

Cycle

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New 650cc Benelli Scorch



BENELLI 650

Combining more advanced design concepts, a promise of diamond-hard durability, and a pennypincher's price tag, this new Benelli just might score against its well-entrenched competition.

Two mechanics rolled back a great door and disappeared into the hangar-like building. From somewhere inside we could hear the incredible whine of a four-cylinder racing engine turning something like fourteen grand. Must be on a dyno stand, I thought, for the note never varied. The mechanics reappeared one at a time through the door, each pushing a motorcycle. The first was a big twin with an aluminum-colored frame and paneling in a sort of British racing green. The machine was clean, but looked as if it had been worked hard. Its footpegs appeared to have been chopped off at the tips by a buzzsaw—or maybe by some very hard cornering. The other machine was immaculate, similar to the first in design, but with a new paint job in cobalt blue. While the mechanics went back inside for helmets and goggles, we were briefed in Italian on the operation of the bikes. Our translator struggled against the noise from the dyno room and the noise from the track, a bare six feet from our idle machines. Then I put on the helmet and gloves and took a couple of laps around the track. Left foot brake, right foot shift. Good front stopper. I easily passed smaller machines making break-in runs on the tiny oval. Finally I signalled Fattori who was waiting on the green machine and he sped out the gates into the city of Pesaro and from there up into the mountains along the Panoramic Drive.

The occasion was our first test of the new Benelli 650, this month's cover bike, and the location was the Benelli factory at Pesaro, Italy. Although unveiled at a European motor show almost two years ago and advertised a few times here by the U.S. importers, Cosmopolitan Motors, the new Benelli has never been offered to the public. The reasons lie somewhere in the labyrinth of corporate financing, tooling, and marketing, but the motorcycle is real and it is a good one. Benelli is the second largest producer of motorized two-wheelers in Italy (second to Piaggio, who makes Vespa), a flourishing, family-run, European-style company that wants very much to succeed as well in the intensely competitive U.S. market as it has succeeded in Italy. The new bike is aimed at buyers who now flock to big British twins. What Benelli hoped to offer was a stronger, more modern engine, better handling and braking, and a lower price than the British twins. The goal was also a "sporty" image: low weight, good acceleration, and a lean-and-hungry look.

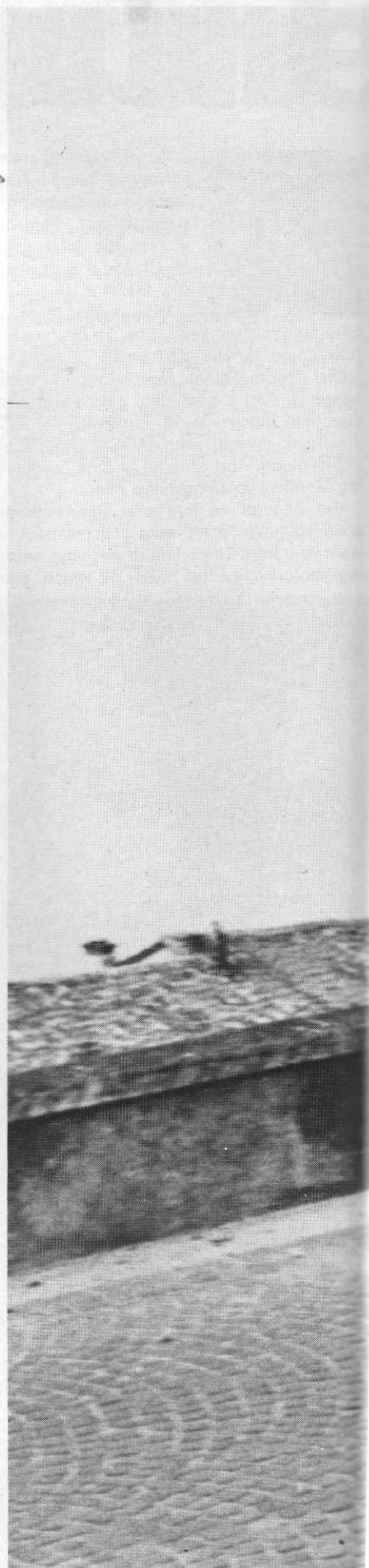
A mistake Benelli made and hadn't quite realized when we got to Pesaro was that

you don't out-English the English by being more English. Benelli's stylists had fastened on the racy look of Rickman's popular "Metisse" kits, creating a frame and general configuration that was almost identical. Only later did someone realize that buyers would think of a copy as a copy, of a less-expensive imitation as a cheap imitation. They also may have realized that the best stylists in the world live in Italy. In any case a face-lifting job has been done on the 650; it now looks more like its own machine and can set busily about establishing its own identity among U.S. riders. Meanwhile nothing has been done to alter that all-new and very original powerplant.

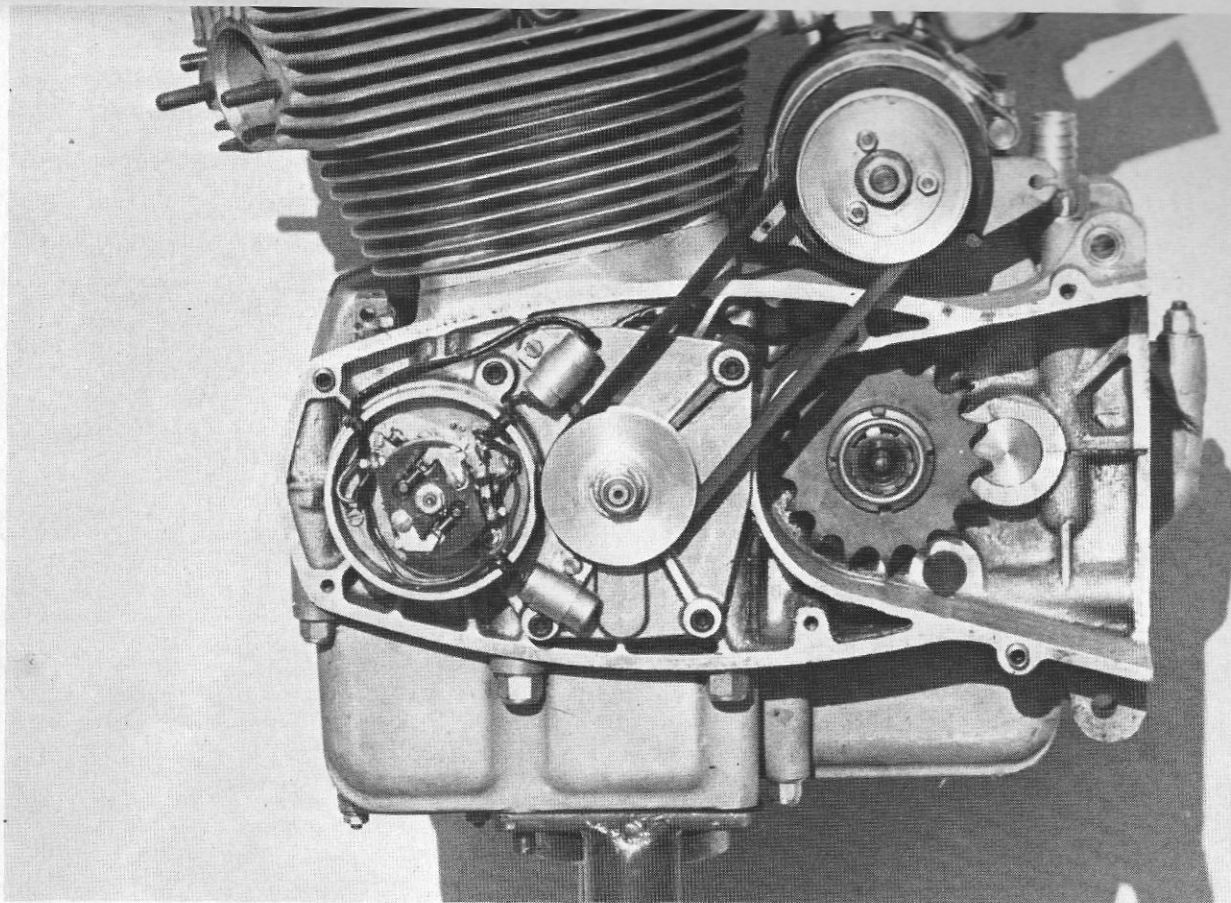
From the very beginning, Piero Prampolini, Benelli's chief designer, wanted a clean, oiltight engine without the usual British and European assortment of external oil lines arcing back and forth between reservoirs and oozing at every joint. For this reason, as well as for serviceability, he chose a horizontally-split crankcase which holds its engine-gearbox oil in a sump at the bottom. An elaborate pressurized lubrication system forces oil at 130 qts/hr. through internal passages to all the principal bearings and bearing surfaces. In Japanese fashion, the crankcase splits right along the centerline of the various shafts. Lifting off half the case reveals the camshaft, crankshaft, and transmission shafts all in a row, resting in ball and roller bearings. Very simple and very robust.

Both the camshaft and the clutch shell are driven from the crank by massive helical-cut gears. A small tube from the oil pump directs a steady stream of oil into the primary mesh between crankshaft and clutch, keeping the gears quiet as well as lubricated. The driveside main bearing is a double-row ball-type to take the lateral (push-pull) thrust of the helical gears in addition to the normal radial thrust of crank operation. Between the two center main bearings, where an ohc engine would normally have its cam drive, Benelli has located a flywheel.

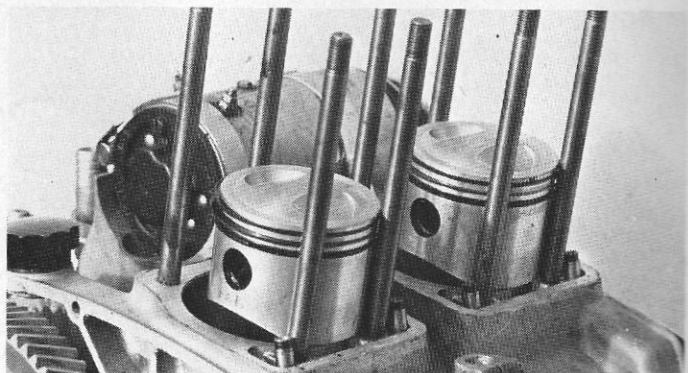
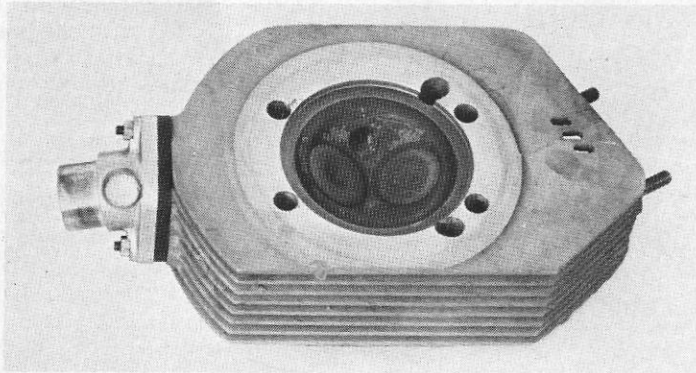
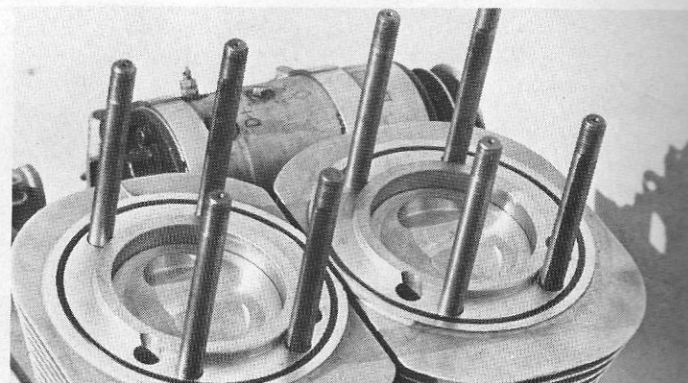
The new 650 features an incredible 84 x 58mm bore-stroke combination—oversquare with vengeance. A very short stroke keeps connecting-rod and pushrod masses low, contributing to higher rpm capacity and greater output. In stock tune, the 650 delivers 50 bhp at 7200 rpm—but a Stage II tune is available that offers 60 bhp at 8200 rpm. Very few big-bore pushrod twins will comfortably rev over eight thousand rpm. That large bore also provides room for large valves (38mm intake, 35mm







Disassembly of new Benelli 650 engine begins with removal of lefthand cover for access to ignition and generator drive components. Huge 140 watt Bosch dc generator may eventually feed battery for electric start. Breather outlet behind generator prevents buildup of crankcase pressure and virtually eliminates seepage at gaskets and oilseals. Automatic ignition advance mechanism is driven at half engine speed on end of camshaft. Breaker points in battery-and-coil system are independently adjustable for precise timing. Generous oil sump holds more than three quarts, eliminates need for remote tank.



Disassembly of upper end reveals some stock Benelli rocker gear that appears on other models. Big 27mm Dellorto concentrics are brand new for this model. Cylinderhead mating surface has wide lip for metal-to-metal contact and thus maximum heat transfer. The O-ring seal stops oil seepage from pushrod tubes and provides additional pressure barrier. Extra large bore leaves room in cylinderhead for big valves and a large squish area for efficient combustion. Stock 9.5:1 pistons are not highly domed and shouldn't develop hot spots. Massive cylinder studs reflect general design sturdiness.

BENELLI 650 *Continued*

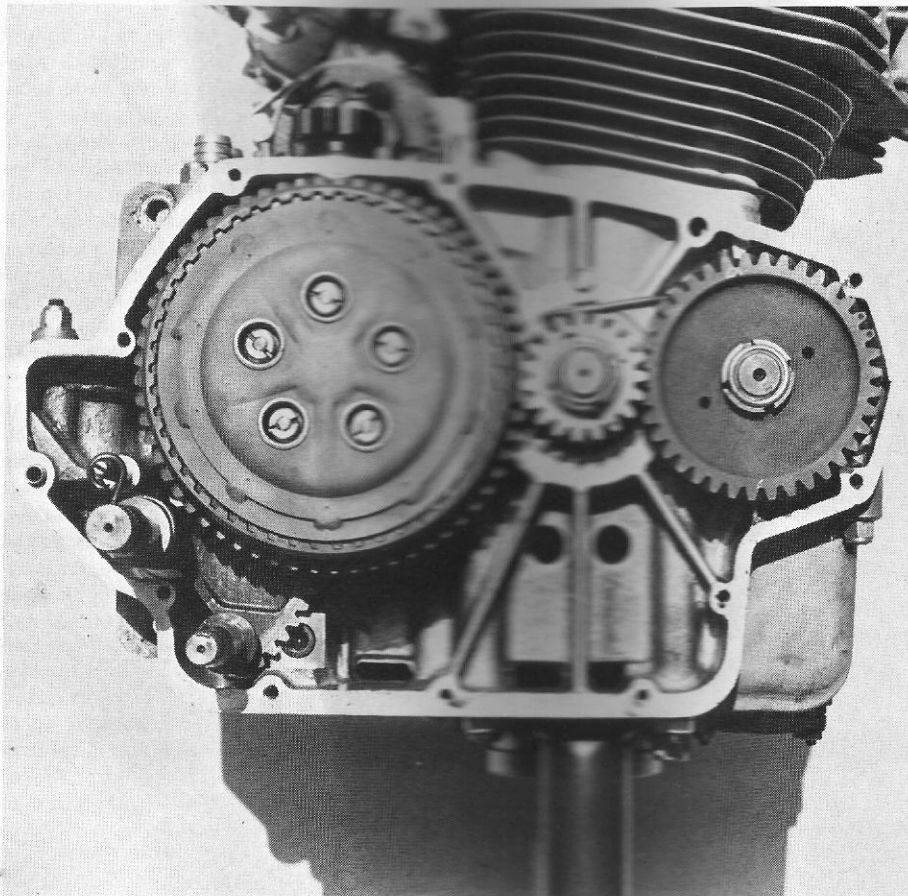
exhaust) and thus adequate breathing at those speeds. A final benefit from this bore-stroke combination is that overall engine height is reduced. Prampolini could therefore get away with his deep, three-liter sump without producing an engine too tall for a practical frame.

The Benelli's clutch is a conventional wet multi-plate unit, feeding into a sturdy five-speed gearbox. Internal ratios are 2.381, 1.452, 1.000, 0.862, and 0.751, giving a wide, even spread for general street use. The 650's output provides 26 bhp way down at 3000 rpm in stock tune, indicating an unusually wide power spread. This is certainly not an engine-gearbox combination that has to be kept on the boil for brisk performance: Stock gearing is definitely chosen for flexibility rather than top speed and there is enough overlap in the gears that you don't have to keep your mind on precise engine-speed-gear-matching all the time.

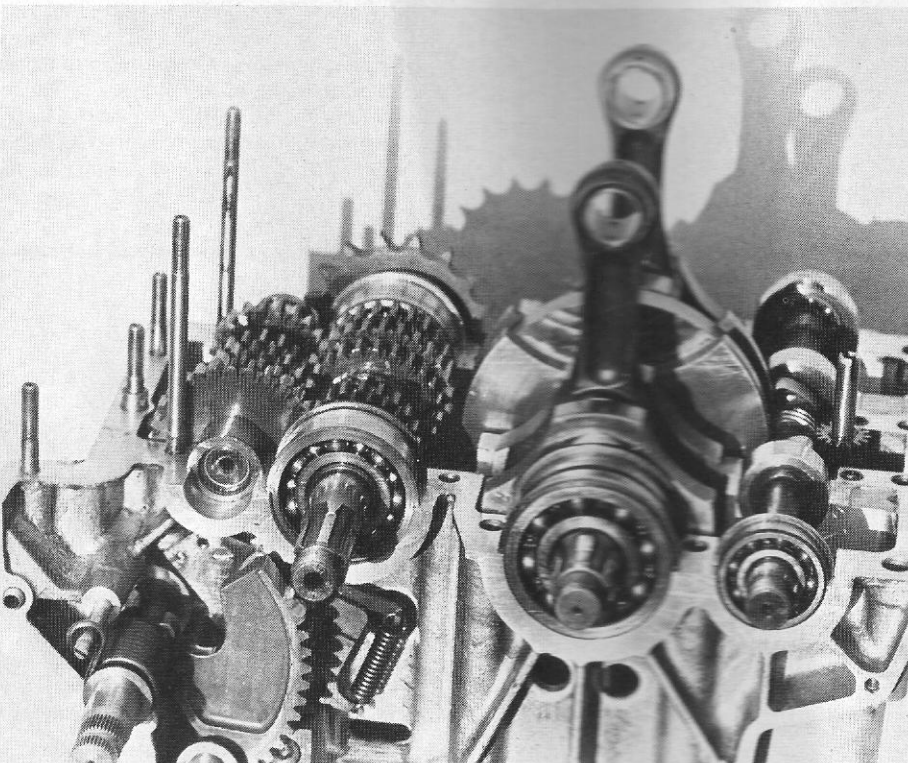
Despite the conspicuous thievery, Benelli's Metisse-type frame did its job with great success. Those struts that tilt forward from the swingarm-pivots provide a very rigid load path to the steering head and hence good handling. For the main cradle, tubing of 32mm outside diameter (over 1¼ inch) and 1.5mm wall thickness is used. The result is a very stiff frame and a very light one. When Benelli elected to modify this frame for the current model, its designers removed the side struts and created a sort of box-section backbone. In theory this configuration is not quite as rigid (though it is standard on many big twins). We know that the first handling package was an excellent one and we very much doubt that Benelli's engineers would sacrifice this for the sake of styling.

The forks, brakes, and rear suspension of the Benelli remain unchanged and they are all very functional production units. That twin-cam front stopper is over nine inches in diameter and will haul the big twin down from the ton with its tire howling. Made by Grimeca of Italy, it is the same brake that appears on the new American Eagle 750. The forks are suspiciously Ceriani-looking, but are made by another Italian firm. They have over 4½ inches of travel on compression and about two on extension, and they track very well on both smooth and rough pavement. A friction-type steering damper is provided for high-speed riding but it proved unnecessary.

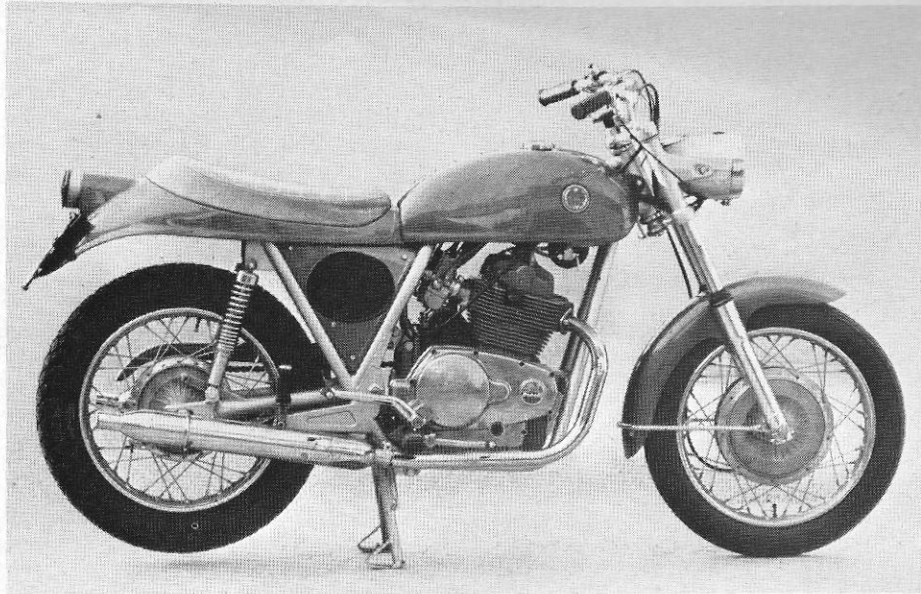
If there was any conspicuous flaw in Benelli's new creation, it was in the electrics, and much has been corrected since our test. The huge Bosch 180 watt generator works superbly and is very reliable. It is also large, heavy, and a bit of an eyesore on an otherwise clean engine-gearbox. Bosch ignition (battery and coil) also worked superbly, providing easy starting with one or two prods. The lights on our test machine were small and poor, but these have now been replaced with good units



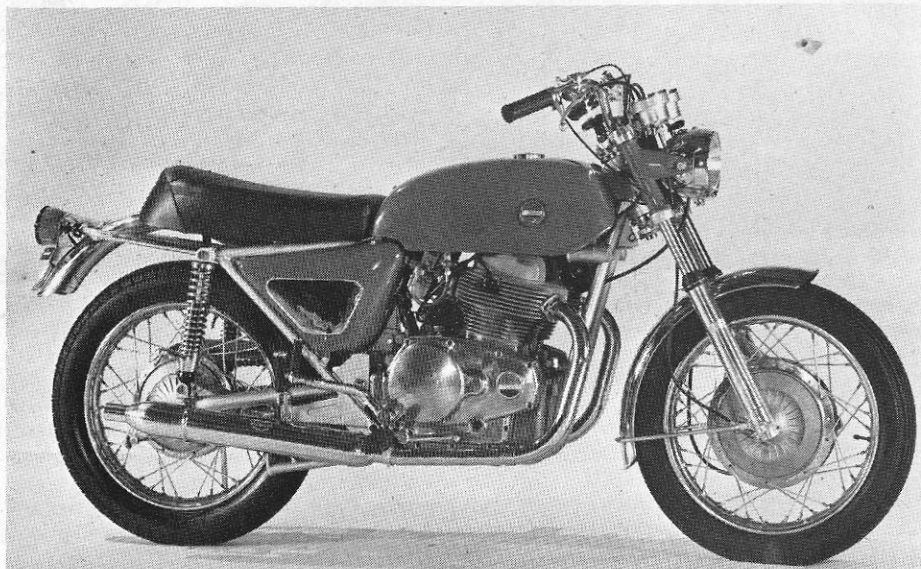
Removing righthand cover reveals massive helical-gear primary drive and camshaft drive. Note small tube that directs a constant stream of oil into primary mesh for quietness and longevity. Extensive baffling in oil sump minimizes oil surge and foaming. Both crank and transmission share common oil supply, which also serves heavy-duty wet clutch. Oil pump circulates over 130 quarts per hour.



Horizontally-split crankcase separates along shaft centerline. From left to right are camshaft, crankshaft, and transmission shafts—all in multiple ball or roller bearings. Note heavy flywheel between center main bearings to smooth out power pulses. Five speed gearbox provides even spacing for general street use; overall gearing gives 112 mph at power peak (7200 rpm) in fifth gear, 96 in fourth.



Tested Benelli 650 prototype above has been restyled into the model below for U.S. consumption.



from Bosch. Only the mickeymouse control switch at the handlebar remains to complain about. It is one of these little cubes with switches for various components sticking out various sides. It looks lumpy, old-fashioned and extremely vulnerable to water. A somewhat similar complaint holds for the bolt-on choke lever at the right side of the handlebar. We like the way Japanese and other manufacturers have been modularizing their controls into a single clean unit at the left and right. Since Benelli has borrowed good ideas from several sources, why not this also?

Eventually, we are told, the Benelli 650 may be equipped with an electric starter, and that is part of the reason for the big generator. Electric starting is an asset on any bike if the price in weight is not too great. Meanwhile we like the lightness and leanness of the existing machine and experienced no starting difficulties using the kick lever. The carburetors, two brand new 27mm concentric-floatbowl types from Dellorto, have a built-in starting mixture system that bypasses the regular fuel-air metering system. That handlebar "choke" opens the starting system. Since this is never used while riding, we think it should be moved off the handlebar altogether and down onto the carburetor bodies. Dellorto does make a model with a small flip-on lever and these could be connected with a synchronizing bar *à la* Honda for a cleaner layout up front and no loss to starting convenience.

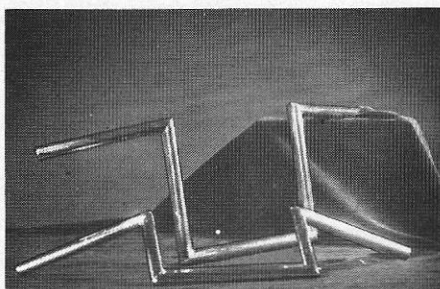
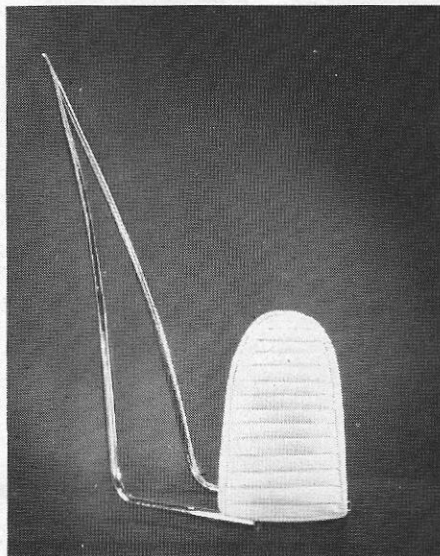
Detail improvements aside, it is the ride that matters most from a motorcycle. Therefore we were eager to get the big machines out on the road. Fattori led the way into the mountains as I continued to adjust to the feel of the bike. On Pesaro's Panoramic Drive you familiarize fast. The road climbs steeply upward, then snakes along a course northward, roughly parallel to the

(Continued on page 78)

BENELLI 650

| | | | |
|-------------------------|------------------------------------|------------------------------|----------------------------|
| Price, suggested retail | East Coast, POE \$1389 | Mph/1000 rpm, top gear | 15.9 |
| Tire, front | 3.50 in. x 18 in. | Fuel capacity | 2.8 gal. |
| rear | 4.00 in. x 18 in. | Oil capacity | 6.7 pt. |
| Brakes, front | 9.11 in. x 1.125 in. | Lighting | Generator, 180 watts |
| rear | 7.75 in. x 1.125 in. | Battery | 12 v, 12 ah |
| Brake swept area | 59.17 sq. in. | Gear ratios; overall | (1) 15.48 (2) 9.44 |
| Specific brake loading | 9.85 lb/sq. in. | | (3) 6.50 (4) 5.60 (5) 4.88 |
| Engine type | Fourstroke pushrod twin | Wheelbase | 56.3 in. |
| Bore and stroke | 3.31 in. x 2.28 in., 84 mm x 58 mm | Seat height | 31.0 in. |
| Piston displacement | 39.3 cu. in., 643 cc | Ground clearance | 8.4 in. |
| Compression ratio | 9:1 | Curb weight | 407 lb. |
| Carburetion | (2) 27 mm, Dellorto concentrics | Test weight | 582 lb. |
| Air filtration | Paper element | Instruments | Speedometer, tachometer |
| Ignition | Battery and coil | Standing start ¼ mile (est.) | 14.3 seconds—90 mph |
| Bhp @ rpm | 50 @ 7200 | Top speed | 105 mph |

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BENELLI 650 *Continued from page 38*

coast. Because the main highway is down at sea level, almost no one uses this difficult mountain route. What makes it ideal for motorcycling is not only a scarcity of traffic but also smooth pavement and a path that winds, dives, twists, climbs and loops in a manner not to be believed.

Now I do not ordinarily corner an unfamiliar bike to the footpegs, and when I began to hear them scraping I assumed that the Benelli had been built too close to the ground or its footpegs were badly located. Neither proved true. Chris Fattori, it seems, is a former Argentine roadracing champion. Although he was holding back, he does like a brisk ride. It didn't take long to get in the spirit of things and I soon found myself throwing the big Benelli from peg to peg in the esses—and loving it.

It helped not to have to shift a lot. The engine is a real torquer and I was riding almost entirely in second and third (at 7200 rpm this gives 58 or 84 mph). Gearchanging on the blue bike was a bit stiff but the handling admirable. The green bike, showing 45,000 miles, was much smoother, but damping in the front forks had gone a little funny. Like most large-displacement vertical twins, the Benelli 650 is a little coarse in nature. Vibration, especially on the newer machine, would definitely have been more noticeable if we weren't doing all that white-knuckle cornering. Acceleration and throttle response were excellent.

When the mountains gave out near Rimini, the Panoramic Drive looped back down to earth, depositing us at an entrance to one of Italy's no-speed-limit *autostradas*. We waited until our chase car caught up with us, then moved on. We must have



ridden nearly ten miles flat out. That, as indicated on the speedometer of our chase car, averaged at a little over the ton. (At 7200 rpm in fifth, calculated speed is 112, so the bikes are slightly overgeared.) The green bike with all that break-in mileage proved to be slightly faster on the top end. In general, high speed handling and performance were excellent. Steering was very precise without use of the damper and no tendency toward speed wobble showed itself. Fourth gear is good right up to 98 mph and proved to be just about right for passing at highway speeds. Fifth is an ideal flat-country cruising gear, for at 70 or 80 mph the tach is standing just about at the torque peak at 4800 rpm, where the engine works at maximum volumetric efficiency. Expressway riding has its limits as far as

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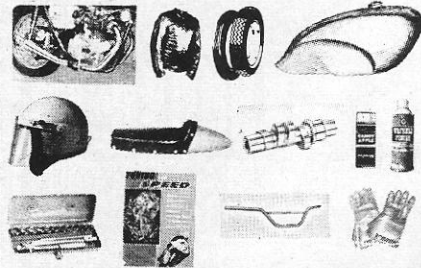
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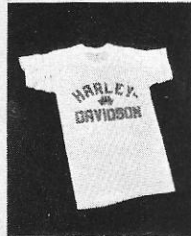
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BENELLI 650 *Continued*

motorcycling goes, but if you buy a big bike you want to know that it will measure up to long-distance work at high cruising speeds. The new Benelli 650 presents no problems in this department.

The new Benelli is a late comer to the big-bike scene and it will face some very stiff competition. Not only are there several well-established 650s around, but a whole new generation of 750s is on its way. Riders who don't want the weight, complication or cost of the multis will still probably buy vertical twins. The Benelli features many design advances over most of its competitors and at \$1400 it is less expensive. It will have to establish its own service reputation but it seems well prepared to do so. Here is an all-new, moderately priced and well-styled motorcycle. For openers, a new owner could always challenge his rivals to ten miles flat out. Though neither legal nor sensible, it's nice to know you've got a machine strong enough to take that kind of abuse.

—John P. Covington

SACHS 100 & 125 *Continued from 55*

through and are welded to both sides of the swingarm tube.

Rearward support for seat, shock absorbers, exhaust system, and fender is formed by a pair of A-shaped tubing assemblies welded to the downward bend in the frame backbone. A chrome-plated high-tensile rear fender is fastened to the tubular frame substructure with U-shaped steel straps. Everywhere a bit of hardware is hung on the Sachs, it is asked to stay put with a high-tensile bolt and aircraft-type lock nuts. Removing an 8mm bolt from under the front of the seat allows the seat to swing back on the hinge that holds it to the fender. A carburetor silencer cum air-cleaner assembly lies under the seat between the two A-shaped sub-frame extensions. Simply removing a wing nut from the top of the black, pyramid-shaped box reveals the Fram paper-element air filter. Several features of the silencer-cleaner show it to be the result of much experimentation to obtain maximum possible air filtration with minimum flow restriction. Air entrance to the filter box is limited to a narrow slot by the close fit of the removable top. The slit, which leaves equal space around the 16-in. perimeter of the box, is effective against splashes of muddy water and bigger pieces of debris. Since the treated paper-type filters are about 65% impaired when they get wet, possibly one of the foam-type filters would work better in some of the wetter parts of the country. Once past the filter, air goes into the large hollow box, which means that the air doesn't have to change directions abruptly as soon as it enters. A small plenum chamber! The air outlet to the carburetor is nicely belled to avoid turbulence and eddies as the air picks up speed. The connector tube between the cleaner and carb passes right though the frame backbone tube. The filter tube which passes through the backbone is welded at the tube joints to prevent weakening of the frame.

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