	1.9
2500	1.3	2.8
3000	2.1	3.7
3500	3.1	4.6
4000	3.8	4.9
4500	5.1	5.9
5000	6.2	6.5
5500	6.6	6.3
6000	7.4	6.5
6500	7.3	5.9
7000	8.2	6.7
7500	10.6	7.4
8000	13.6	8.9
8500	15.5	9.6
9000	16.8	9.8
9500	17.1	9.6
10000	17.1	9.1
10500	13.6	6.8

Yamaha IT175



RPM	HORSEPOWER	TORQUE
3000	2.1	3.7
3500	3.1	4.6
4000	3.7	4.9
4500	4.4	5.1
5000	5.2	5.4
5500	6.0	5.7
6000	5.6	4.9
6500	7.1	5.7
7000	9.5	7.2
7500	12.3	8.6
8000	14.4	9.4
8500	15.0	9.3
9000	15.7	9.2
9500	16.9	8.0
10000	7.1	3.7



Believe it or not, these are both 175-cc cylinder/head assemblies. The Yamaha's ten-pound, under-finned, easily-overheated top-end pieces are on the right; the Hercules assembly on the left weighs exactly twice as much but is virtually impossible to get too hot.

the engine doesn't feel as crisp and sharp at low rpm.

The Suzuki PE175 case-reed engine was favored over the Yamaha IT175 engine, even though the Suzuki motor doesn't make as much horsepower. First of all, the PE has more flywheel inertia than the IT, which lets the Suzuki run down to low rpm more predictably and with better throttle response than the Yamaha's. Secondly, the PE engine's power delivery is easier for the average trail rider to deal with. Its torque curve is very wide and flat, with no trace of peakiness or abrupt power delivery anywhere in the entire rpm range.

Though the PE's engine behaved better through our demanding low-speed areas than any bike except the SWM, its shortage of peak power was a hindrance on some long, steep climbs. We always seemed to get up those huge hills, but the rider had to be very aggressive and avoid any mistakes on the way up. Someone who specializes in super-fast WFO trail riding or who has a fetish for climbing the longest, steepest hills he can find may feel that the PE175 engine does not fit his bill. Otherwise, the Suzuki has the friendliest engine of the bunch.

The Yamaha IT175 reed-valve engine is a spunky little devil capable of whisking the 217-pound bike along the trails impressively. The IT175 flies up long, steep ascents almost as quickly as the SWM, and engine-wise, it slogs through the rough, slow stuff almost as well as the PE175. The IT makes good low-end power down to a certain rpm, at which point the engine may or may not keep on running. The IT's light flywheels, combined with what we think is the ignition system's tendency to suddenly stop making sparks at very low rpm, result in an engine that sometimes just gives up the ghost while you're picking through slow obstacles.

On the top end, the IT generates good horsepower, but it has a flat spot in the powerband at about 6000 rpm. This dip in power makes the engine feel peakier than it actually is, because the flat spot is immediately followed by a sudden resurgence of power. Also, the ratio gap between first and second gear is often difficult for the engine to bridge because the rpm can drop right into that flat spot after a shift.

The IT engine was an absolute dream, though, compared to the performance of the piston-port Hercules powerplant. The GS175 was lifeless below 6000 rpm and totally helpless under 4000, as indicated by its meager horsepower and torque numbers at those engine speeds. Between 6000 and 8500 rpm the Herc would accelerate impressively, considering the bike weighs 251 pounds, but getting *into* that powerband was a problem at times.

The Hercules was difficult for even the experts to negotiate through our slow, rocky sections, and it was a sadistic nightmare for the novice riders, due to all the clutch-slipping required and the near-total lack of throttle response at low revs. In the faster sections the GS was all right, although steep hills with no pre-run ap-

proaches had to be shunned entirely in some cases by some riders.

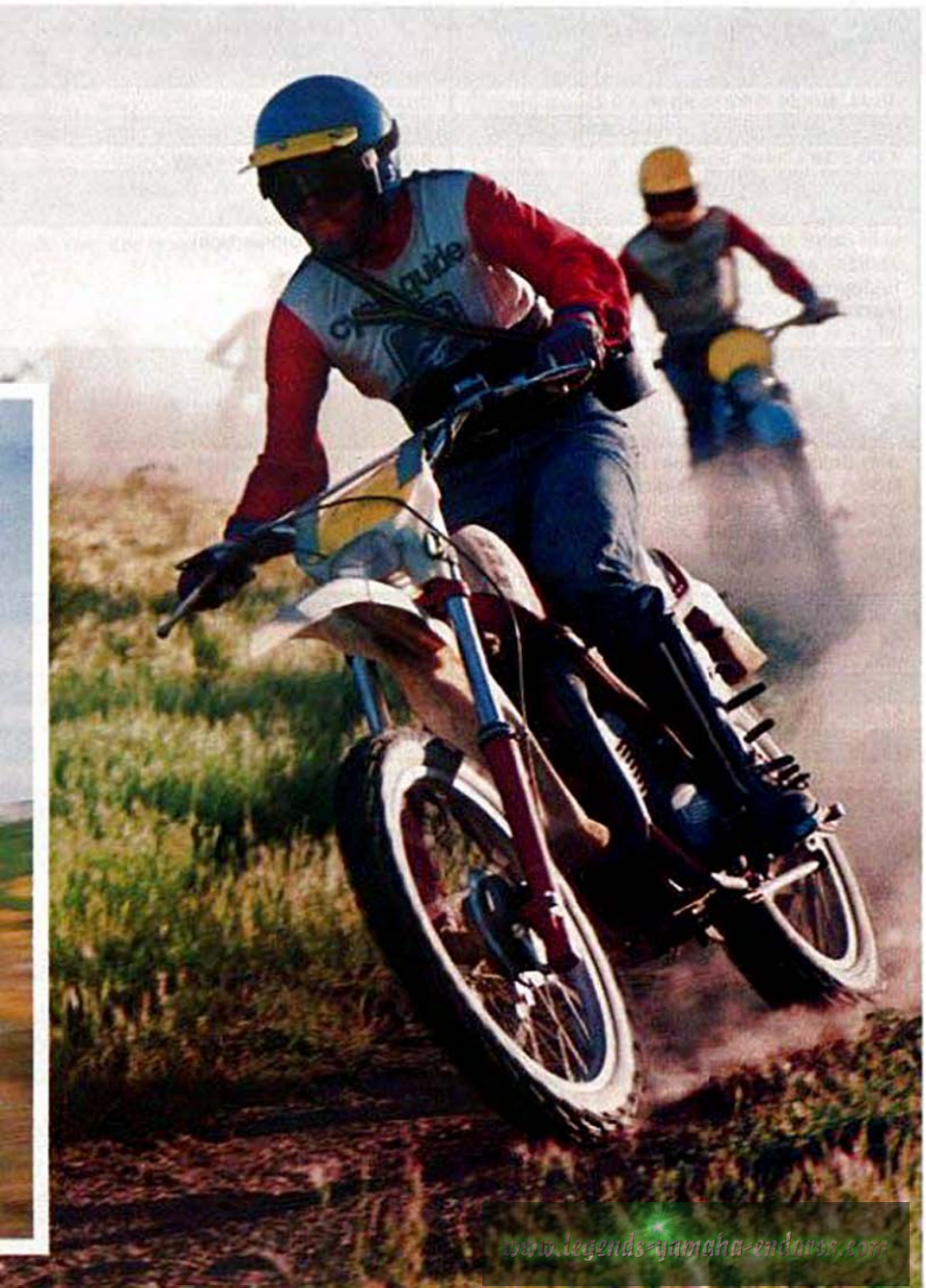
Had we gotten the 59-tooth rear sprocket, the Hercules would have been somewhat easier to ride. But the engine still would have been peaky, and that is an intolerable characteristic for an enduro engine to have. For fast, open-terrain cross-country races ridden by highly skilled riders, the GS175 may be fine; but when the situation calls for slow maneuvering, uphill crawling or novice riders, the engine is just not up to par.

Too bad the Herc's engine is so pipey, for despite being the heaviest bike of the five, its steering was about the best of the lot in terms of accuracy, precision, stability and required rider effort. Only the SWM was its steering equal. No matter where we were riding or how fast we were going, the Hercules would go precisely where the front wheel was aimed. The bike always seemed willing to turn quickly, even while maneuvering lock-to-lock at five mph. Yet the GS was the most stable and confidence-inspiring of our 175s at high speed.

The SWM has the same steering geometry dimensions as the Herc (29-degree head angle, 4.72 inches of trail), but it feels slightly different under some conditions due to having the longest suspension travel (exactly ten inches at both ends). Also, the SWM is 31 pounds lighter overall than the Herc—12 pounds lighter on the front wheel. The SWM steers with the same degree of accuracy as the Hercules but at very high speeds it sometimes wiggles slightly. The twitch is never enough to cause a get-off, but it can prove a bit unnerving to a novice.

The Suzuki PE175 also steers quite well, but not quite as nimbly or precisely as the SWM or Herc. The PE's geometry made the bike maneuver a bit slowly in some of the first-gear sections, but once the bike got moving at 20 mph or faster, it was just as pleasantly steerable and stable as the best of the 175s.

The Hercules offers a multitude of rear shock mounting positions. As far as we're concerned, the best springing/damping/steering-geometry/ground-clearance combination is obtained with the Marzocchis attached as you see them here.



The Yamaha IT175, though, has far too much steering head angle and front wheel trail. As a result, it maneuvers sluggishly at low speeds, even with the big, front-wheel-trail-reducing Metzeler on the rear.

Complicating matters is the IT's short wheelbase. The close relationship of the wheels tries to make the IT react quickly, while the long front wheel trail wants the bike to react slowly. The result is a motorcycle that sometimes gets confused. When bounding over rocks that are big enough to bounce the IT off course, for instance, the short wheelbase makes the resulting sidehop change the bike's direction of travel more than expected, while the slow steering prevents the rider from quickly getting back on course.

The Can-Am, too, has some steering problems, but they're inconsistent and difficuh to pinpoint. The 31-degree steering head angle that results from the combination of the Marzocchi fork and standard

Continued on page 72

	CAN-AM 175 QUALIFIER	HERCULES GS 175 ISDT COMMEMORATIVE
Engine type	two-stroke	two-stroke
Cylinder arrangement	vertical single	vertical single
Port arrangement	one rotary-valve-controlled intake, four transfers, one booster, one exhaust	one piston-controlled intake, four transfers, one exhaust
Bore and stroke	62 mm x 57.5 mm	60 mm x 61 mm
Displacement	173.6 cc	172.4 cc
Compression ratio	13.5:1 (uncorrected)	11.5:1 (uncorrected)
Ignition	Bosch flywheel magneto CDI	Motoplat flywheel magneto CDI
Charging system	none; direct AC lighting	none; direct AC lighting
Carburetion	one 32-mm Bing slide/needle	one 34-mm Bing slide/needle
Air filter	washable oiled foam element	washable oiled foam element
Lubrication	oil injection, 2.3-qt. (2.2-*l*) tank capacity	pre-mixed fuel and oil
Primary drive	straight-cut gears, 3.29:1 ratio	helical gear, 2.60:1 ratio
Clutch	wet, 6 driveplates, 5 driven plates	wet, 6 drive plates, 5 driven plates
Starting system	primary kick	primary kick
Final drive	#520 chain (⅝-in. pitch, ¼-in. width); 15-tooth gearbox sprocket, 42-tooth rear wheel sprocket, 2.80:1 ratio	#530 chain (⅝-in. pitch, ⅜-in. width) 14-tooth gearbox sprocket, 55-tooth rear wheel sprocket, 3.93:1 ratio
Front fork	Standard: Betor, 7.7 in. (195 mm) travel, 35-mm stanchion tube diameter; Optional: Marzocchi, 9.1 in. (231 mm) travel, 35-mm stanchion tube diameter	Ceriani, 9.0 in. (228 mm) travel, 35-mm stanchion tube diameter
Rear suspension	Gabriel gas-bag shocks, 7.1-in. (180 mm) rear wheel travel, 5-way adj. spring preload.	Marzocchi gas shocks, rear wheel travel adj from 4.7 to 6.8 in. (119 to 173 mm) according to shock mount position; 5-way adj. spring preload
Front brake	drum, single-leading shoe	drum, single-leading shoe
Rear brake	drum, single-leading shoe, cable-operated	drum, single-leading shoe, rod-operated
Rear tire	4.00 x 18 Cheng Shin knobby	4.00 x 18 Metzeler knobby
Frame	tubular mild steel, double front downtubes	tubular chromoly steel, double front downtubes
Steering head angle	with Betor fork: Delivered at 29 degrees from vertical; adjustable from 24 to 30 degrees in ½-degree increments. With optional Marzocchi fork: Adjustable from 26 to 32 degrees in ½-degree increments	29 degrees from vertical
Front wheel trail	with Betor fork: Delivered at 4.75 in. (120 mm); adj. from 3.75 to 5.0 in. (98 to 127 mm). With Marzocchi fork: adj. from 4.15 to 5.5 in. (105 to 140 mm)	4.72 in. (120 mm)
Wheelbase	with Betor fork: Adj. from 54.2 to 56.5 in. (137.6 to 143.5 cm), as dictated by steering head angle and position of chain adjusters. With Marzocchi fork: Adj. from 55 to 57.3 in. (140 to 145.5 cm) as dictated by steering head angle and position of chain adjusters	56.1 to 57.1 (142.5 to 145 cm)
Weight	234 lb. (106.3 kg)	251 lb. (114 kg)
Weight distribution	42.7% front, 57.3% rear, with Marzocchi fork and 29-degree steering head angle	43.4% front, 56.6% rear
Ground Clearance	10.3 in. (261 mm), at footpeg bolts	10.2 in. (259 mm), at skidplate
Seat height	34.6 in. (879 mm)	35.6 in. (904 mm)
Handlebar width	33 in. (838 mm)	33.5 in. (851 mm)
Footpeg height	13.2 in. (335 mm)	13 in. (330 mm)
Instrumentation	speedometer, odometer, tripmeter resettable in tenths	VDO speedometer, odometer, tripmeter resettable in tenths
Fuel tank	plastic, 3.0 gal. (17 *l*), including .3 gal. (1.1 *l*) reserve	steel, 2.7 gal. (10.2 *l*), including .27 gal. (1.0 *l*) reserve
Top speed (calculated)	74 mph (119 kph)	77 mph (124 kph)
Available color	red	orange with white fenders
Suggested retail price	$1299 East and West Coasts	$1095 East and West Coasts

GEAR	1	2	3	4	5	6	1	2	3	4	5	6	7
INTERNAL GEAR RATIO	3.40	2.31	1.69	1.32	1.10	0.95	3.17	2.18	1.64	1.29	1.11	0.97	0.83
OVERALL GEAR RATIO	31.32	21.28	15.57	12.16	10.13	8.75	32.40	22.28	16.76	13.18	11.34	9.91	8.48
MPH PER 1000 RPM	2.5	3.6	5.0	6.4	7.7	8.8	2.4	3.5	4.6	5.9	6.8	7.8	9.1

SUZUKI PE175	SWM 175 ISDT	YAMAHA IT175
two-stroke	two-stroke	two-stroke
vertical single	vertical single	vertical single
one piston-controlled intake, one reed-valve-controlled intake, six transfers, one exhaust	one rotary-valve-controlled intake, four transfers, one booster, one exhaust	one reed-valve-controlled intake, four transfers, one booster, one exhaust
62 mm x 57 mm	62 mm x 57.5 mm	66 mm x 50 mm
172.0 cc	173.6 cc	171.0 cc
7.6:1 (corrected)	14.0:1 (uncorrected)	7.4:1 (corrected)
flywheel magneto CDI	Bosch flywheel magneto CDI	flywheel magneto CDI
none; direct AC lighting	none; direct AC lighting	none; direct AC lighting
one 32-mm Mikuni slide/needle	one 32-mm Bing slide/needle	one 34-mm Mikuni slide/needle
washable oiled foam element	washable oiled foam element	washable bristle-covered oiled foam element
pre-mixed fuel and oil	pre-mixed fuel and oil	pre-mixed fuel and oil
straight-cut gears, 2.76:1 ratio	straight-cut gears, 3.29:1 ratio	helical gear, 3.23:1 ratio
wet, 7 drive plates, 6 driven plates	wet, 6 drive plates, 5 driven plates	wet, 6 drive plates, 5 driven plates
primary kick	primary kick	primary kick
#520 chain (⅝-in. pitch, ¼-in. width); 12-tooth gearbox sprocket, 48-tooth rear wheel sprocket, 4.00:1 ratio	#520 chain (⅝-in. pitch, ¼-in. width); 15-tooth gearbox sprocket, 47-tooth rear wheel sprocket, 3.13:1 ratio	#520 chain (⅝-in. pitch, ¼-in. width); 12-tooth gearbox sprocket, 41-tooth rear wheel sprocket, 3.42:1 ratio
Kayaba, 8.8 in. (224 mm) travel, 36-mm stanchion tube diameter	Marzocchi, 10 in. (254 mm) travel, 36-mm stanchion tube diameter	Kayaba, 7.2 in. (183 mm) travel, 36-mm stanchion tube diamter
Kayaba gas shocks, 9.4 in. (239 mm) rear wheel travel, 3-way adj. spring preload	Marzocchi gas shocks, 10 in. (254 mm) rear wheel travel, 5-way adj. spring preload	Yamaha gas monoshock, 7.2 in. (183 mm) rear wheel travel, 15 mm spring preload adj., 28-position adj. damping
drum, single-leading shoe	drum, single-leading shoe	drum, single-leading shoe
drum, single-leading shoe, cable-operated	drum, single-leading shoe, rod-operated	drum, single-leading shoe, rod-operated
4.00 x 18 IRC knobby	4.50 x 18 Pirelli knobby	4.10 x 18 IRC knobby
tubular mild steel, single front downtube	tubular chromoly steel, single front downtube	tubular and pressed mild steel, single front downtube
30 degrees from vertical	29 degrees from vertical	32 dogrees from vertical
5.12 in. (130 mm)	4.72 in. (120 mm)	5.7 in. (144 mm)
55.4 to 56.4 in. (140.7 to 143.3 cm)	56.6 to 58.4 in. (143.8 to 148.3 cm)	54.4 to 55.4 in. (138 to 140.7 cm)
216 lb. (98.2kg)	220 lb. (100 kg)	217 lb. (98.6 kg)
45.8% front, 54.2% rear	44.1% front, 55.9% rear	45.6% front, 54.4% rear
11.8 in. (300 mm), at skidplate	10.8 in. (274 mm), at centerstand	9.7 in. (246 mm), at brake pedal
34 in. (864 mm)	37.2 in. (945 mm)	34.5 in. (876 mm)
33.5 in. (851 mm)	33.5 in. (851 mm)	33.6 in. (851 mm)
15 in. (381 mm)	14.6 in. (371 mm)	12.3 in. (312 mm)
tripmeter resettable in tenths	with inline-axle fork: VDO speedometer, odometer, tripmeter resettable in tenths. With leading-axle fork: None	speedometer, odometer, tripmeter resettable in tenths and to zero
plastic, 3.2 gal. (11.8 *l*), no reserve	until 8/78: steel, 2.0 gal. (7.6 *l*), no reserve. After 8/78: plastic, 3.5 gal. (13.2 *l*), no reserve	plastic, 2.26 gal. (8.6 *l*), including .48 gal. (1.8 *l*) reserve
69 mph (111 kph)	82 mph (132 kph)	75 mph (121 kph)
yellow	red with white trim	blue
$1179 East and West Coasts	with inline-axle fork: $1909 East and West Coasts. With leading-axle fork: $1919 East and West Coasts	$1138 East and West Coasts

1	2	3	4	5	6
3.09	2.21	1.65	1.25	1.05	0.88
34.11	24.40	18.22	13.80	11.59	9.72
2.2	3.1	4.1	5.4	6.4	7.6

1	2	3	4	5	6
3.40	2.31	1.69	1.32	1.10	0.91
35.05	23.81	17.42	13.61	11.34	9.38
2.2	3.3	4.5	5.7	6.8	8.3

1	2	3	4	5	6
3.09	2.07	1.50	1.19	1.00	0.84
34.13	22.87	16.58	13.15	11.05	9.28
2.1	3.2	4.4	5.6	6.6	7.9

ENDURO / ISDT COMPARISON

continued from page 45

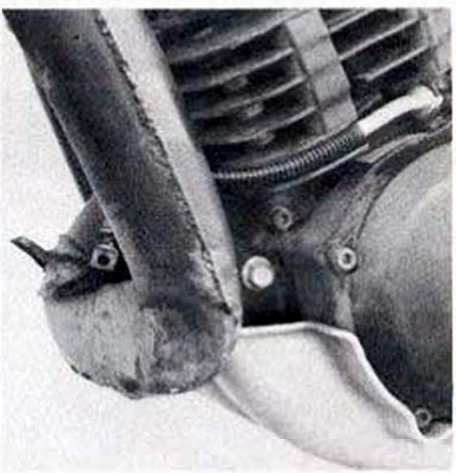
steering head adjuster cones makes the steering too slow for good maneuvering—which is why we changed it to 29 degrees—but even at that steeper setting the Qualifier is not very confidence-inspiring. In fact, it often seems as though the bike will go anywhere but where the rider wants it to go.

Part of the problem with the Can-Am lies with the unwieldy riding position. The handlebars are relatively high and swept back at too sharp an angle, and the footpegs are much too far forward. The sit-down position isn't too hard to cope with, but the stand-up position is terrible. When climbing a rough, steep hill, for example, the rider feels like he's standing on the front axle with the ends of the handlebars way back beside his ribs, making it virtually impossible for him to get his weight far enough forward on the machine. The Qualifier's steering quirks wouldn't disappear completely with an improved riding position, but we'd venture to say that about 75 percent of its problems would be solved by bolting on a set of more conventional handlebars and moving the footpegs rearward about two inches.

The Qualifier's Gabriel gas-bag rear shocks are unquestionably the worst suspension pieces to be found on any of the five bikes. Their spring rate is close to correct, but the shocks lack any perceptible damping, so the back of the Can-Am just bobs up and down at will, which is not the hot tip for optimum handling.

The Can-Am's optional Marzocchi fork worked much better than the rear shocks, especially after we changed the oil. The Marzocchi unit also behaves better than the standard Betor fork, but even with the 20-weight oil the leading axle-fork bottomed too easily. With all these idiosyncrasies and suspension foibles, the Can-Am was rated last in the overall handling category by every one of our riders. Marzocchis or no Marzocchis.

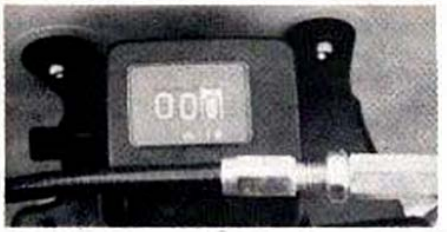
The Yamaha IT175 suspension is pretty plush and effective for all-around riding, and the wide adjustment range of the monoshock unit is a definite bonus. For most riding conditions we were able to crank enough preload and damping into the shock to please even our 190-pound rider, yet at lower settings it was acceptable for riders in the 140- to 160-pound range. But at high speeds over rough ground, the shock and the fork were just too soft to effectively cushion the pounding and prevent frequent hard bottoming.



The Yamaha exhaust system's proximity to the ground—about 12 inches at its lowest point—allowed a large-but-typical trail boulder to smash the header pipe almost totally closed.

The IT175 came in next-to-last in handling—partly because of the aforementioned slow steering, and partly because of its drastic shortage of ground clearance. Twice we had to straighten a badly bent shift lever; half a dozen times we straightened the brake pedal; once we had to replace the pipe; one rider sustained two bruised toes on his left foot in an encounter with a firmly entrenched rock; and countless times the IT either got hung up on a rock or log, or else veered off course after the skidplate bashed into something.

Leading-axle and inline-axle SWMs both have the same length fork stops, even though the leading-axle triple clamps hit the stops sooner. Until the stops are cut much shorter, the bike will barely turn sharply enough to get it out of your garage.



The PE175 has no speedometer—not really necessary on an enduro bike—just a huge, resettable-in-tenths odometer. Ours went haywire during the first few minutes of riding.

The Suzuki and the Hercules were rated about even in overall handling. The PE is the lightest bike of the five. It offers the most ground clearance and it has more suspension travel than the Hercules. But the Herc steers better and is more stable at high speed. The PE front fork behaves beautifully until you start going really fast, and then it begins to bottom regularly. A slightly stiffer spring rate or RM-type fork air caps with about five or six pounds pressure in the tubes would help the situation immensely.

The PE's rear shocks are typical Kayabas: They absorb most trail obstacles quite effectively but they have too much compression damping. They don't react quickly enough on sharp, square-edged bumps, so the rear end of the bike frequently gets kicked up.

The Herc's Ceriani front fork works to near perfection, effectively isolating rough ground from the rider's hands and forearms while keeping the wheel in close contact with the ground. And although the Marzocchi rear shocks offer comparatively short travel and could not be described as "plush," they do the job very nicely.

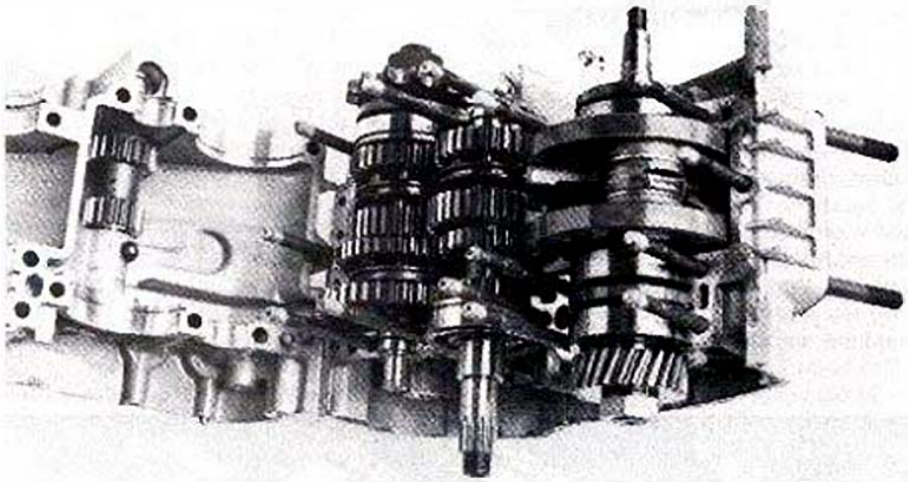
We preferred the Herc's shocks in the forward-most of the several possible mounting positions, which gives the most wheel travel, the quickest steering and the softest ride. In that position, the back end of the GS was noticeably more firm than the rear ends of any of the other 175 enduros, but the ride was never uncomfortable and the rear wheel was under control at all times.

And then there's the SWM. In terms of handling, the bike is in a class by itself. The reasons are simple: ten inches of wheel travel at both ends; steering geometry that seems to be ideal for enduro riding; a lower center of gravity than the Can-Am or the Suzuki, both of which have less suspension travel than the SWM; a dry weight of only 220 pounds; and stock Pirelli Regolarita knobby tires, brand-new to this country and unbelievably effective. The SWM unerringly, unfailingly goes wherever you ask it to go. It does whatever you make it do. It went through our rigorous low-speed maneuverability sections almost as if half the obstacles weren't even there, and it glided over the cobbliest of trails on our fastest uphills and downhills like a two-wheeled hovercraft.

The only failings in the SWM's incredible handling are caused by the Marzocchi rear shocks, which are rather firmly damped. And for riders weighing over 180 pounds or so, the rear springs may be a shade too soft. The coarse damping will cause the SWM's rear wheel to kick up slightly on steep lips or square-edged bumps, although it doesn't do it as badly as the Suzuki with its equally-stiff Kayabas. And with a big guy aboard, the springing will periodically permit hard bottoming on really big bumps and upon landing from good-size jumps. Of course, there are some situations in which the only reason the SWM bottoms or kicks up where the others do not is because it is easier to make it go faster than the others. Nonetheless, the rear suspension springing/damping balance could use some attention.

The SWM's fine handling is complemented by its excellent control layout and comfortable riding position. The handlebar/seat/footpeg relationship is suitable for riders of all sizes. The comfortable seat is shorter than those on the other bikes, but that's not a bad feature. The abbreviated saddle allows short-legged riders to more easily get their weight back over the rear wheel, since the footpeg-to-seat distance on this and other modern off-road bikes is rather spacious.

Short-legged riders need all the help



The Hercules has dual primary-side main bearings and the heaviest crankshaft. The horizontally-split crankcases simplify major engine maintenance. The small, two-gear shaft in the lower case half transforms into a seven-speed what normally would be a four-speed gearbox.

they can get on the SWM, however. The seat height is 37.2 inches—just .3-inch less than the seat height on the tallest motocrosser we've ever tested which means that taking a dab is a precarious proposition unless you're on flat, level ground or unless you can get your boot on the high side of a steep hill. Several of our test riders—including a couple of six-footers fell over when they needed to put a foot down and found out too late that they couldn't reach the ground.

The IT175 is the antithesis of the SWM. Dabbing or paddling is easier on the Yamaha than on any of the other 175s, which is one of the main reasons it has become so popular with short riders and inexperienced off-road types. The IT's riding position, too, is better-suited for a smallish person. The all-important handlebar-to-footpeg distance is rather short, making a tall rider feel crowded while standing. The seat is comfortable and the sit-down position is perfect for riders 5-foot-7 or shorter, and acceptable for taller people.

From an overall comfort/riding-position standpoint, the Hercules was better than the Yamaha and Can-Am, superior to the SWM only for a shorter rider and not quite as good as the Suzuki. The Herc is heavy, and when the rider shifts his weight rearward his left leg hits a large hump in the left-side number plate that covers the exhaust system. And the footpegs tend to let a wet or muddy boot slip off too easily. Otherwise, the Herc's control layout feels excellent and the seat is comfortable and not too high.

The Suzuki was thought to be the most ergonomically pleasant bike of the five. The controls are all ideally located in a natural position, the front half of the seat is very comfortable (the rear half is thin and comparatively hard) and a rider immediately feels right at home the instant he straddles the PE. His legs may brush the infamous Suzuki bulges on the side number plates if he tries to get his weight way back, but even then the bulges are not really objectionable.

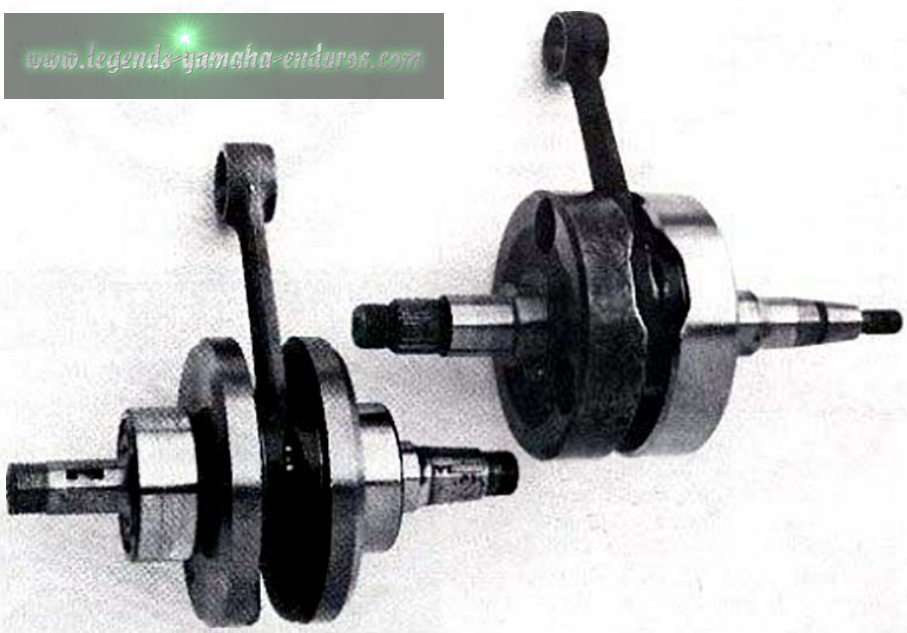
The only 175 that generated enough vibration worth mentioning was the Hercules. It vibrates badly enough up around peak horsepower rpm to make the hard Magura handgrips feel about six inches in diameter. And since the engine must be run in the 6000-to-8500-rpm range so much, the rider's hands often get numb from this Vibra-Massage treatment.

All the enduro ISDT 175s had decent braking systems, although some were noticeably better than others. The Can-Am required the strongest front brake lever pressure, while the Yamaha required the easiest lever pull. The Hercules and SWM front brakes also demanded considerable effort at the lever. The Suzuki's front brake required just about the right amount of lever pressure. It was a little less sensitive than the Yamaha's, but the brake would fade slightly on long downhills.

The SWM had the most-sensitive, easiest-to-lock rear brake, followed closely by the Yamaha. The PE's rear stopper was a nice compromise between too much and too little, while the Hercules and Can-Am both required relatively firm pedal pressure. Overall, the Suzuki has the most-balanced braking system but the brakes on the Hercules are also very good.

In water and mud, all the bikes lost some portion of their braking power. The Yamaha and Suzuki usually emerged from the wetness with the most-usable brakes, while the Hercules and SWM were often hard to slow down or stop. Getting the Can-Am's brakes wet was tantamount to removing the brake shoes altogether, for it frequently had no discernable brakes after a creek crossing or mudhole encounter.

The Hercules unquestionably came in last in overall reliability, largely because its Motoplat solid-state ignition coil went belly-up during our last day of riding. In addition, the Herc's handlebar-mounted choke lever fell off—probably due to engine vibration—the rear brake pedal insisted on tightening up on its pivot shaft, sticking the pedal in the "on" position, and the seven-speed gearbox was hard to shift throughout the test. The cause for the shifting problem was located after the test when we tore the engine down and found that the long shift-drum selector arm had been rubbing against the clutch and the kickstart idler gear, resulting in enough friction to make shifting rather hard. On the flip side of the coin, the Herc's clutch was the most indestructable motorcycle clutch we have ever used. After days and



The narrow Can-Am/SWM crankshaft (left) has only a fraction of the flywheel inertia of the wider, heavier Suzuki crank (right). The Rotax engine uses an ignition flywheel that is slightly heavier and larger in diameter than the Suzuki's but it does not quite make up for the small crankshaft.

days of incessantly and intentionally slipping the clutch on uphills to compensate for the peaky engine and tall gearing, the clutch never even needed one single free-play adjustment.

The clutches on the Can Am and SWM, though, would tolerate very little abuse. After just a few seconds of intentional slippage on the side of a steep hill, we could feel the free play quickly increasing to the point where the clutch could not be disengaged at all. But the clutches would always return to normal after a brief cooling-off period. This behavior posed no real problem for the SWM, since its bottom-end power was strong enough and its first gear ratio low enough to preclude the need for slipping the clutch very often. The Can-Am, however, was not so fortunate and lost its clutch free play many times.

The Yamaha and Suzuki clutches didn't fade when slipped—in fact, the Yamaha's clutch was so grabby and engaged so quickly that it virtually *couldn't* be slipped. The PE's clutch was also on the sudden side, but not as much as the Yamaha's.

Four of the bikes came equipped with odometers, three of which failed by the end of the first day of riding. The PE's unique odometer-only (there is no speedo, just a huge, resettable-in-tenth odometer) never survived its second registered mile before DNF'ing entirely, and the Herc's VDO odometer broke within four miles. The Yamaha's odometer is neat—when it works—because it can be reset either to zero if the knob is pushed in, or by tenths if the knob is pulled out. It functioned throughout the test but had frequent spells of erratic behavior. The Can-Am had the only odometer that continued working throughout the test. The SWM models with inline-axle forks will come equipped with VDO speedometer/odometer units. Leading-axle models like our test bike will have no instrumentation at all, but an electronic odometer is available as an option. For $19.19, it should be standard.

When we disassembled the SMW engine after the test, we found some deep scratches on the piston skirt that were apparently caused by some aluminum chips we discovered in the crankcase. With everything the bike had been through before we got it, there was no way of telling if the aluminum had been sucked in through the carburetor or if it was in the crankcase when the engine was assembled at the factory. Despite the minor damage done by the aluminum, the SWM appeared to be working perfectly at the time of its disassembly in our shop.

Tearing down the Can-Am revealed that it had suffered a minor piston seizure. We suspect the damage had been done before we got the bike because none of our riders reported any engine problems. And we know that our particular test bike had received some very hard break-in miles before we got it. Fortunately, the seizure was not serious enough to noticeably affect engine performance.

With the riding and the disassembly done, with the discussion of power and handling and braking and comfort behind us, all that remains is to answer one specific question: Which of these 175 enduro/ISDT motorcycles is the best?

The answer to that question cannot be contained within one motorcycle brand name. The best 175 enduro/ISDT depends upon who you are, where you ride, what type of riding you do and how much you can afford.

For the supreme go-fasters—the guys who are top-quality, national-championship caliber riders or two-day ISDT qualifier competitors, or even for the local riders who go like hell and really know how to use all that a bike has to offer—the SWM is the class of the class. It's not at any disadvantage in the slow, tight going, yet it is fully capable of handling anything the terrain can throw at it at high speeds. Yes, it costs a lot of money; but it is the finest enduro motorcycle of any size that we've ever tested. If you can afford the bike and have the talent and long legs to make full use of it, the expenditure is worthwhile.

The average enduro/trail rider, though, would be better off with a Suzuki PE175. Except for its mildly tuned engine, it has no major faults that could detract from its overall performance in the hands of most riders. The PE slurps in circumstances that most other bikes struggle through, and it is competitively priced and apparently quite bulletproof. For the vast majority of you interested riders out there, the PE is *the* machine.

The Yamaha is our third-place finisher, with one large qualification: The low-slung IT might be preferred by the smaller or short-legged riders. Otherwise, the IT's steering is too slow and the ground clearance too low to put the bike in the same league as the SWM and PE175.

The fourth-place Hercules has considerable potential, but curing the engine's peakiness—the worst aspect of the motorcycle—is too big of a problem for an average citizen to attack. If the Hercules people could install some low-end grunt in the engine and shave about 30 pounds off the overall weight, they would have a machine equal to the SWM in most respects.

The Can-Am, too, has good potential, but it is strong where the Herc is weak and vice-versa. The Qualifier has a very good engine and gearbox, but, among other things, it needs better rear suspension, an improved riding position and some steering improvements that could involve a chassis redesign. In the opinion of all of our test riders, the Can-Am finished in fifth and last place.

In addition to learning which of the available 175s was the best motorcycle, our test revealed something we didn't expect: that SWM is capable of taking root in the United States. We were skeptical before the test, for at a time when many European manufacturers are being squeezed out of business here by the growing competency

of the Japanese-built bikes. SWM dares to *begin* distribution here.

Some people may scratch their heads and wonder how a tiny Italian factory selling incredibly expensive motorcycles intends to compete in this cost-conscious, volume-oriented market. Simple—quality of performance. Build a motorcycle that's better than the competition and it'll sell—maybe not in great numbers, but enough to stay in business. Husky is surviving with that sort of strategy and so is Laverda and, to some extent, BMW.

We think SWM is here to stay for a while. The bikes may be pricey, but they're just as good as they are expensive. You could buy a PE175 for $800 less and use that money to modify it, but you still probably wouldn't get it to perform as well as the SWM.

In any case, both the SWM and Suzuki are superstar motorcycles that are as good in their field of endeavor as a Honda CR250R or a Suzuki GS1000 are in their respective categories. So the next time the conversation turns to talk of *real* performance bikes, throw in the names SWM and PE175 for consideration. If someone with an XS1100 Yamaha laughs at you, get on your enduro machine and challenge him to a race—up a mountain trail. •

ENDURO / ISDT TECH PROBE

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uses two neutral detents, and their combined force is difficult to overcome. One of the detents was designed to operate a neutral light when this basic engine is used in some other application. Eliminating that detent would certainly improve the shifting between first and second; unfortunately, the gearbox has to be completely torn down before the detent can be removed.

The Sachs engine is as unconventional as its gearbox. The flat-topped piston and the unusual shapes of the transfer ports and combustion chamber all seem to indicate that the Sachs engineers were either ignorant of the two stroke development that has taken place in the last 20 years, or they thought everyone else was doing everything wrong. The results, however, indicate that they would have been much better off with a more conventional approach. Only the Suzuki engine has less power than the Sachs and the narrow powerband in which the Hercules can function is totally out of keeping with the particular requirements of an enduro/ISDT bike.

The Suzuki, though lacking the peak power of the other four machines, is not at as great a disadvantage as you might suppose from looking at the horsepower numbers. The PE was not designed specifically for the ISDT. It was designed to work best in New England-type enduros where the conditions demand smooth, tractable power. Thanks to more flywheel effect than our other 175s, the Suzuki often gets its easily controlled power to the ground where more motocross-like engines simply spin the rear wheel. The first five gear ratios in the PE175 are more closely spaced than on the other machines and that also helps offset the differences in power.

Nevertheless, the Suzuki in stock form would be at a disadvantage in ISDT special tests and in some of the faster enduros. However, the PE175's go-fast potential has been convincingly demonstrated by Drew Smith with his outstanding finishes in the ISDT qualifiers. Though the PEs being used in the qualifiers are not stock, the modifications they incorporate are not extensive. Basically, the carburetor size is increased from 32 to 34 mm; the exhaust port is raised 1 mm; the head gasket thickness is reduced from 0.5 to 0.2 mm; and the air box inlet and the exhaust silencer are modified to be less restrictive.

The Suzuki and Yamaha engines are similar in many respects, but in most cases Suzuki has taken the approach that would result in a more reliable engine. For instance, both engines use reed valves to control the passage of mixture into the crankcases. In the Yamaha, all of the incoming mixture must pass through the reed valves. Because the valves are restrictive, they can only improve performance if the inlet cycle is much longer than a piston-controlled port will normally

allow. The Yamaha's inlet period is extended by having two large holes in the intake skirt of the piston. These holes permit mixture to flow through the piston when the intake skirt would otherwise completely block the inlet tract. The holes also shorten the life of the piston. And in this case the Yamaha's piston life is further impaired because its piston skirts are relatively short.

Suzuki uses a conventional piston-controlled port that is supplemented by a reed-valve-controlled port feeding directly into the crankcase. This design is advantageous because it uses a full, long-skirted piston that should last much longer than that of its Yamaha counterpart.

The SWM and the Can-Am both use Rotax rotary-valve engines but with certain differences. SWM employs the same cylinder and piston as Can-Am uses on its 175 motocross engine. The ports in the SWM cylinder are therefore taller than those in the Qualifier and the SWM piston has only a single Dykes ring while the Qualifier has two rings. Of course, the exhaust systems are entirely different, and the internal sixth gear ratio is slightly taller in the SWM. The Can-Am also has oil injection, while the SWM runs pre-mix. Both engines perform exceptionally well. The SWM produces the most horsepower but the Can-Am engine is stronger from low speeds through the mid-range.

Ease of maintenance is an important consideration on an enduro/ISDT bike and each of these machines has its strong and weak points. The Can-Am and SWM come standard with centerstands that greatly simplify wheel changes or wheel-related repairs. But neither of those machines comes with a sidestand, and we too often found ourselves forced to park one of them on ground that was not level enough for the centerstand to support the bike. The Suzuki, Yamaha and Hercules all come with sidestands and with mounting brackets ready to accept optionally available centerstands.

Removing the rear wheel from a motorcycle for tire repair can be very easy or very difficult, depending on whether the manufacturer went to the trouble to make it easy. The SWM and the Hercules use the same type of wheels, which are ideal for quick removal. The drive chain and rear brake remain with the motorcycle when the rear wheel is removed. Just pull the axle and the wheel slips right out.

The IT's rear wheel arrangement eliminates the need to pull the axle, but fooling with the chain and brake is just as much trouble. And when the wheel is reinstalled, the drive chain must be adjusted. This step shouldn't be necessary and it can be time-consuming if during wheel removal the rider did not note the position of the cam-type chain adjusters.

On the Suzuki, the rear axle must be removed and you must fool with the chain and brake. The only features in the PE's favor are fixed chain adjusters and a nifty wrench that will remove an axle very quickly.

Removing the rear wheel from the Can-Am is simply a pain in the neck if you're forced to do it quickly under in-the-field conditions.

Other maintenance seems most easily performed on the Suzuki, with some tasks being a little more difficult on the Yamaha and SWM. The Hercules has too many nut-and-bolt mountings that would be better if the nuts were welded to the frame. The Can-Am, like the Herc, has too many things that are difficult to do because they were not specifically designed to be done easily.

Of course, no matter how easy a machine is to work on, most jobs require tools. Only Can-Am and Yamaha seem to appreciate that fact because only they have provided a means for carrying tools and spares. The Suzuki does have its multi-purpose axle/spark plug wrench neatly mounted on the front fork, but that won't help get the carburetor off.

Two other points that require some explanation are the SWM's small fuel tank and the Herc's adjustable rear suspension.

The ISDT model SWMs imported after August of this year will have 3.5-gallon plastic fuel tanks in place of the present two-gallon steel tanks.

As for the adjustability of the Herc's rear suspension, it is mostly superfluous. Altering the position of the rear shocks changes their mechanical advantage in relation to the wheel, which changes their relative spring and damping rates and provides more or less wheel travel. The first question that comes to mind is, why would anyone want less wheel travel when the maximum provided is less than that of any of the other machines? Assuming that someone *did* want less travel, the simple act of moving the shock absorbers would not be a satisfactory alteration. The standard spring and damping rates are too high when the shocks are in any position but the one providing the greatest travel. Furthermore, any lessening of rear wheel travel lowers the rear of the motorcycle and upsets the otherwise ideal steering geometry. And, as one rider said only half-jokingly, "How can you have any faith in a manufacturer that doesn't know where to put the rear shocks?"

Of these five 175 enduro/ISDT motorcycles, the Suzuki appears to provide the best compromise between performance, cost, light weight, reliability and ease of maintenance. The SWM is a more specialized machine. Were it not so expensive it would nearly equal the Suzuki on all points except performance, where the SWM is indisputably supreme. The Yamaha is basically sound, but certain aspects of its performance need improvement and we would not expect it to be as reliable in the long term as the PE or the SWM.

The Hercules is disappointing. So much of the machine is clever and well-thought-out that its deficiencies are all the more difficult to swallow. Its excellent handling and low price could make it very desirable but the engine's narrow powerband is too difficult to live with.

The Can-Am has little to recommend it aside from its engine and gearbox. Considerably revised models are expected in 1979, but until then the Suzuki offers better overall performance for a lot less money. •