

•6 American Championship Motorcycles

The chase for the American Grand National Motorcycle Championship begins in February in Houston, Texas. The chase has 20-odd races, spread out over nine months and all parts of the country. When the grind ends in October, racers have driven thousands of miles, thousands of spectators have seen hundreds of racing miles, and everyone knows who the new National Champion is.

The National Champion has spent the year demonstrating his cold-nerved skill in four categories: steeplechase, dirt short track, mile and half-mile dirt track, and road racing. Any champion must be master of both road racing and mile/half-mile competition because these events account for 75 percent of the national championship meets.

No hopeful can go racing on the national circuit without a bank vault full of equipment. Each type of racing has its own intricate, specialized machinery. Road racing bikes would be entirely alien on a dirt track, and a flat tracker an equal foreigner on any pavement circuit. The racer himself provides the link between all categories: he must be at ease pitching his dirt tracker sideways at 100 mph on a mile oval, and just as cool-headed while rushing toward a 120-mph bend at 170 mph on his road racer.

Money fuels racing in America. For manufacturers and distributors victory is a matter of prestige and honor. A few manufacturers are willing to pay handsomely for a winning image and this means bearing the cost of factory teams and professional riders.

But the heaviest investment is the creation, development, and refinement of complex, exotic racing hardware. This war of engineering never ends. The struggle behind the scenes begins before the season opens, and continues without interruption. Twenty-odd races merely punctuate the war fought at the drawing boards.

Yankee motorcycle racing grew up on horse tracks; this racing is still the most intense and hardest fought in America.





Harley-Davidson XR-750

Though seriously challenged every season, Harley-Davidson's XR-750 V-twin remains the dominant force in American dirt-track racing. At mile and half-mile ovals, the Harley twins are implicit favorites. Indeed, the deference shown to the Milwaukee twins at dirt tracks is much like the respect given to Yamaha TZ-700's at road races. Other machines don't simply win dirt-track events; they must beat the Harley V-twins.

Individual dirt-track machines, though nominally alike, reflect the studied preferences of given pilots. At speed, expert riders can detect small variations in basic frame geometry, suspension action, tire patterns, and a score of other areas. Riders become sensitive to incremental changes which may produce a winning edge—because dirt-oval contests are fierce, intense, close-quartered battles. The difference between winning and finishing tenth could hinge on tire selection.

Unlike its competitors, the Harley-Davidson XR-750 is no hybrid racer, in which a modified production engine mates to a special dirt-track frame. In its primary mode, the XR-750 was designed as a dirt-track racing bike. As a pure racer built with a specific purpose, the V-twin enjoys the advantages inherent in machines developed from clean drawing paper.

The XR-750's metal technology runs far beyond standard light alloy castings. The cylinders and cylinderheads are cast in a space-age aluminum alloy with an unusually high silver content; this light, tough material quickly dissipates the heat generated at racing speeds.

Painstaking development went into the cylinderhead design; the effort exceeded any reasonable level for general purpose motorcycle engines. The configuration of intake and exhaust ports could follow the dictates of flow-bench testing; compromises for mass production weren't necessary. And so, with development, the best XR-750 engines have produced 80 horsepower.

Yet dirt-track races cannot be won with sheer power. A victory takes many elements—stability, traction, reliability, and power. And that mixture consistently sends the pushrod Harley twin to the winner's circle.

Factory-backed XR-750 boasts such refinements as magnesium artillery wheels—and brilliant rider Gary Scott.



Yamaha 750

More than its adversaries, the Yamaha 750cc dirt-tracker is an assemblage. The Yamaha is not a racing bike designed from scratch, such as the Harley-Davidson XR-750. And the Yamaha 750 engine, unlike the Triumph and Norton units, has no roadster counterpart. Yamaha's 750cc vertical twin has been created from the 650cc roadster engine.

Construction of such an engine means careful selection of parts. Early-series Yamaha 650 crankcases—lighter and less complex than later series—form the foundation of the 750cc special. All non-essentials are deleted. For example, in the absence of a generator, a total-loss battery system supplies ignition current. The 650cc engine grows to 750cc with modified cylinders, oversized liners, and 80mm pistons which replace the standard 75mm items. Cylinderhead modifications include racing camshaft, re-profiled ports, and larger valves. Big

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carburetors and tuned-megaphone exhausts round out the package. This speed-kit was developed in the United States because dirt-track racing, as practiced by Yankees, is indigenous to America.

This bolt-up hot rod serves well on mile and half-mile tracks. The Yamaha trackers have an impressive spread of power. The single-overhead-camshaft engine has about 65 horsepower at 7,000 rpm and returns a solid 70 horsepower at 8,500 rpm, the logical rev-limit for the nine-piece, pressed-together crankshaft.

Champion, a frame specialist, supplies the structures used by factory-supported Yamaha 750's. But with more and more privateers switching to Yamaha power, every frame-master has a chassis for Yamaha's ever-present twin. The specialists just might be playing their hunches: with increasing stateside development of the Japanese vertical twin, the Yamaha 650-to-750 unit may yet become the dominant force on American dirt tracks.

AMA Champion Kenny Roberts shows his winning blend of courage, equilibrium, power, traction, and concentration.

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Norton 750

Triumph's vertical twin has been a stalwart of mile and half-mile racing for a quarter-century. First as a 500cc racer, and later in 650cc and 750cc versions, the Triumph twin has powered a long line of successful dirt-trackers. But when the factory discontinued production of 750cc twins, the end of the works-supported dirt-trackers became inevitable. Unquestionably, privateers will continue with Triumph power for several seasons, so the Triumph name will not disappear on the dirt tracks.

Neither will another British vertical twin. The Triumph's stablemate, Norton, will continue to battle Yamaha and Harley-Davidson with full factory support. Norton has a promising future as a dirt-track racer; the current long-stroke engine already produces competitive horsepower, and the short-stroke Norton 750cc engine will guarantee that British vertical twins remain competitive.

Norton's 73mm x 89mm powerplant develops around 68-70 horsepower at 7,000 rpm, and like the Triumph twin, the Norton pulls strongly from 4,500-5,000 rpm. With a more robust crankshaft assembly, the Norton twin can endure more strain without breaking than the old Triumph engine.

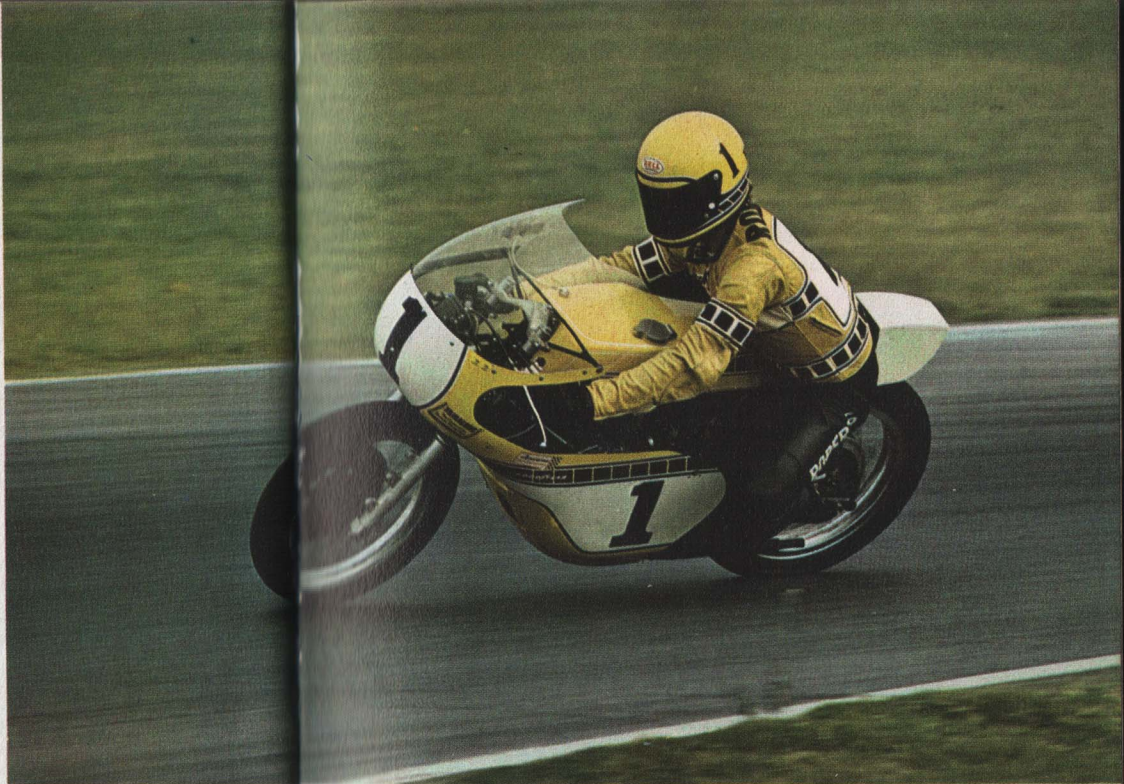
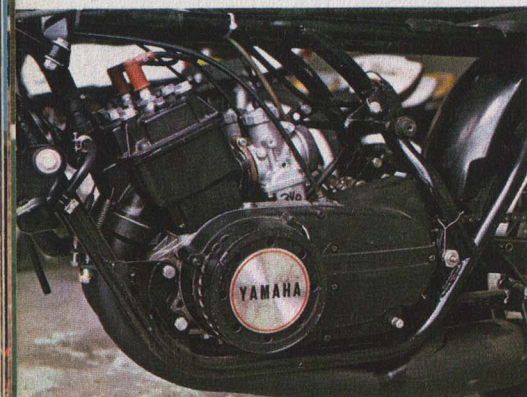
Frame specialists build the running chassis for most mile and half-mile racers. Trackmaster, one of the California specialists, constructs frames to the specifications of the Norton factory team. The most unusual feature of the single-loop Norton/Trackmaster frame is its notch in the central tube; this hump allows the cylinderhead to be removed for servicing without pulling the complete engine from the frame.

The wheelbase measures about 56 inches, though the rear axle can be moved 1 or 2 inches in a horizontal plane and also adjusted in vertical plane in order to vary the handling for particular race tracks. The fork angle can be varied from 27 to 28 degrees.

Handlebar bends and foot-peg positions must be fit to an individual rider, according to his own style, strength, and physical size. And that's fair enough. Any racer needs the confidence which comes from a perfect fit.

Works-supported Triumph dirt-trackers (above) have been terminated. British honor will ride solely on the Norton name (below).





Yamaha TZ-250

For a decade, the Yamaha 250 road racers have been the dominant force in American lightweight road racing. Yamaha broke the ranks of its 250cc opponents—Parilla, Ducati, Honda, Benelli, Bultaco, Suzuki, Kawasaki—and one by one they disappeared.

Inside a ten-year period, Yamaha introduced no less than seven series of 250cc racers, each more powerful and reliable than its forerunner. By comparison, other manufacturers seemed far less ambitious. Every one or two years Yamaha widened their technological gap by building new equipment.

The Yamaha TD-1A of 1963 was an air-cooled, piston-port two-stroke with 27mm carburetors, magneto ignition, a wide-ratio five-speed gearbox and sometimes-exploding clutch. Speed, not reliability, was the A-model's strength. Piston seizures would stop many TD-1A's.

114 Yamaha had not yet perfected the wall coating for its aluminum-alloy

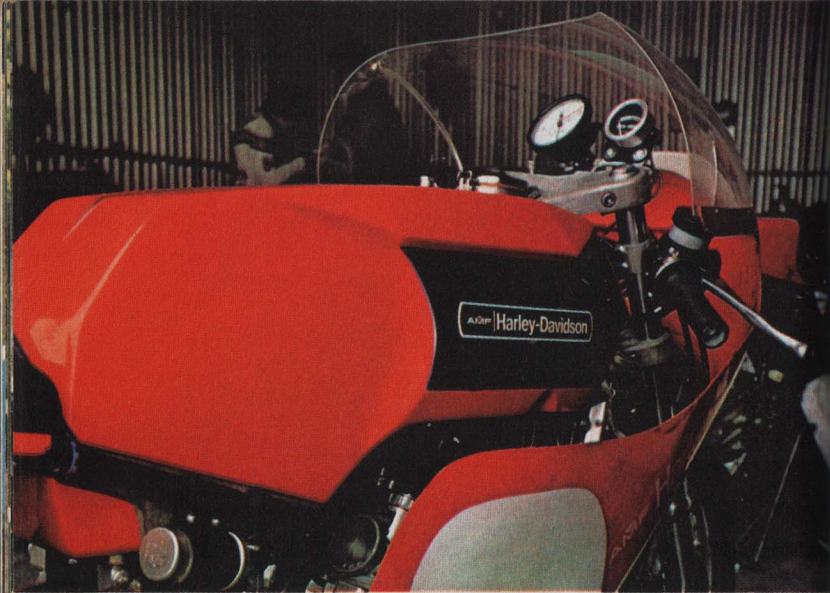
A generation of racers, including American Champion Kenny Roberts, learned their craft aboard Yamaha 250 twins.

cylinders, and at speed the pistons often jammed in the cylinders. If it lasted, the A-model—with 29 horsepower at 9,500 rpm and 118 mph in top speed—was the fastest lightweight afloat.

Yamaha's TZ-250 shows ten years of progress. Piston/cylinder compatibility was solved long ago. The water-cooled, twin-cylinder racer turns out about 54 horsepower and runs 30 miles per hour faster than the TD-1A. Expansion chamber developments and piston/cylinder porting advances account for the phenomenal increase in performance. Thirty-four-millimeter carburetors feed the 11,000-rpm engine, while point-less electronic ignition triggers the spark plugs. Engine power reaches the rear wheel via a dry clutch and six-speed close-ratio transmission. The TZ-250 handles corners in a way that TD-1A owners would never have believed possible. The super-effective front disc brake stops the TZ-250 far better than the A-model managed with its twin-cam drum brake.

The TZ-250 exhibits determined work and winning experience.

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Harley-Davidson RR-250

Harley-Davidson returned to the lightweight road-racing arena in 1974. Absent for three years following the demise of its old 250/350 four-stroke single, the Milwaukee firm rejoined the battle with two-stroke twin-cylinder power. Its new RR-250, a production version of the works Harley-Davidson, is a near-replica of the world-championship bike used by Walter Villa.

In its 1974 American debut, the RR-250 gave the Yamaha camp an intense, if short, fit. In the hands of Harley-Davidson ace Gary Scott, the surprisingly powerful Italian racer motored away from Kenny Roberts and his nearly invincible water-cooled Yamaha. Scott's win at Loudon, New Hampshire snapped an unbroken procession of Yamaha 250 victories. Subsequent mechanical problems and team injuries prevented the Italian water-pumper from posting any other wins in 1974. Nevertheless, by the season's closer at Ontario, California, the works and semi-works Harley-Davidson 250's had become the fastest lightweights in America.

Under new AMA rules, only 25—instead of 200—RR-250's, needed to be built in order to qualify the model for American racing. The old 200-unit rule had effectively quashed any American racing plans by manufacturers who had small facilities for race-bike production. The Italian division of Harley-Davidson had no way of meeting the 200-bike rule. But production of 25 units was possible.

As the Harley-Davidson RR-250's began to filter into private hands, lightweight racing regained some spectator interest. With the 25-unit rule, updated Yamahas and brand new Kawasaki 250's seem certain to appear. Two-fifty racing in America may once again become a real battle of brands.



Though its basic engine specifications resemble the Yamaha TZ-250, the RR-250's general appearance is quite different.

Suzuki 750

The Suzuki 750 water-cooled road racer has its origins in the GT-750 touring machine. Unlike Yamaha, which met AMA rules with 200 examples of the TZ-700, the Suzuki 750 racer began, in theory at least, as a roadster and became—by the magic of piece-by-piece replacement—a racer.

First seen in 1972, the water-cooled triple proved awesomely powerful. Suzuki had the first 750 with a genuine 100 horsepower. That sort of power revealed handling deficiencies which were latent in lesser machines. Plagued by homologation infractions, low reliability levels, and handling difficulties, the Suzuki team labored through the 1972/73 seasons, usually showing far more potential than positive results.

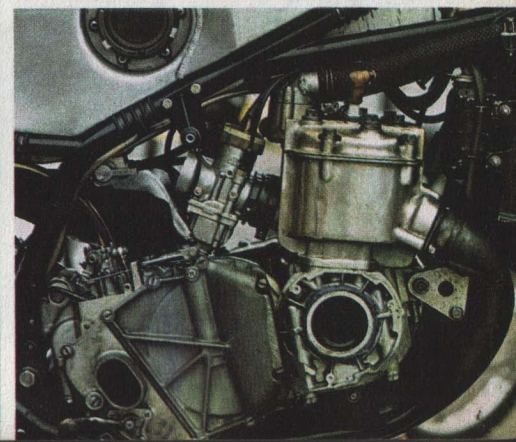
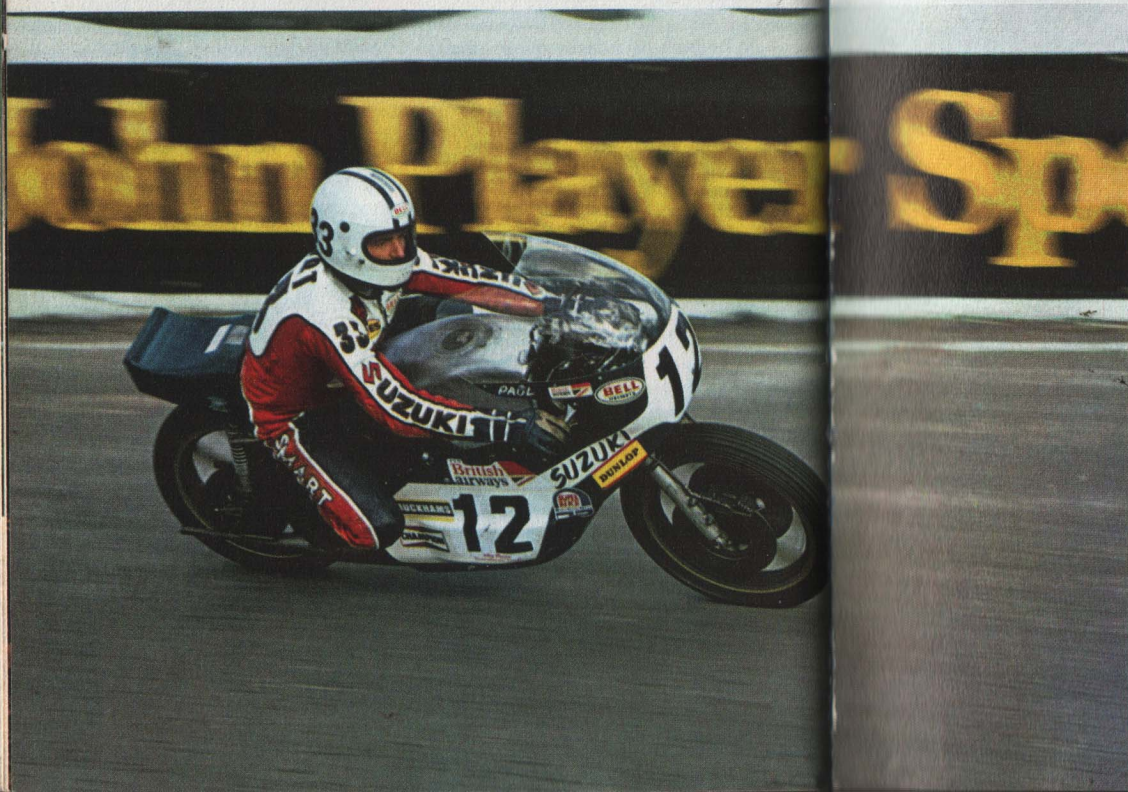
Suzuki built new racing bikes for 1974 and launched a development program in the United States. Early encouragement in 1974 (near-victory at Daytona, an outright win at Loudon) turned to gloom when injuries benched Suzuki's fastest rider, Gary Nixon. His absence

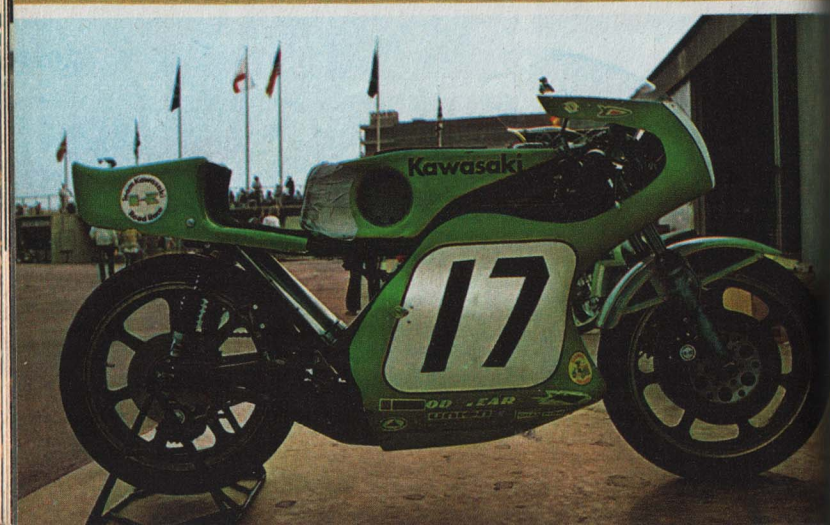
In the United States, repeated victories have fallen just beyond Suzuki's grasp, despite star riders like Paul Smart.

also halted the development of the semi-works Erv Kanemoto-750 Suzuki, which was clearly the best-prepared and most potent Suzuki racer in the United States.

The 70mm x 64mm three-cylinder engine produces maximum horsepower at about 8,000 rpm. Thanks to its good breathing characteristics and water cooling, the Suzuki develops more horsepower at 8,000 rpm than the air-cooled Kawasaki does at 9,500 rpm. For sheer horsepower, the Suzuki proved equal to the Yamaha TZ-700, though the lack of a six-speed transmission handicapped the Suzuki many times in 1974.

Under new, liberalized AMA rules, a revamped water-cooled Suzuki will be able to maintain its horsepower parity with the Yamaha TZ-700. Indeed, with 100-plus horsepower on command, all camps will be carefully studying frame design. Both Yamahas and Suzukis have ample power; the trick is building a frame to contain the juggernaut engines.





Kawasaki 750 H2R

Kawasaki's air-cooled H2R 750cc road racer reached the end of its development in 1974. When it first appeared in 1972, the three-cylinder bike immediately became the machine to watch—and shortly thereafter, the thing to beat in the AMA national road-racing series. Modified and updated for the 1973 season, Kawasaki remained the major power at almost any road race in North America. Rolling on cast magnesium "artillery wheels," and painted in high-visibility green, the Kawasakis could easily be picked out in any collection of 750 racing equipment.

Time deals harshly with racing motorcycles. The 1974 AMA season brought updated Suzuki racers and the new Yamaha TZ-700. These water-cooled wonders made the Kawasaki H2R show its age. Based on the air-cooled 750 Kawasaki roadster, the H2R racer could not be converted to water cooling under the AMA rules then in force. Yet a water-cooled racer was necessary to keep Kawasaki competitive.

A completely new water-cooled engine would give Kawasaki an opportunity to update transfer-port design, thus increasing horsepower. But fundamentally, water cooling prevents that horsepower loss which occurs in all air-cooled two-strokes as they reach hot operating temperatures. A 92-horsepower, air-cooled Kawasaki 750, when fully warmed up, could skid back down to 78 horsepower.

The 71mm x 63mm air-cooled triple, spinning to 9,500 rpm and feeding its power through a five-speed gearbox, would fairly catapult the lightweight (310 pounds dry) Kawasaki out of corners. Experiments in 1974 included larger 38mm carburetors (to raise the output) and a revised frame (to obtain better handling). But these were small steps compared to the obvious next stage, water cooling.

A revision of the AMA rulebook will enable Kawasaki to develop a water-cooled successor to the H2R. And that should make the Green Meanies from Kawasaki front-line contenders again.



Yvon du Hamel, Kawasaki's team leader, has ridden the H2R to more major American victories than any other rider.

Yamaha TZ-700

In one short season Yamaha became the ruling power in AMA big-bike road racing. Though the old 350cc Yamaha twins had occasionally whipped their 750 opposition through 1973, the new TZ-700 Yamaha locked up AMA road racing by the end of 1974. In order to meet the old AMA homologation rule, Yamaha produced 200 racers, and these 700cc four-cylinder water-cooled machines were virtually grand prix machines, which were made available to privateers.

The 700 racer is a juggernaut. Essentially two 350cc water-cooled twins lashed together, the four-cylinder in its original version produced some 90 horsepower in a relatively mild state of tune. Reed-valves and fairly modest exhaust port-timing made the engine tractable. Even so, 90 horsepower—fed through a six-speed transmission—produced heart-stopping acceleration. Ninety horsepower was just the beginning for the 370-pound motorcycle as the exigencies of racing and normal development pushed the output well beyond the century mark.

At first many privateers believed that the big Yamaha would be far easier to ride than the TZ-350 production racer, which most private entrants had earlier used. The smaller bike had that famous on/off light-switch type of power. But riders soon discovered that the four-cylinder two-stroke made other demands, equally exacting as the twins. With such terrific power on call, riders had to develop a very sensitive throttle hand because the TZ-700 could literally spin the rear tire coming out of corners. Riding hard at the limit, the slightest miscue could pitch the complete plot into the weeds. The big Yamaha's fantastic power did not operate as a great leveling tool among riders. Rather, the 100-horsepower monsters served to elevate more quickly that natural aristocracy of racing talent.

Of all the American riders, no one raced the 700 Yamaha with more skill, finesse, and élan than AMA National Champion Kenny Roberts. In Europe, England, and America Roberts underscored that proposition again and again in 1974.

Two great Yamaha riders: Kenny Roberts (black and yellow American team bike) and Giacomo Agostini (red and white European bike).

