

YAMAHA XS360-2D

The 2D is a standard XS360D in econo-trim. You pay less for the 2D—but still get a lot.

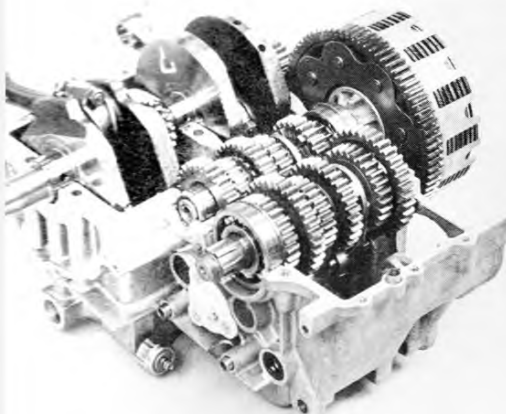
● TAKING A WORD FROM DETROIT'S LEXICON, you could call Yamaha's new XS360-2D a stripper. But this car-biz codeword doesn't quite apply to Japanese motorcycles like the XS360-2D. A Detroit stripper is a machine missing important parts; if you're lucky it still has back seats, ash trays and door handles. On the other hand, while the Japanese have made cuts, they've pared away with a certain restraint. In order to save potential customers \$200 (\$995 list versus \$1197 for the standard XS360D), the "Special Value Edition" has no electric starter, uses a drum front brake instead of a disc, lacks a centerstand and has ordinary turn signals rather than Yamaha's impressive self-cancelling system. But that's it. Otherwise the motorcycle is exactly like the standard XS360D.

Yamaha isn't playing word games with their econo-360: you pay less and you get less, and there's no sense pretending that less is more. Less is less. But to their credit the Yamaha accountants and engineers have not changed or deleted any components that would turn the XS360-2D into a Detroit-style stripper. The comfortable saddle, the supple suspension, the willing single overhead cam engine and the six-speed gearbox all remain.

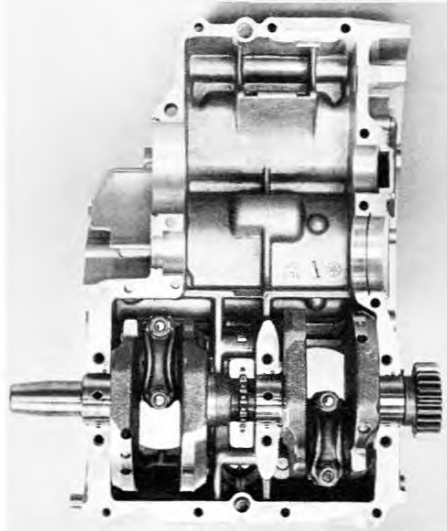
Compact mid-displacement four-stroke motorcycles (350–400ccs) have been sold by the tens-of-thousands for about a decade now, and this category traditionally has been the most sales-active part of the street-bike market. Honda got



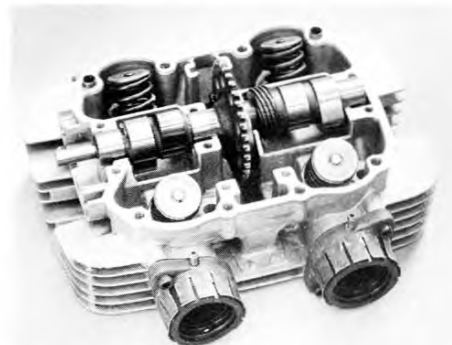
YAMAHA XS360-2D



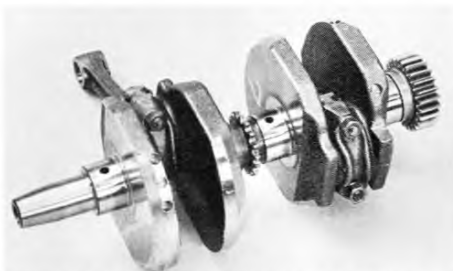
The very orthodox 360 engine splits horizontally, has six-speed gearbox, and no Omni-Phase balancers.



The one-piece crank is shown here in place in the top-half case. Primary drive take-off is on right.



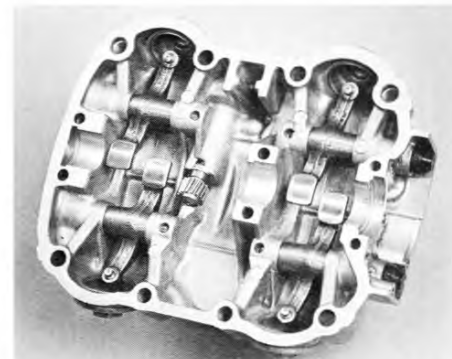
Camshaft runs on three plain bearings. Rubber carb manifolds have spring-steel support collars.



Crankshaft has two-piece rods on plain bearing big ends; crankpins are set at 180-degree intervals.



Standard-type alternator has inner and outer coils in left-side case; rotor spins on left end of crank.



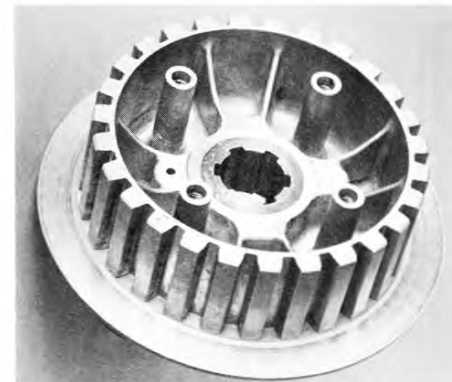
Rockers arms are contained in the cam cover. Tach gear is turned by screw gear on the camshaft.

there first with the original CB-350, and later introduced its successor, the CB-360. Honda's early success encouraged other manufacturers to produce their own compact four-stroke twins, and the anticipation of air-pollution standards—which could be more easily met with four-strokes—likewise spurred Kawasaki, Yamaha and Suzuki into the present CB-360/KZ400/XS360/GS400 class. In this street category manufacturers can no longer ignore the hard facts of the marketplace. While it would be possible for any major maker to build an extravagantly engineered product, an \$1800 motorcycle in this class would probably die in the showroom. For that kind of money, the floor traffic would move elsewhere—to a larger, more sophisticated machine. Price is an important consideration.

Motorcycles built on the twin-cylinder four-stroke pattern with displacements of 350 to 400ccs must deal with several basic and interrelated problems. Four-stroke vertical twins suffer the curse of inherent vibration. There's no way to perfectly balance the pistons, rods and crank assemblies dynamically. The more displacement a four-stroke vertical-twin has, the more severe the vibration problem will be, and the better an anti-vibration system looks. A manufacturer can add a system of counter-rotating weights, but this add-on engineering increases the complexity of the engine and the weight of the motorcycle. Using a different approach a maker

can opt for a smaller engine (a 360 rather than a 400), hold down the weight of the reciprocating masses, set the crankpins at 180-degree intervals, (which produces less-objectionable rocking-couple vibrations rather than the great primary up-and-down shaking of 360-degree twins), and minimize the inherent vibrations as much as possible. Although Yamaha has done it both ways in the past, the company took the latter alternative in the 360 motorcycle series.

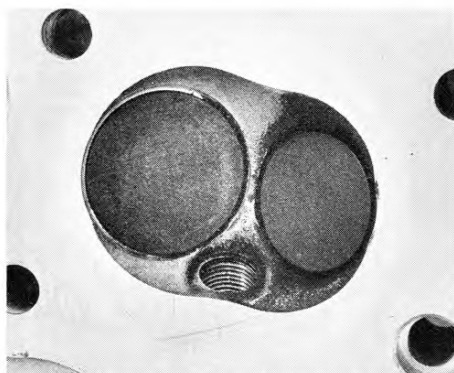
Weight and physical size are other areas in which careful trade-offs must be made when building a compact four-stroke twin. It's important to get the motorcycle scaled correctly to normal-sized Americans. Since 350cc engines are strong enough for serious street (and two-up) riding, the bikes must be big enough for Yankees to fit comfortably, even after a couple of hours and 100 miles on the road. Nevertheless, manufacturers dare not allow the motorcycles to become too large and heavy because obesity will ruin motorcycles that produce only 25 to 30 horsepower. The XS360-2D Yamaha scores well in the weight department. At 364 pounds, wet, it weighs about 15 pounds less than the standard XS360 and about 43 pounds less than Kawasaki's electric-start KZ400. With its modest power the XS360-2D is no dragstrip flash, though it turns the standing quarter-mile in 15.5 seconds with a trap speed of 82.6 mph. By comparison, a KZ400 runs the



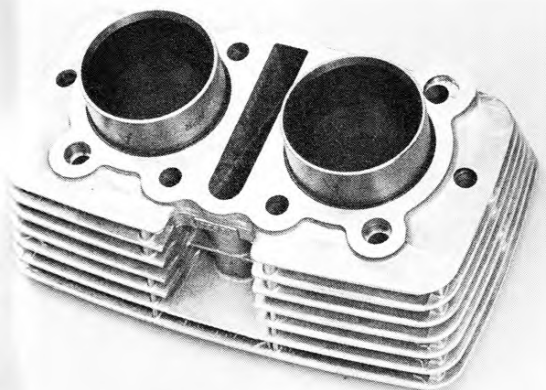
Aluminum clutch hub has steel insert so that gear-box-shaft-splines mate to a similarly hard surface.



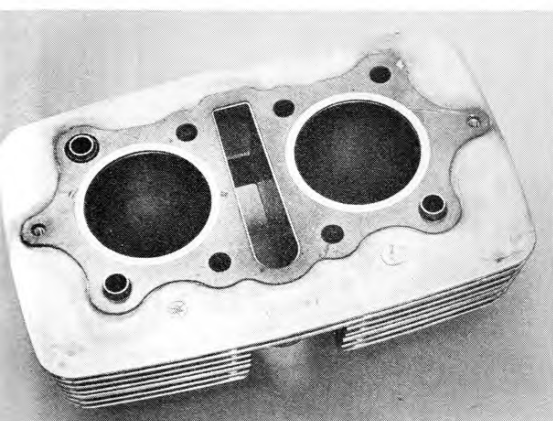
No nut secures the clutch to the transmission shaft. Instead a Seegar ring fits into this groove on shaft.



Closed combustion chamber does not arch over the whole piston top. Intake is 35mm; exhaust 30mm.



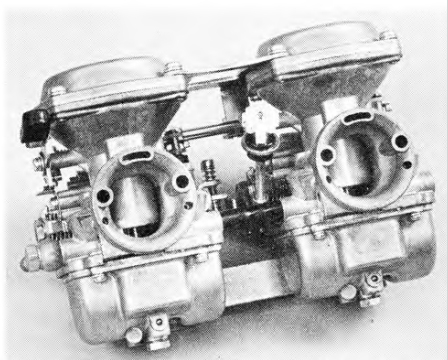
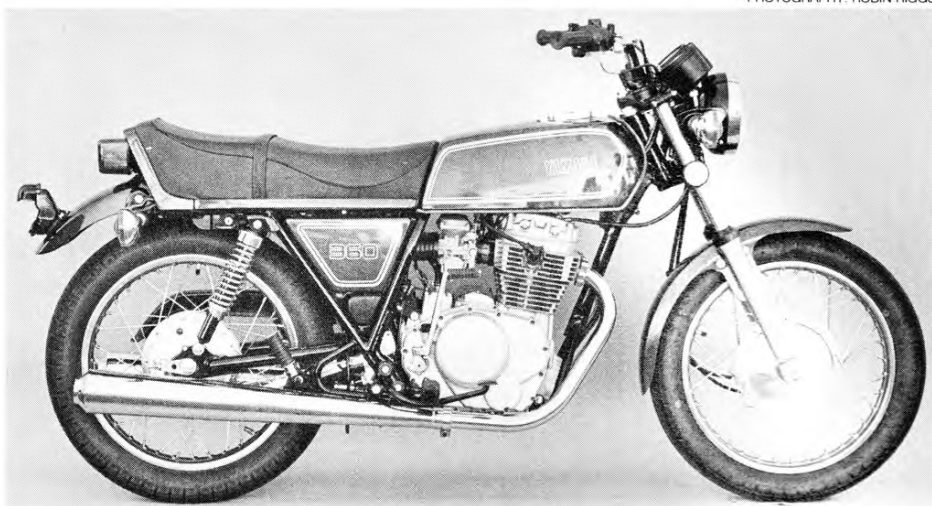
The one-piece cylinder block is held down by eight through-bolts; center cavity contains cam chain.



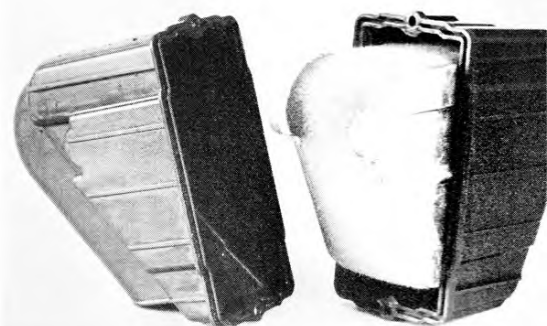
O-ring bolt-hole doubles as oil-feed line. Eight through-bolts and two outboard bolts secure head.



Cast aluminum piston is almost flat-topped, but has a slightly-raised area. Arrow points to exhaust pocket.



Slides in carbs rise as vacuum is created in chambers above the slides. Center knob is joint idle adjustment.



Injected-molded plastic airbox has tongue-and-groove mating surfaces. Element is a cleanable dry foam rubber.

quarter in 15.4 seconds, at 84.2 mph.

Yamaha is ahead of their competitors in getting street-bike suspensions to respond to irregularities in the road. Yamaha has overcome the static friction, or stiction, in their front forks by softening the fork springs and using super-slippery plastic inserts in the tops of the sliders. This combination increases the sensitivity of the front fork to small bumps and prevents tiny road jolts from being transmitted into the handlebars. The 360 fork has two-rate springs; the first four inches of travel are controlled by very soft 22.4 lbs/inch springs, and the final 1.5 inches of travel is handled by 26.5 lbs/inch springs. As for the rear suspensions, in general Yamaha uses softer springs and stronger damping than the current norm for Japanese rear shocks.

In the 360 series the revised Yamaha suspension system is an Especially Good Thing. Street motorcycles in the 350/400 category need all the help they can get to deliver on-the-road comfort. Foam-King saddles are just dandy, but squishy padding can't cure problems created by stiff-legged suspensions. On the freeway, bumps disappear into the Yamaha suspension components, making the XS360 the most comfortable motorcycle of the 360/400 four-stroke twins.

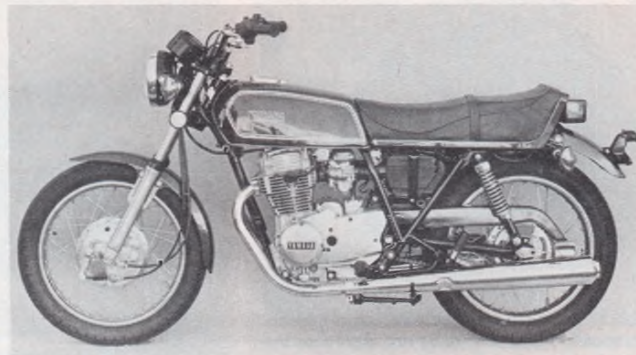
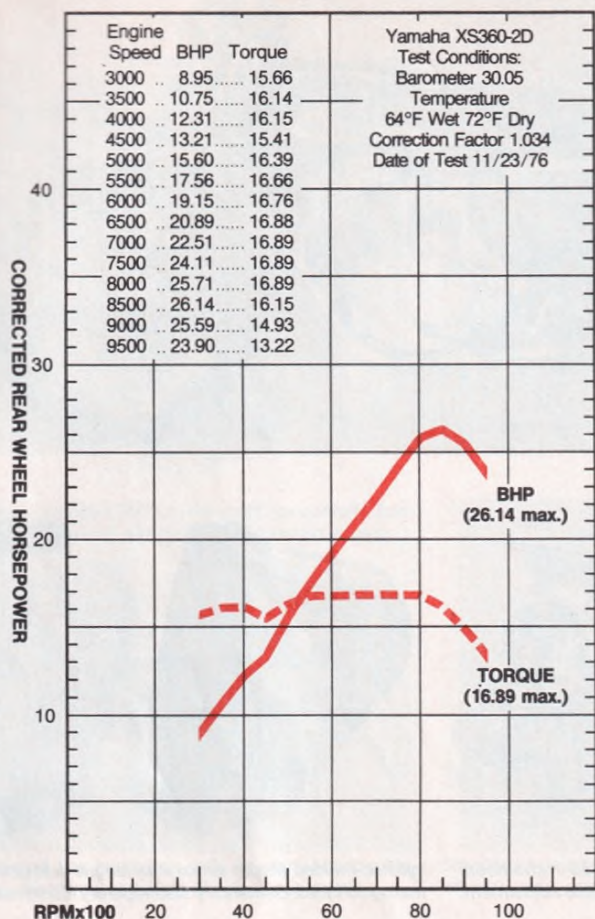
Yamaha has taken steps beyond suspension to insulate the 360 rider from discomfort. Although the rather blocky seat appears to have a distinctly un-

anatomical shape, experience indicates just the opposite. The padding conforms to human posteriors without sinking the rider five inches or letting him bob around in a spongy sea of foam. The thick seat also provides a pretty effective barrier to vibration, although there's some tingling in the saddle at certain engine speeds.

Rubber-mounted handlebars limit the vibration reaching the rider's hands and arms but, happily, the flexible mounts do not give the bars a vague, rubbery feeling. The soft-rubber handgrips are absolutely first-rate for comfort. The footpegs as well as the handlebars feed some vibration through to the rider—enough that you're aware it's there, but not enough to be bothersome.

Riders under six-feet and 175 pounds will find spatial relationships between the bars, seat and pegs ranging from acceptable to very good; riders over six-feet will begin to feel cramped. One staffer pointed out that anyone over six-two will experience the old kiddie-car squeeze inside 40 minutes. In order to hold the dimensions and weight of the motorcycle inside acceptable boundaries for the 360 engine, Yamaha couldn't get the bike sized to really big and tall riders. Football linemen should look elsewhere.

The steering geometry has been calibrated for round-town maneuverability and quick-response highway handling. The steering-head angle is 26.5 degrees; the trail measures 3.2 inches. You can



YAMAHA XS360-2D

Price, suggested retail \$995, POE West Coast

Tire, front 3.00S 18 Bridgestone Super Speed

rear 3.50S 18 Bridgestone Super Speed

Brake, front 7.9 in. x 1.38 in.
(200mm x 35mm)

rear 7.1 x 1.18 in.
(180mm x 30mm)

Brake swept area 60.5 sq. in. (390.23 sq. cm)

Specific brake loading 8.66 lbs/sq. in.

Engine type Four-stroke SOHC Twin

Bore and stroke 66mm x 52.4mm
(2.60 in. x 2.06 in.)

Piston displacement 358cc (21.9 cu. in.)

Compression ratio 8.7:1

Carburetion 2; 34mm Mikuni CV

Air filtration Dry foam element

Ignition Battery and coil

Bhp @ rpm 26.14 @ 8500

Torque @ rpm 16.89 @ 7000 & 8000

Rake/Trail 26.5°/3.19 in. (81mm)

Mph/1000 rpm, top gear 9.9 mph

Fuel capacity 2.9 gal. (11 liters)

Oil capacity 2.4 qts. (2.3 liters)

Battery 12V, 7AH

Primary transmission 3.25 (78/24); Gear

Secondary transmission 2.50 (40/16);
3/8 x 5/8 Chain

Gear ratios, overall 20.31; 14.44;
11.21; 9.14; 7.81; 7.04

Wheelbase 53.25 in. (1353mm)

Seat height 30.0 in. (762mm)

Ground clearance 5.0 in. (127mm)

Curb weight 364 lbs. (165.1kg)

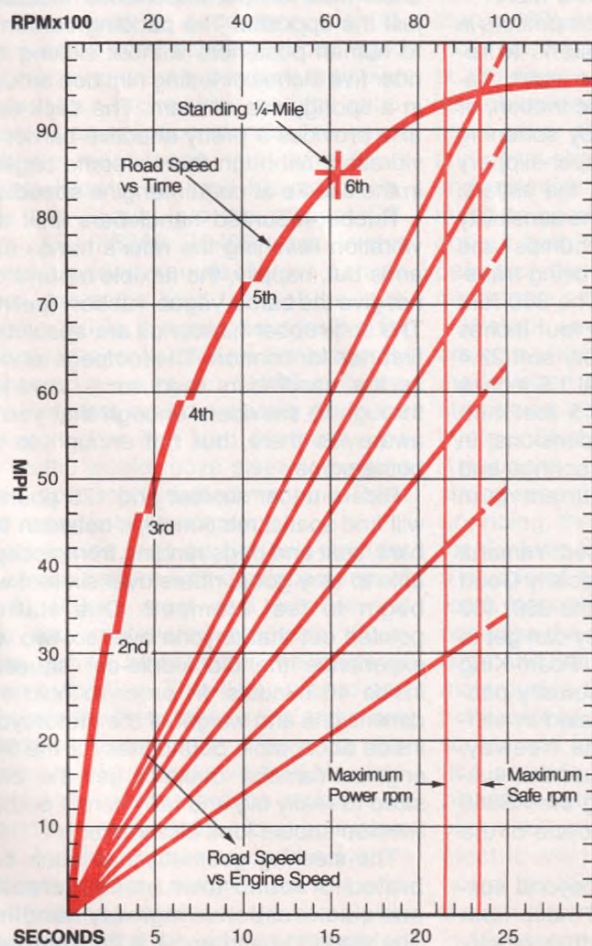
Test weight 524 lbs. (237.7kg)

Instruments Tachometer, Speedometer,
Odometer, Tripmeter

Standing start 1/4-mile 15.53 @ 82.56

Average fuel consumption 43.6 mpg

Speedometer error Indicated 30 mph, actual 31.84
Indicated 60 mph, actual 60.04



The willing engine and compliant suspension are the best parts of the XS360-2D.



YAMAHA XS360-2D

thread a needle with the 360 at legal speeds, so long as you're precise and delicate with your inputs; at 75–80 mph the XS360 became too snappish and sensitive for at least a couple staff members. While the rear shocks had enough damping to suppress really hearty wobbling for lighter members of the staff, another staffer (200 pounds) found the damping insufficient. The bike would begin galloping after hitting small bumps in fast corners. The soft springs and a big payload cut the left-side ground clearance. Dialing up more preload on the rear shock springs helped the clearance problem, but then the fork springs felt too soft compared to the action of the preloaded rear springs. The XS360 was not intended as a back-road carving instrument.

Humming along at 60mph in sixth gear has the engine turning just about 6000rpm, a comfortable speed for the motorcycle. With six speeds the bike has a cog for any occasion, and the 360's very nice clutch has a broad engagement arc and light draw. The complete rev-range is available, right up to the 9300-rpm redline. Neither vibration nor mechanical reluctance discourage a rider from using the 6500–9300 rpm zone. On the contrary, the engine feels very willing; it thrives on



revs though it never seems at all peaky.

The twin 34mm Mikuni constant vacuum carburetors will not permit an enthusiastic rider to momentarily overcarburete and bog the engine. The carbs have the 360 pulling cleanly and strongly from off-idle to redline. The only drawback to the CV carburetion is the rapidity with which the units shut down the engine when the throttle is rolled off. The soft front springs and the inevitable Japanese drive-train slop accentuate the roll-off effect in the 360's carburetion.

The engine, together with the compliant suspension, is the best part of the XS360. Simple and straightforward, the single overhead cam engine follows established Japanese practice, and shows a more restrained approach in street engine design than some earlier efforts from Yamaha. By comparison, Yamaha's 500 twin—with four-valves per cylinder and Omni-Phase balancing—seems radical, even though the 500 was designed and introduced years before the 360. But simple engines have a couple of important advantages: they're less expensive to build and a lot easier to service.

The XS360 engine is not without its interesting features. The 66mm bore (52.4mm stroke) committed Yamaha to a pretty expansive combustion chamber, at least potentially. In order to get the compression up to the desired 8.7:1 level, Yamaha could have used open combustion chambers with high-dome pistons. This approach might have necessitated complicated and expensive pistons, and/or made it difficult to achieve good flame propagation in the combustion process. Yamaha had a more direct solution, closing up the combustion chamber, by making—in very rough terms—two half-spherical pockets connected by an alley. Around the 35mm intake valve the chamber measures about 48mm across at the bottom of the cylinderhead, then necks

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A unique concept—the Air-Shock replaces the conventional and limited coil-spring with an infinitely adjustable "Air Spring"—putting convenience, comfort and control at your fingertips.

The "Air Adjustable" concentric air spring finally makes it possible to have a "spring-rate" low enough to take advantage of the nice soft ride it affords. Simply inflate or deflate it to suit any possible riding style and condition—quickly and easily compensate for drastic load changes; passengers, luggage or aggressive riding through corners. And because "The Air Adjustable" is naturally progressive, you enjoy a very comfortable ride. And you won't bottom out.

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down to 46mm between the valves, and opens up again around the 30mm exhaust valve. The pistons have very slight domes which fit into the 23cc combustion chambers.

Yamaha's approach yields a very compact combustion chamber that's easy to manufacture. Of course the valves are shrouded, and the engine might breathe better with a different kind of combustion chamber, but that's of no great consequence. The XS360 isn't a racing engine; it only has to make a usable, reliable 25 horsepower, and that it can do within its rpm-limits.

In other places the engine follows convention. The rocker arms are carried in the camshaft cover; the camshaft, riding in plain bearings, is driven by a single-row cam chain that runs up a cavity between the cylinders; the contact-breaker ignition points mount off the left end of the camshaft; two-piece connecting rods have plain-bearing inserts in the big ends; the one piece crankshaft turns on three plain-bearing mains; a gear-primary runs off the right side of the engine, while the rotor for the alternator fits on the left side of the crankshaft.

The XS360 engine has its cam-chain tensioner in the cylinder head hidden under the camshaft cover. It's sandwiched between the intake valves and behind the cam-chain sprocket. A spring and plunger bear on a long spring-steel chain guide with a scuff-shoe, which keeps tension on the camchain. On the opposite side of the cam-chain cavity, there's another chain guide running from the cylinder head down to the block.

The electric starter in the XS360D is located behind the cylinder block in a depression in the main case, and the starter chain runs down to a sprocket located behind the alternator. Of course the electric starting apparatus is missing in the XS360-2D, but the cases are the same in both versions of the 360.

Kickstarting the Yamaha is either a first- or second-kick situation, or an endeavor of six or seven passes. In part, quick cold-starts (35–40 degrees F. California "winter" mornings) depended upon pushing down the cold-start carb-lever just far enough—but not too far. Furthermore, the kickstarter mechanism doesn't always engage near the top of the lever's arc, and a quarter-kick won't start the 360. So you should manipulate the lever and turn the engine over until the kickstarter engages at a point which will give you a full swipe. The starter ratio is not perfect; that is, even a full swing will only turn the crank two revolutions. Careful readers should note that Yamaha's showroom brochures contain an error, stating that the Special Value Edition has primary kicking that allows the rider to start the engine in any gear. In this regard the Owner's Manual contains the correct information—"This model cannot be started unless the transmission is in neutral."

You might suspect that the substitution of a 200mm twin-cam drum brake for the 360D's disc would have constituted an unwelcome change. True, it took a few miles to get used to a front drum brake's self-servo effect, especially after becoming accustomed to disc brakes which have a very linear relationship between hand pressure and braking force. Even repeated, hard applications failed to get the drum brake to fade, and it is powerful. The brake did, however, feel a little less sharp and crisp at the end of our test period than at the outset.

The centerstand was sorely missed. Without it chain adjustment becomes a nuisance; you must hunt around for an appropriate box to place under the bike in order to elevate the rear wheel. Trying to adjust the chain without a box makes the task a two-man operation. With neither a box nor a helper, you've got a good chance of cocking the rear end and getting the rear wheel out of alignment. Lubing the chain also becomes a hassle without a centerstand because you must apply lube to a section of chain, and then roll the bike forward and lube the next section of chain.

This centerstand-economy raised the same question again and again: couldn't Yamaha have saved the money elsewhere? For the centerstand we would have traded the sidestand, the tachometer and a warning light to be named later. Most XS360-2D owners would probably want full instrumentation (looks sporty) and the sidestand (easier to use than centerstand); the chain would simply be ignored or serviced by the dealer.

As a practical matter, before purchasing the XS360-2D the potential buyer should be certain that he can start the motorcycle without undue difficulty, and he should persuade himself that, among other things, he doesn't need an electric starter. Convinced of that, the dollar-wise shopper will conclude the most significant thing that's been stripped from the XS360 is \$200.

