BMW R80/7

The purist's BeeEm: a motorcycle without sugarcoating.

Not too long ago, BMWs were the *wunderkinder.* The big black German flat-twins could cruise effortlessly all day at a pace that would reduce other motorcycles to heaps of scrap metal and leave the riders of those motorcycles feeling as though they'd been turned to Jello. Many of those other motorcycles were quicker sprinters, handled better and cut a more studly image at the local A&W, but the silent, shaft-driven Beemers with their unmatched reputation for reliability were the kings of the open road.

Things have changed, and so have the BMWs. The engine design is the same basic horizontally-opposed twin plugged into a shaft final drive, but most of the rest of the bike is different. Now there's a telescopic fork, a five-speed gearbox, a bigger standard tank, an almost sinful selection of bright colors and countless detail improvements. The most important change is to the engines. By next year, the *smallest* BMW imported to the U.S. (the all-new 650) will be bigger than the old R60 series, the biggest Beemers available ten years ago. These changes have created a new, sportier image for BMWs, although without compromising their reputation for reliability.

Yet even with all the changes, BMWs are nearly the same as they have always been. Of course, while the German marque has stayed with one basic design, the Japanese have built singles, Vee-twins, horizontally-opposed fours and vertical twins, triples, fours, and sixes. Not only are many of these bikes faster and more attention-getting than BMWs, but many of them have equalled or surpassed the Beemers in terms of reliability and comfort. And none of the Japanese makes suffer from the economic situation which has raised the cost of BMWs (and all German goods) to breathtaking levels.

Despite these handicaps, BMW has managed not only to survive but to produce a product which many motorcyclists regard as the most desirable available, if somewhat overpriced. The firm now limits itself to big-bore street machines, the most successful area of the motorcycle market these days. Following that trend, BMW has entered a slightly different displacement field with its new 797-cc R80/7, which is simple one of the older 746-cc R75/7s with its cylinder bore opened up another 2.8 mm to 84.8 mm. The 800 has inherited the traditional 70.6-mm BMW piston stroke and the same 32-mm constant-velocity Bing carburetors found on the R75/7 and the R100/7. And except for badges, decals, and color the R80 is externally indistinguishable from either of those two motorcycles.

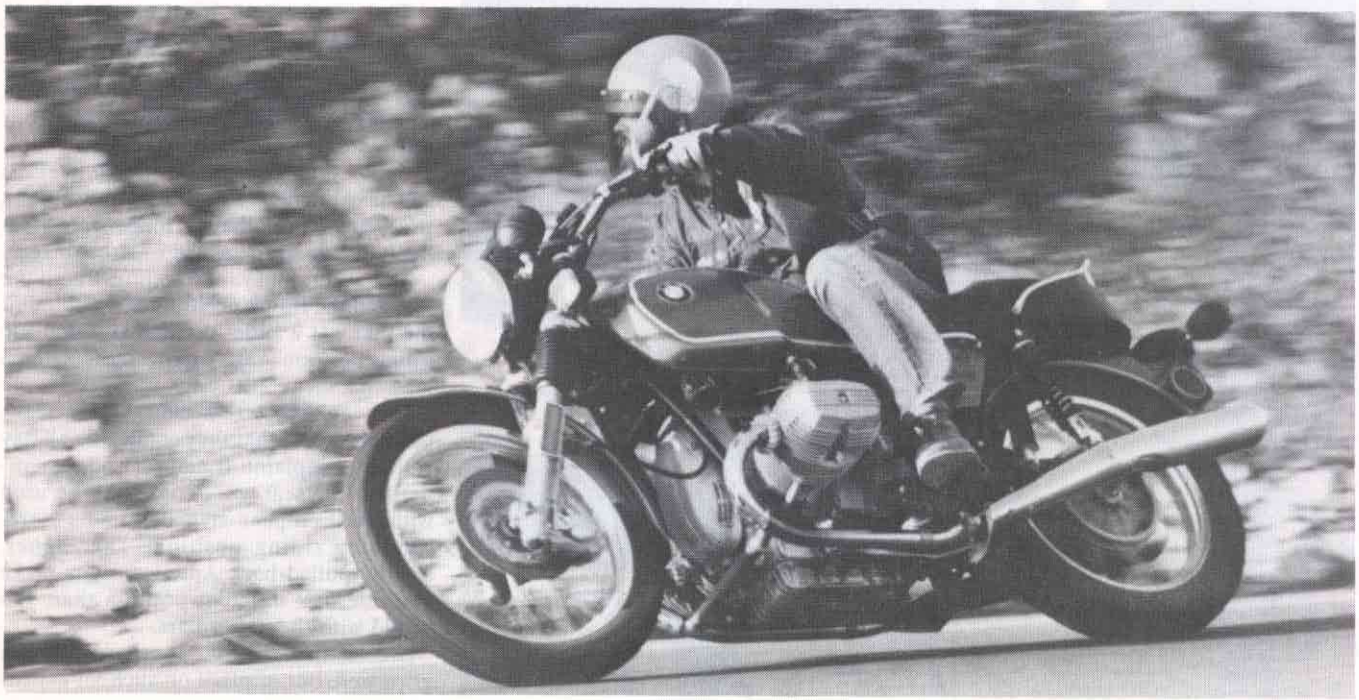
Because it made nice power and was the smoothest machine in the BMW line, the R75 was usually rated as the best of the Beemers by BMW fanciers. We were originally told that extra displacement was added to the R75 because an 800 would be "a little faster, a little torquier." However, the unveiling of the new 650 Beemer makes it obvious that BMW also wanted to put some space between the 650 and the next bike up the model line.

No doubt the R80 makes a smidgen more power than the 750. The 800's 13.47-second pass through the quarter mile was a shade quicker than the last R75 we tested. The 800 does have a higher final drive gear ratio than early-model R75 BeeEms, but the ratio is the same as on the later R75s. In fact, our R80 was only a tenth of a second slower than the $6000 R100RS we tested last year.

However, quick quarter-mile squirts aren't what the R80—or any BMW—is all about. Any of the 750 multis will dust off the BeeEm in a drag race. Instead, the simple pushrod twin offers excellent wide-range power matched by five very well-chosen gear ratios. The R80 makes comfortable passes at highway speeds without downshifting, and it isn't necessary to scream the engine to extract lively performances in town or on a mountain road.

The BMW's hefty flywheel effect makes the R80 easy to get away from a stop despite the dry clutch's somewhat sudden engagement. It was just as well that the bike was difficult to stall since (like about half the BMWs we've tested) the R80 had a faulty interlock switch in the clutch lever. This switch is supposed to permit the electric starter to operate (and turn off the turn signal beeper) when the clutch lever is pulled in. Since the switch didn't work, the rider had to select neutral (which is not hard to find) if he stalled.

The big flywheel is also a culprit in



PHOTOGRAPHY: ART FRIEDMAN

what's left of the BMW's gearshifting clank, since the weighty flywheel slows changes in engine speed. Unless the rider carefully matches his engine speed to road speed while shifting, the gears mesh with a clank as one fairly large mass of metal is suddenly forced to change speed in order to mesh with another heavy piece. Still, the recent addition of an external linkage has smoothed out gear changes considerably. (The pivot of the gear lever has been changed, and the additional leverage seems to help shifting.)

Our R80 offered a virtually lash-free driveline and excellent throttle response, permitting smooth passes through corners that required several throttle adjustments. Riding in traffic was also more pleasant than with other constant-velocity-carbureted bikes which usually respond to small throttle changes in fits and starts. Our machine was not an emission-controlled bike so R80s manufactured in 1978 may suffer some carburetion difficulties in order to meet federal regulations, although the increased leanness may also improve fuel consumption over the 43.5 mpg we averaged.

The shaft final drive robs the BMW of a small amount of its power, but that is a price most road riders will happily pay for the reliability, cleanliness and quiet of a shaft drive. Since the R80 weighs only 442 pounds, it's hard to complain about the shaft's extra weight over a chain. The shaft drive does create some idiosyncrasies for which the rider must occasionally compensate. Under acceleration, all shaft-final-drive machines rise as the pinion gear tries to climb up the ring gear in the rear hub. A reversal of this behavior causes the bike to drop and compress its suspension during deceleration. Because the BMW has soft spring rates and a lot of suspension travel it rises and falls quite a bit—more than any other shaft-drive machine. One staffer commented that he felt like he was on an elevator instead of a motorcycle when he pulled away from a stop.

This rising and falling during changes in throttle setting requires the rider to adjust his approach to corners if he wishes to obtain maximum cornering clearance. Keeping the throttle on while cornering will raise the bike and provide adequate clearance, but it's pretty easy to drag the stands and then the cylinder heads if the throttle is shut in a turn.

The R80 is fun to ride on snaking mountain roads because its steering is accurate, steady and responsive. Because the bike is light and has a low center of gravity and moderate rake and trail, it handles lightly and quickly. At very high speeds and extreme lean angles, the BMW will wallow a little, but few riders ever ride that hard.

The suspension does a good job of smoothing things out in bends with big bumps in them. The suspension is at its best over big, rolling bumps and dips. In smaller and sharper bumps, the front fork's stiction relays some of the road's choppiness to the rider. Although BeeEms still have the most suspension travel in the street-bike world, they no longer can claim the best ride in the world of street bikes.

Our testers had varied feelings about the seat and the riding position. Some felt that the seat was a little too firm and that the riding position wasn't quite right. Others who slid their butts back and sat on the slightly angled section between the seat's two tiers found that they could ride all day without complaint. It helps if you remember that the seat was designed to be used with low, European-style bars and a corresponding riding position. The higher, slightly pulled-back American bars make you ride in a different position than you would with the flatter bars.

We all thought that the hard Magura grips were out of place on such an expen-

The "padded dash" fitted to all '78 BMWs may be snapped off and discarded if the owner doesn't like it—or if a passerby does like it.

sive bike, and we had long conversations about the annoying placement of the carburetor's intake tubes which compete with your ankles for space above the footpegs. Most of us just found this situation slightly uncomfortable and annoying, but Hickox, who has small feet, found that the right carb's location occasionally made it awkward for him to apply the rear brake.

Other minor discomforts included a strong, low-frequency shake when accelerating below 3000 rpm—several hundred rpm below the normal cruising speed (about 3500 rpm). The bike is quite vibration-free above 3000 rpm. It was also kind of disconcerting to find that this $3900 machine had a speedometer that was five mph optimistic at an indicated 60 mph.

We always feel a bit awkward using BMW's up-and-down, blade-type turn signal switch on the right bar instead of the

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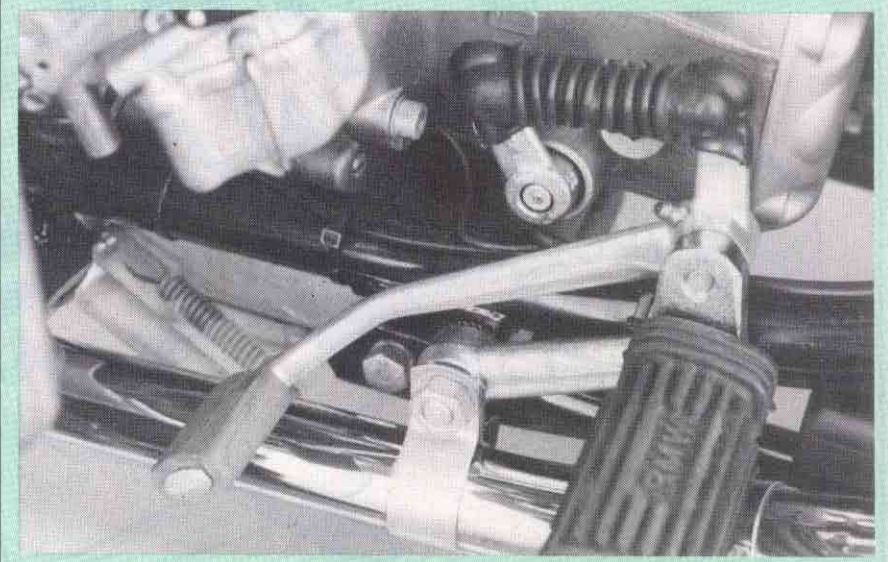
BMW HAS BEEN BUILDING MOTORCYcles with shaft drive and twin opposed cylinders since 1923. Neither the engine configuration nor the driveshaft were original ideas, but BMW combined both features into a fine-handling motorcycle of exceptional quality. From the beginning BMWs were smooth, reliable and well-made. And that combination, until very recently, was difficult to find in any other motorcycle no matter what the price.

Today a BMW does not offer the same advantages. There are many motorcycles that offer quality, smoothness and reliability, and most of those machines cost much less than a comparable BMW. But a BMW remains light and simple. Just 15 years ago simplicity and light weight were not exceptional, but they are now the qualities that separate a BMW from its rivals. At this point in two-wheeled evolution, when motorcycles are evolving toward more cylinders, more valves, more carburetors and more weight, the BMW represents one of the few remaining light and simple alternatives. So while the Japanese companies play their games of engineering one-upmanship, they are inadvertently assuring a market for BMW motorcycles. And they're doing so at a time when the German firm is economically disadvantaged.

The BMW engine in particular is attractive in its simplicity. Though it may look ungainly to unfamiliar eyes, the opposed twin has much to recommend it. Only a small couple resulting from the offset cylinders prevents the opposed twin from having perfect primary and secondary balance. And unlike the 90-degree Vee-twin, which is also mechanically well-balanced, the opposed cylinders permit evenly spaced firing impulses.

Setting the engine in the frame longitudinally is a compromise. Obviously, a front-to-rear crankshaft axis goes well with shaft drive because the power does not have to make a 90-degree turn before going through the driveshaft. And there is really no practical alternative to longitudinal mounting if the engine is air-cooled. An opposed-twin set transversly in the frame would almost certainly require liquid cooling to prevent the rear cylinder from overheating. But when the crankshaft turns on the longitudinal axis the torque reaction tries to make the bike fall to one side. The effect is not very great, but some people find it disconcerting. There is also more vibration transmitted through the frame when the engine is longitudinally mounted because the principal out-of-balance forces then act transversly and the frame is substantially less rigid in that particular plane.

The engine's basic design and construction are so conventional that they hardly bear mentioning. The one-piece forged crankshaft uses plain bearings at the crankpins and mainshafts. The camshaft is below the crankshaft and is driven by a dual-row chain from the front of the crank. The alternator is also mounted on the front of the crankshaft but the ignition breaker points are driven off the front of the camshaft. Long pushrods operate the valves through conven-



The new shift linkage results in more positive gear-changes because the new pivot point provides more leverage.

TECH PROBE

tional rocker arms with screw-type adjusters.

To many people, the traditional overhead-valve design is both antiquated and inefficient. Actually, the advantages of overhead camshafts have been greatly exaggerated by the companies promoting such things. The BMW's monkey-motion works just fine. Furthermore, the air-cooled opposed twin does not lend itself readily to overhead camshafts because of the complications involved in driving the cams. Overhead camshafts would also make the engine even wider than it already is.

Though pushrods are acceptable, ignition breaker points on a $3900 motorcycle are questionable. We were told by Butler and Smith, BMW's U.S. distributor, that pointless electronic ignition was not used because breaker points are much easier and cheaper to repair in the event of a failure. That is true. But there is a greater chance of failure with points than with electronic ignition. And if the failure occurs on the road, we doubt that the average BMW owner would be any more capable of repairing the points or condenser than he would be capable of repairing an electronic ignition. In the long run, for the average owner, we feel electronic ignition would be far less troublesome.

A large flywheel on the rear of the crankshaft carries a single-plate dry clutch with a single diaphragm spring. From the clutch, the power passes to the transmission input shaft where a helical gear turns the transmission layshaft at a ratio of 1.5 to 1. The input shaft also incorporates a cam-and-spring-type shock absorber.

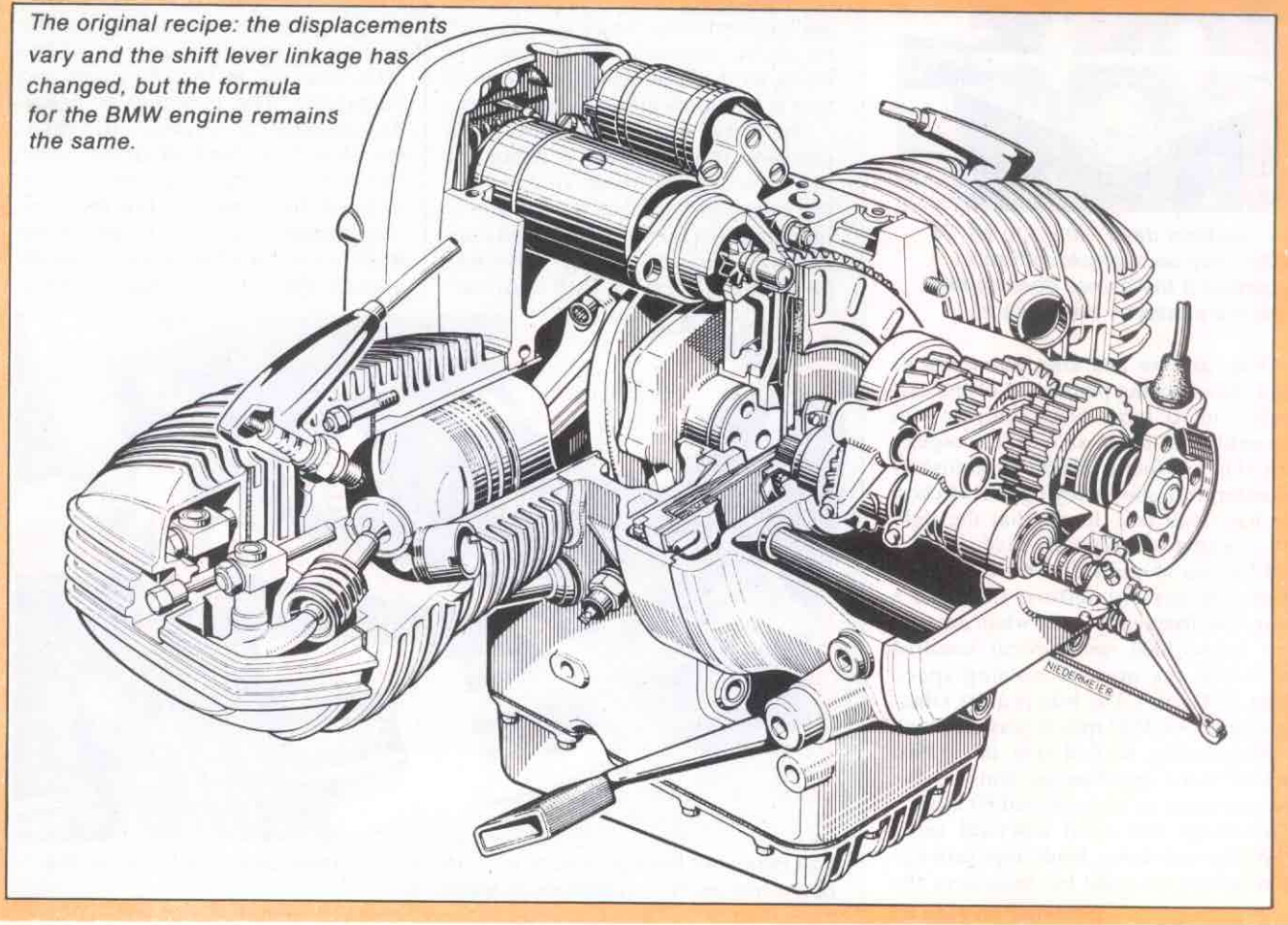
One dubious design feature of this gearbox is that if anything goes wrong with any of the parts comprising the layshaft assembly, the layshaft and all five gears must be replaced—no individual parts are available. BMW considers this a "precision" assembly that must be sold as a matched assembly. We wonder why BMW, and no one else, finds it necessary to make a gear shaft a precision assembly.

From the layshaft, the power passes to the output shaft, through a universal joint to the driveshaft, and finally through the spiral bevel gears that drive the rear wheel. A spline in the driveshaft compensates for any change in shaft length. The swingarm, through which the driveshaft turns, is mounted on tapered roller bearings.

Another advantage of the BMW engine is that it permits the use of a very light and rigid frame, since the steering head and swingarm pivot can be connected in the most direct manner. Unfortunately, while some of BMW's racing bikes exploit this advantage, the production bikes do not. But though the design of the production frames may be less than ideal, in practice the latest frames are perfectly adequate.

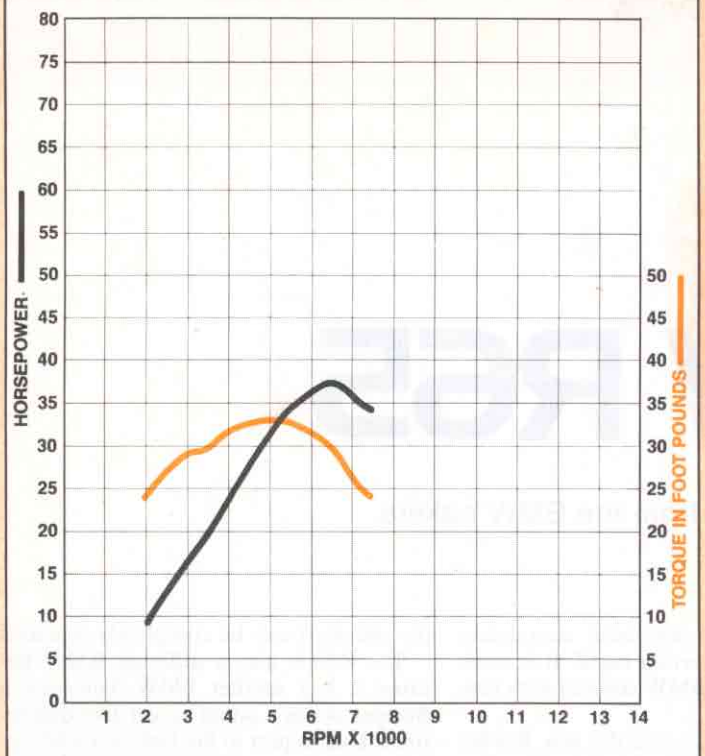
When compared to a $1500-dollar-cheaper Yamaha XS750E, the R80/7 does not have: electronic ignition, a vacuum-operated fuel tap, an integrated ignition switch/steering lock, self-canceling turn signals, dual front disc brakes, cast aluminum wheels or a disc rear brake. The Yamaha also is faster, stops better and rides more comfortably than the BMW.

In engineering, as in performance, the Beemer has much to recommend it, but nothing to justify its cost. The bike is so expensive only because of Germany's position in the world market. Nevertheless, if one wants the unique qualities the BMW has to offer, it might be worth the price. Certainly many people think so. ●



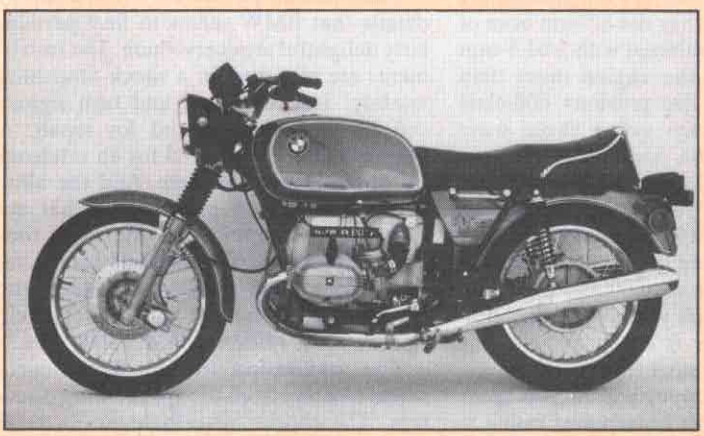
The original recipe: the displacements vary and the shift lever linkage has changed, but the formula for the BMW engine remains the same.

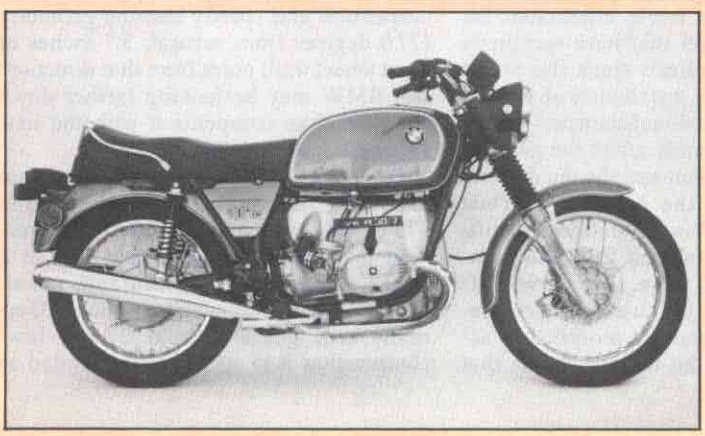
BMW R80/7 SPECIFICATIONS



RPM	HORSEPOWER	TORQUE	RPM	HORSEPOWER	TORQUE
2000	9.0	23.5	5000	31.4	33.0
2500	12.8	26.8	5500	34.4	32.8
3000	16.6	29.0	6000	36.1	31.6
3500	19.7	29.6	6500	37.1	30.0
4000	24.1	31.6	7000	35.5	26.6
4500	27.8	32.4	7500	34.3	24.0

This chart shows engine horsepower and torque calculated from figures taken at the rear wheel and does not account for transmission losses between the engine and rear wheel. These results may differ from manufacturer's claims or from results obtained using a different dynamometer.





Engine type	four-stroke
Cylinder arrangement	horizontally-opposed twin
Valve arrangement	overhead valves, pushrod operated
Bore and stroke	84.8 mm x 70.6 mm
Displacement	797.4 cc
Compression ratio	9.2:1
Ignition	battery/single points/single coil
Charging system	12-volt; alternator, voltage regulator, rectifier
Carburetion	two 32-mm Bing constant-velocity
Air filter	disposable paper element
Lubrication	wet sump, 2.4-qt. (2.25 /) sump capacity
Primary drive	helical gears, 1.5:1 ratio
Clutch	dry, 1 drive plate, 1 driven plate
Starting system	electric only
Final drive	spiral bevel gears, 3.36:1 ratio
Front fork	7.2 in. (183 mm) travel
Rear shocks	Boge, 4.4 in. (111.8 mm) rear wheel travel, 3-way adjustable spring preload
Front brake	double-action hydraulic caliper, 10.25-in. (260-mm) perforated disc
Rear brake	drum, single-leading shoe, rod operated
Front tire	3.25H19 Continental RB2 rib
Rear tire	4.00H18 Continental K112 block
Frame	tubular mild steel, double front downtubes
Steering head angle	28 degrees from vertical
Front wheel trail	3.7 in. (95 mm)
Wheelbase	58.3 in. (148.1 cm)
Weight	442 lb. (200.5 kg)
Weight distribution	44.8% front, 55.2% rear
Gross vehicle weight rating	877 lb. (398 kg)
Ground clearance	6.3 in. (160 mm), at sidestand
Seat height	32.5 in. (825.5 mm)
Handlebar width	27.6 in. (701 mm)
Footpeg height	11.9 in. (302.3 mm)
Instrumentation	speedometer, tachometer, odometer, tripmeter resettable to zero
Speedometer error	30 mph indicated, 27 mph actual; 60 mph indicated, 55 mph actual
Fuel tank	steel, 6.6 gal. (25 /) including 1.2 gal. (4.5 /) reserve
Fuel consumption	38 to 46 mpg (16 to 20 km/l)
Range	205 to 248 miles (328 to 410 km) plus 46 to 55 miles (72 to 90 km) reserve
Best ¼-mile acceleration	13.47 sec., 97.9 mph (157.5 kph)
Top speed (calculated)	104 mph (167 kph)
Stopping distance	33 ft. (10.1 m) from 30 mph, 138 ft. (42.1 m) from 60 mph
Available color	metallic blue, metallic black, burnt orange, gold or black
Suggested retail price	$3850 East and West Coasts

All weights and measurements are made with machine unladen and fuel tank empty.

GEAR	1	2	3	4	5
INTERNAL GEAR RATIO	2.93	1.91	1.38	1.11	1.00
OVERALL GEAR RATIO	14.78	9.61	7.02	5.61	5.04
MPH per 1000 RPM	5.1	7.8	10.7	13.4	14.9