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The ISDT: Color Coverage

YAMAHA TT500

Everybody's Favorite Playbike


DIRT
TEST

Yamaha TT500

A BIG-BORE FOUR-STROKE SINGLE HAS MANY ADVANTAGES OVER A TWO-STROKE POWERPLANT. HERE'S WHAT THEY ARE AND WHY THEY'RE IMPORTANT TO THE PLAYRIDER...

Not many of the people who buy motocrossers or ISDT bikes ride them at Unadilla or Trask Mountain. Most dirt bikes get used for banging around the woods or exploring desert trails in the activity commonly known as playriding. The TT500 is a darn good playbike. Yamaha advertising doesn't come right out and say, "this is a playbike," but that's its market and the bike is its own best ad.

The British-built Ariel, AJS, Matchless, Enfield, BSA and Velocette four-strokes had been thundering along basically unchanged for two decades when the two-strokes began throwing strikes. British factories have never pulled the opposition's pitches to left field. If they swung at all, it was usually a miss or a weak bouncer to the first-base dugout. In the end the English just stood there and went out on a called strike three. Lethargy and lack of foresight by British industry brought extinction to big-bore four-stroke singles more than any inherent weakness the motors had as off-road powerplants. The suitability of a big thumper for the dirt never died, it just laid in limbo until there arose a benefactor to transfuse it with modern technology. Enter Yamaha in 1976. Hello TT500.

Why does a full 500cc four-stroke single make such a good playbike? There are five basic reasons:

(1) It's more reliable than a two-stroke.

(2) There's more low-end torque and a wider powerband.

(3) It gets better gas mileage.

(4) It has more engine braking.

(5) Hop-up components can deliver further power without jeopardizing reliability or power characteristics.

Let's examine each of these reasons individually:

Reliability: Two-strokes have one major disadvantage which is a constant threat to their continued operation, and that is extreme susceptibility to overheating. This is partly because they have a heat-producing power stroke with every crankshaft revolution instead of every other revolution as in a four-stroke. Secondly, the area of the piston adjacent to the exhaust port is blasted by fire each time the port opens. This heat has the unfortunate tendency to convert oil from the fuel/air mixture into gum, which collects in the tiny clearances around the piston ring. The ring is one of the most critically important components in the engine and must have unhampered movement in its groove to seal properly. Gum build-up in the ring groove soon leads to improper ring sealing and subsequent blow-by of hot gasses which further raises piston temperature, thus promoting more gumming, less sealing and eventually a piston seizure. The two-stroke ring also suffers by being pinned in place so its ends won't snag in a port. Therefore it isn't free to rotate and help scrub away the accumulation of gumming oil.

These factors which greatly threaten a two-stroke's reliability are of minor consequence to a four-stroke. This is because a four-stroke engine runs cooler in the first place, has no oil mixed with its gas and has three piston rings, including an oil scraper which prevents all but a thin film of oil from ever reaching the ring grooves. Problems unique to four-stroke failure, such as burned valves, cam chain breakage, galling valve guides, etc., occur far less often than piston seizure in a two-stroke.

This is not to say a two-stroke can't be made as reliable as a four-stroke. It's just that they are far more sensitive to departures from the perfect state of tune necessary for equal reliability. For instance two-strokes are far less tolerant of riding abuses such as lugging or sustained full-throttle operation. They are more easily irritated by altitude changes, shifts in timing, dust build-up on the air cleaner, etc. They're allergic to the wrong type of oil, improper mixture ratios and bad gas. A four-stroke shrugs off these problems and keeps running.

Low-end torque, wide powerband: Through sheer size—there being no substitute for cubic inches—the TT500 begins with an enormous advantage (20 percent) over the 400cc Open class two-strokes. (Maico's limited-production 450 is an exception.) Torque is traditionally described as the source of a four-stroke single's "stump pulling," "tractor-like" power which "rotates the earth." Though somewhat flawed, this contention definitely describes the sensation that results from a twist of the TT's throttle. Big-bore two-strokes can be made to equal the Yamaha's torque output, but never over such a wide powerband. This is partly because the torque-producing pressure in a two-stroker begins escaping halfway down the piston's travel when the exhaust port opens, while in a four-stroke pressure is exerted on the piston through much more of its descent. Furthermore maximum output in a two-stroke cannot be reached until engine revs coincide with the point where inlet and exhaust pulsations most efficiently charge and scavange the cylinder. The laws of physics limit this match-up to a rather narrow spread of revs by four-stroke standards. The Yamaha puts out pretty close to its maximum torque over a 3500-rev spread, an achievement which produces bright green envy in Husky's 390, the king of the two-stroke torquers. A bike which pulls as hard and long as the Yamaha requires less clutch slipping, less shifting and is generally easier to ride than one with a narrower powerband. All of these are obvious advantages to the playrider.

Better gas mileage: During most conditions the TT500 will easily deliver 100 miles of trail riding from its 2.3-gallon tank. By comparison we've emptied the 2.6-gallon tank on a 250 Hercules after only 35 miles. IT400 Yamaha's are notorious gas guzzlers, sometimes averaging below 20 mpg. Anyone who buys a 390 Husky or 400 Penton will have to fit one of the bulky accessory tanks to get a 100-mile range. Two-strokes have mileage problems because so much of the incoming charge is short-circuited out the exhaust port. In a four-stroke the exhaust valve is closed during most of the time the intake valve is open, so fuel waste is minimal. Every playrider eventually begins taking long loop rides which require 150 miles or more of range. The relatively new sport of "bike packing" often demands that machine, rider and camping gear be carried deep into wilderness campgrounds, with further sidetrips beginning there. Fitting a larger accessory tank to the TT will end any worry of gas shortages.

PHOTOGRAPHY: DALE BOLLER AND PAT BROLLIER

Yamaha TT500

More engine braking: When rolling off the throttle a four-stroke provides noticeable engine braking which is useful on downhills and in setting-up turns. This slowing does not result from the engine pumping air as many people think, because the carburetor slide is closed, preventing the entry of air. The braking effect comes mainly from the friction of moving parts. The only resistance a two-stroke offers is friction from the gearbox, primary drive and piston ring(s). In a four-stroke additional friction from valve springs, cam chains, cams, three piston rings, etc., amounts to considerable braking effect, especially at high engine speed.

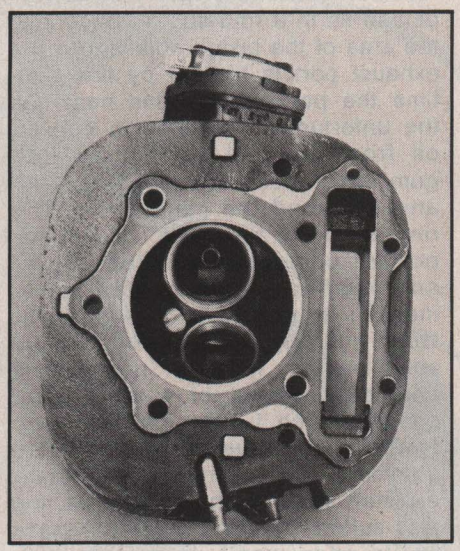
Hop-up potential: Both the Astrodome National TT and Ascot 100-lap TT have been won on Yamaha 500 singles against a field including 750 twins. No further endorsement of the thumper's potential for more performance is necessary. What's important is that hop-ups don't necessarily result in less low-end or narrower powerbands as is the case with performance mods to most two-strokes.

It all sounds like roses based on the above theoretical suppositions. In the interest of equal time, here are a couple of the TT500's disadvantages as a playbike:

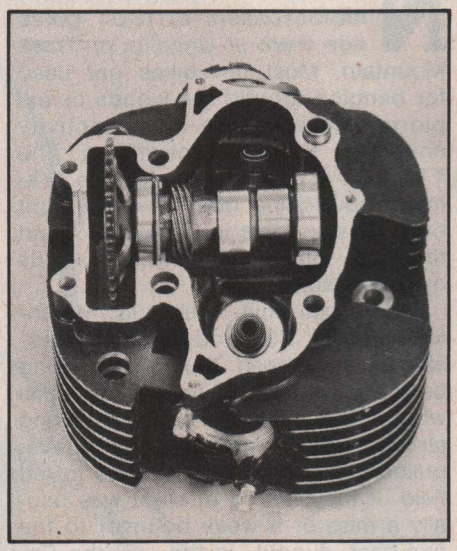
The first is *weight.* At 296 pounds with a full tank of gas, the TT definitely feels big. Not bulky, not ungainly and not awkward, but not nimble either. Anyone 5 feet 10 or above will acclimate quickly, and though he'll never deny the advantage of lightness, he won't turn away from the Yamaha because of its weight. Rick Hocking, the TT500 rider who won the Ascot 100-lap TT, barely stands 5 feet 8 and weighs 150 with a full stomach. His Yamaha flicked around the track like a bobsled. Part of the TT's weight contributes to its durability. Thick-wall frame tubes, a skid plate, fat spokes, steel sprockets, huge axles, etc., all back the TT's reputation for surviving abuse and neglect.

Tricky starting: In spite of the little window which tells you where to position the piston for easier starting and less danger of kickback, the big TT can be a pain to fire. Usually one or two kicks will light it off, but they must carry enough punch to crumble a brick wall. Pansy pokes won't even trigger the spark plug, and a half-jab can leave a kickback dent in your foot. At worst the TT takes six or seven tries to stir. A Matchless owner would call that progress, but his perspective doesn't count in an era of handlebar buttons and two-strokes which spring to life with a nudge.

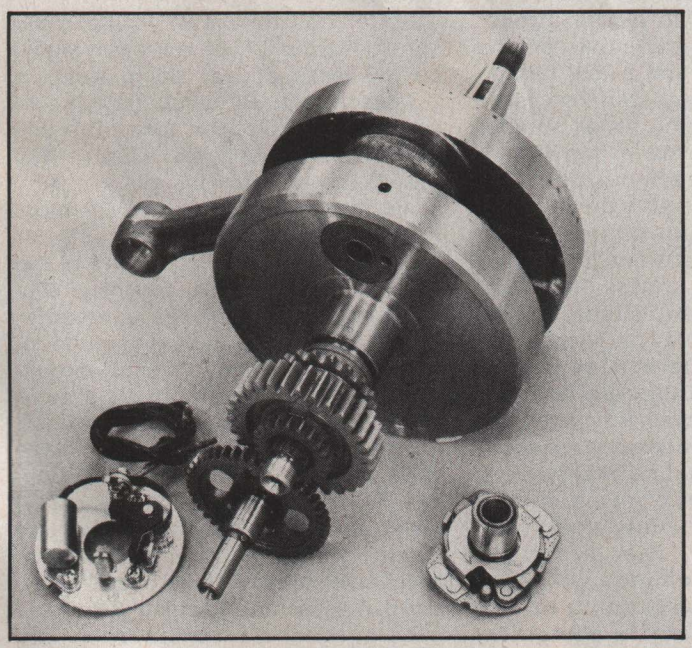
Our 1978 test bike, the TT500E, remains basically unchanged from last year. Larger fins on the head and cylinder are a spillover from the XT



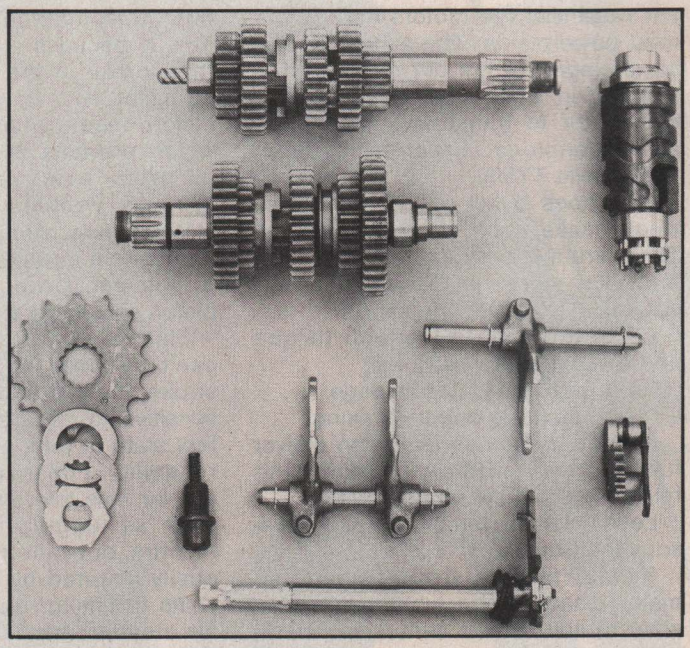
Big valves feeding a hemispherically-shaped combustion chamber combine with a center spark plug location to give ideal theoretical standards for lots of power. The TT has plenty.



Instead of spinning directly on the cylinder-head casting as in the case of Honda XLs, the TT cam rides in ball bearings and thus eliminates the Honda problem of seizing on the head.

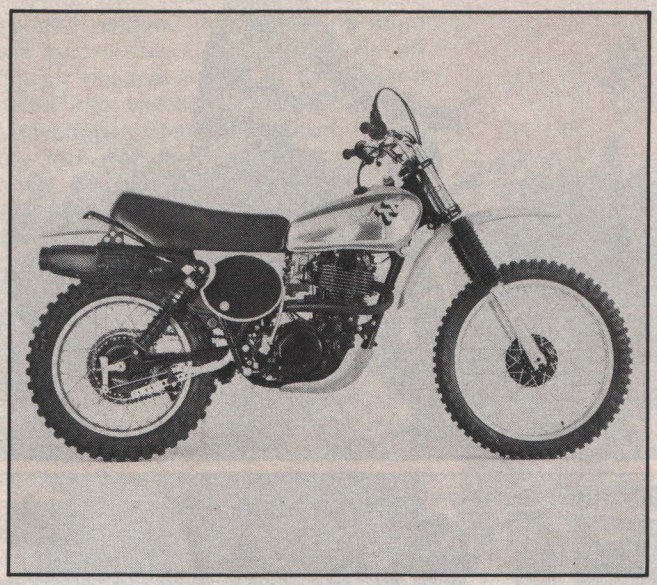


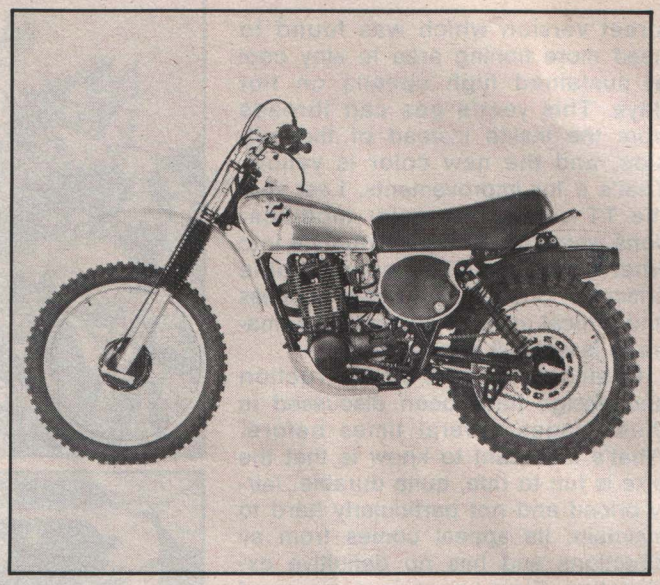
Large 5½-inch-diameter flywheels help the TT keep slugging at low revs. Yamaha has wisely retained a magneto ignition with mechanical points in lieu of CDI. This system can usually be repaired on the trail.

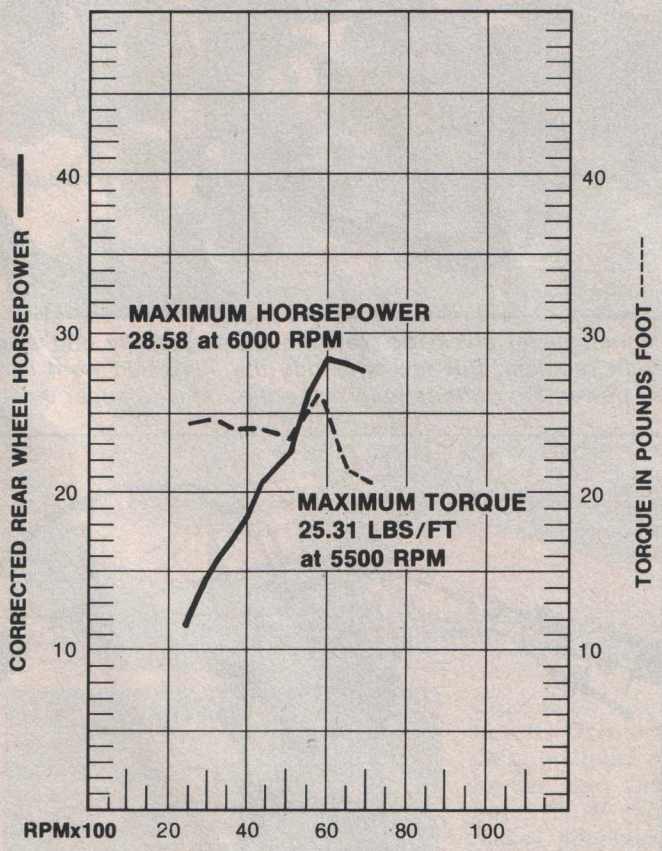


Gear ratios are fairly close in spite of the engine's wide powerband so ready power is always there. A standard rotary drum activates three shifting forks. If you wield a heavy boot, the TT shifts well without the clutch.

YAMAHA TT500







TEST BIKE: 1978 YAMAHA TT500E
Price, sugg. retail.....$1439

ENGINE
Type.....Four-stroke SOHC single
Bore/stroke.....87x84mm (3.42x3.30 in.)
Piston displacement.....499cc (30.45 ci)
Compression ratio.....9.0:1
Carburetion.....Mikuni VM 34 SS
Air filtration.....Oiled foam
Ignition.....Flywheel magneto
BHP @ rpm.....28.58 @ 6000
Torque @ rpm.....25.31 lbs/ft @ 5500
Lubrication.....Dry sump, trochoidal pump
Battery .....none

DRIVETRAIN
Primary transmission.....Spur gear (2.566)
Secondary transmission.....DID 520 T chain (3.466)
Gear ratios, overall...1st 20.973; 2nd 13.840; 3rd 10.592; 4th 8.156; 5th 6.920

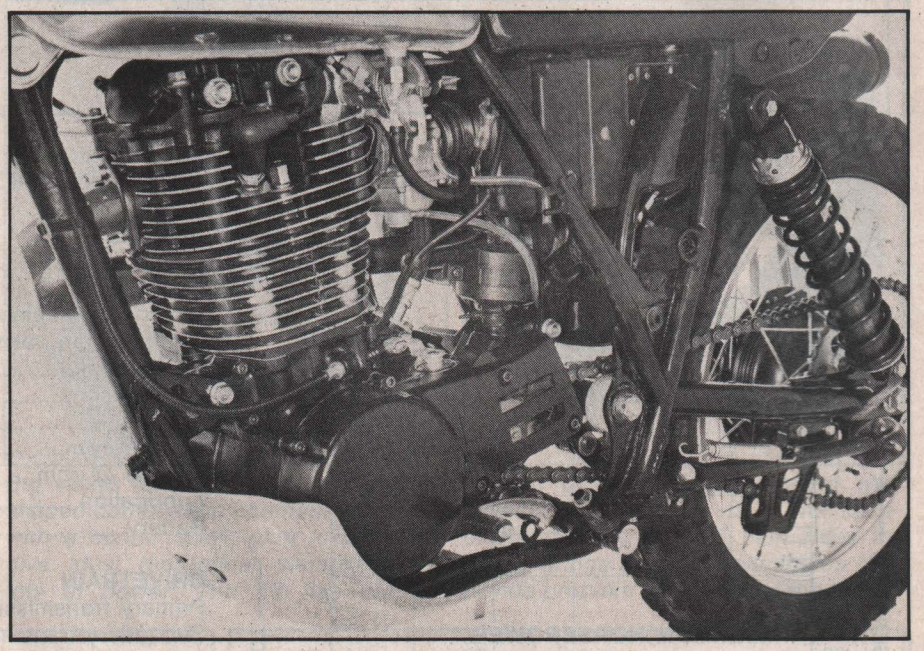
CHASSIS & SUSPENSION
Suspension, front.....Telescopic fork, 7.67 in. travel (195mm)
Suspension, rear.....Swing arm, 6.29 in. travel (160mm)
Tire, front.....3.00x21 Dunlop Sports Senior
Tire, rear.....4.60x18 Dunlop Sports Senior
Brake, front.....5.12 in. dia. (124x22mm)
Brake, rear.....6.30 in. dia. (161.4x25mm)
Brake swept area.....33.32 sq. in.
Rake/trail.....30°/5.19 in. (132mm)
Wheelbase.....56.2 in. (142.7cm)
Seat height.....33.4 in. (84.83cm)
Handlebar width.....34.5 in. (87.63cm)
Ground clearance.....9.0 in. (22.86cm)
Instruments.....none
Stands.....Side
Tire retention device(s).....Security bolts; one front, two rear

WEIGHTS & CAPACITIES
Fuel capacity.....2.3 gal (8.7 liters)
Oil capacity.....2.6 quarts (2.46 liters)
Weight, wet, unladen.....296 lbs (134.26 kg)

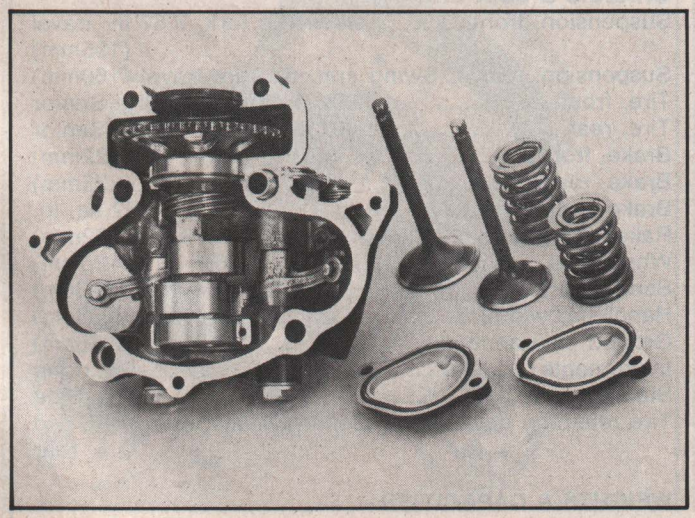
Yamaha TT500

street version which was found to need more finning area to stay cool at sustained high speeds on hot days. This year's gas cap threads from the inside instead of the outside, and the new color is yellow. That's it for improvements. Last year the TT underwent major modifications which put real performance into what debuted amidst considerable criticism. Subsequent sales success and critical acclaim convinced Yamaha to leave well enough alone.

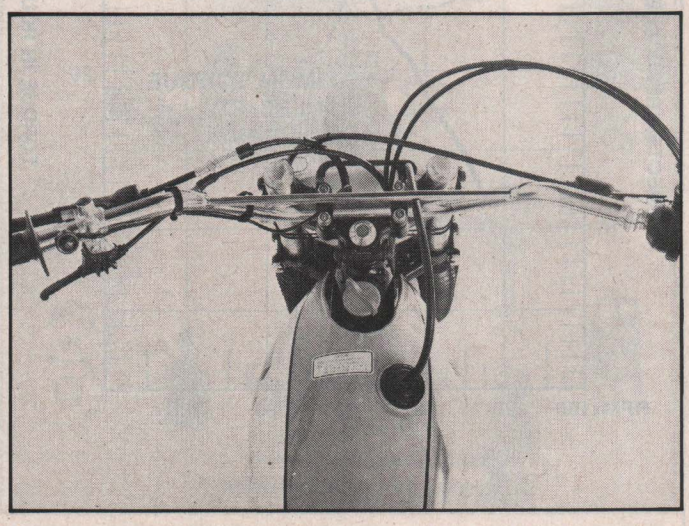
Details of the bike's construction and design have been discussed in these pages several times before. What's important to know is that the bike is fun to ride, quite durable, fairly priced and not particularly hard to maintain. Its appeal comes from all directions and has no definitive explanation. Even youngsters are awed by the traditions which spawned it, though their diapers weren't even shop rags yet when the singles ruled. The feel of big power and raw acceleration, the challenge of taming the beast and mastering its weight, the five-foot rooster tails and easy wheelies, the tinkering with valve clearances and cam chains, the hills suddenly climbed that were never climbed before—all the things that are exciting and different about the bike's personality contribute to its appeal. Whatever mystical attraction that made thumpers all-powerful for 20 years may be found today only in the TT500. Everybody ought to try one once, if for no other reason than to find out if there's a shred of substance in the legend, or if it's nothing but a bunch of sappy nostalgia. Fun research it'll be. *M*



That great lump of finned metal gives the Yamaha its personality and also contributes to its weight problem. But few who ride the TT would want less weight if it meant less power. Fin buttons help make the Yamaha super quiet.



The cam is driven by a chain which must be adjusted externally for slack every 300 to 500 miles. Very simple screw-type valve adjusters are accessible after removing two inspection covers. Gear on cam drives XT tach.



A narrow engine and tank leave plenty of room for using body english to good advantage. Plastic cap adjacent to the steering head covers the filler hole of an in-frame oil tank. Lower lever at left controls a compression release.