11-BIKE TEST: Yamaha V-Max, TDM850; Honda CB1000, CB750; Harley Low Rider, 883; Suzuki 1100G, VX800; Kawasaki ZR1100; BMW K75, R100R

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BRAVE NEW BEEMER

BMW GOES FOR BROKE WITH THE NEW R1100RS SUPER TWIN

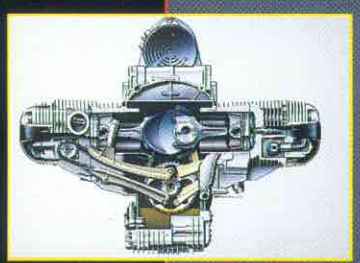
BY KEVIN CAMERON

AT LEAST ONCE DURING BMW'S LONG HISTORY, LEGend has it, management has proposed giving up motorcycle production altogether. When that happened, we are told, elderly stockholders came down from the hills and voted solidly to continue the two-wheel tradition no matter what.

Yet you may wonder how, or even whether, the company's venerable opposed-Twin, the beloved Boxermotor that has evolved steadily since 1923, will keep its place in this high-technology world.

Fear not. An 1100cc, fuel-injected, eight-valve, air-and-oil-cooled BMW Twin has arrived, itself acting as the main frame beam in a radical new motorcycle. It features a hybrid, A-arm-telescopic front suspension, second-generation ABS braking and more. Noise and exhaust emissions reduction is a major design element in this machine, intended as it is to meet tough new European vehicle standards taking force soon.

This new machine very nearly did not happen at all; the concepts and execution were extremely controversial within the company.



Anatomy of a thoroughly modern BMW. With a freshly done opposed-Twin motor, an innovative front-suspension system and updated anti-lock braking, the R1100RS is the first of a new series of machines from the German bike-maker.

Two variations of the R1100RS will be sold, the "short-fairing" version shown here, and the "long-fairing" version (see inset photo, page 36). All the bodywork is made with easily recyclable plastic. Even the 6-gallon fuel tank is plastic, using a polyamide compound formed in a rotational casting procedure. The tank itself contains the fuel pump, a filter and the fuel-level sensor. BMW claims the tank passes all current safety standards. Dry weight of the short-fairing version is 490 pounds. Wheels are 3.50 x 17-inch front and 4.50 x 18-inch rear. As sold in the U.S., price of the short-fairing RS will be $11,890, with ABS a $1200 option. The long-fairing bike will only come with ABS and will retail for $13,990. Expect the bike, officially a 1994 model, in dealerships by the time you read this.

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BMW's first products, back in 1916, were aircraft. It then shifted to production of sophisticated liquid-cooled, overhead-cam aircraft engines (the BMW IIIa set an altitude record of over 30,000 feet in 1919). This was the genesis of the famous blue-and-white BMW circle emblem; the logo symbolizes a spinning propeller in sunlight. The World War I peace settlement limited Germany's aircraft production, so BMW had to seek other markets. The outcome was Max Friz's classic 1923 engine design.

Twenty-five years later, BMW's post-WWII motorcycles established a reputation for conservative solidity. That was a survival strategy; motorcycle popularity in Europe peaked in 1955, then almost died out as mass-produced autos grabbed the market. Nevertheless, engineering is a strong tradition in the company: BMW was first with a production telehydraulic fork in 1935, and won the 500cc world title with a roadracing flat-Twin in 1938. The reputation of the auto division is strong on both road and track.

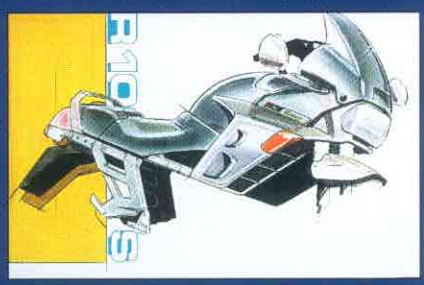
PHOTO BY DAVID EDWARDS

In 1984, shortly after the K series of laydown-Fours was finished, BMW engineers were given the task of updating the Boxer Twin. They faced two kinds of problems: One was to meet foreseeable social standards (noise, emissions, durability, recyclability), the other was to raise the Twin's competence in all aspects (handling, braking, stability, power) to meet or exceed the constantly rising expectations of buyers worldwide.

The new machine keeps little from the recent past, save for the special sound and feel of a flat-Twin, and the proven Paralever single-sided swingarm. There is no chassis as such, for the engine is the major structure. The telescopic fork is gone, replaced by an innovative design that resolves

THE MAKING OF THE R1100RS

Early 1986: Not quite two years after engine-feasibility studies were started, the first design sketches of the new RS Twin were done.

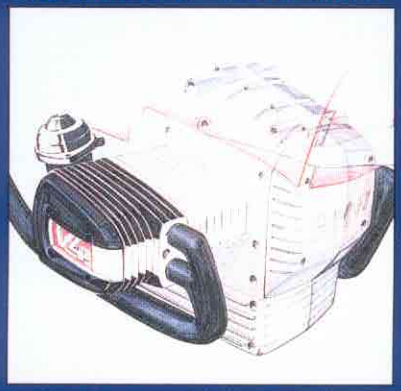


One of the many body-design drawings done for the RS. This draft dates back to 1989.

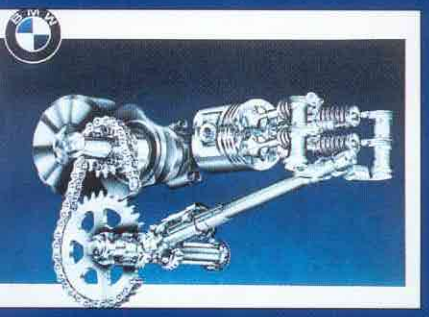
In April,1990, this design-concept mock-up was presented to BMW's board of directors, who gave go-ahead approval.

A later RS mock-up bearing a closer resemblance to the finished product.

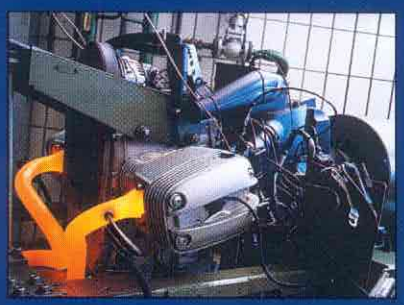
Modeling a full-size clay version of the finalized bodywork in the design studio.



An early drawing of the engine, still with carburetors and with the alternator positioned beneath the front cover.



BMW's engineers discussed various valve-drive systems. This aborted 1985 study depicts a shaft with cams at the side.



Some engines logged as many as 300 hours on the dyno. With exhaust temperatures of up to 1470 degrees, the header pipes glow red hot.

A CAD-screen modal analysis of the front subframe and A-arm mounted on the engine block.

Various versions of the front A-arm. When aluminum arms did not deform sufficiently in crash tests, steel arms were fitted.

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braking and suspension loads through a large, forward-projecting A-arm that pivots on the engine cases. This removes most of the cause of fork stiction, resulting in an unusually supple and strong suspension that is still directly steered. And although BMW has produced 40,000 motorcycles with the first-generation FAG-Kugelfischer anti-lock brake system, that is now replaced by the even more capable ABS II.

The best way to produce an engine that is both powerful and easy to ride is to make it bigger. The traditional hop-up methods–more compression, longer cams, bigger ports–all have drawbacks. BMW's new Type 259 engine is therefore 1085cc, with 99 x 70.5mm bore and stroke yielding a decidedly modern bore/stroke ratio of 1.4. Peak claimed output of 90 horsepower is given at 7250 rpm, for a leisurely piston speed of under 3500 feet per minute. Cylinder filling is good, with BMEP (the stroke-averaged combustion pressure) peaking at 158 psi at the 5500-rpm torque peak. The 10.7:1 compression ratio is high for so large a bore, requiring premium fuel.

Engineers expect more vibration from a bigger engine, but an opposed-Twin is naturally in primary and secondary balance. Natural balance doesn't mean there are no large forces inside the engine; it means only that they cancel. The heavier the vibratory loads from piston and rod motion, the more heavily built the cases must be to contain them.

Three R1100RS color schemes are available: Pearl Silver Metallic shown here (with green or gray seat), Marrakech Red (with gray seat) or Turquoise Green Metallic (with gray seat). A full line of BMW accessories is cataloged for the RS, including a tankbag and newly designed hard saddlebags.

BMW borrowed from its first-hand knowledge of Formula One auto racing to give its new Twin very light pistons. These are little more than disembodied domes, carrying rings, each with a pair of posts to accept a very short wristpin. Minimal skirts are provided to stabilize the piston in the bore.

Because the cylinders must be offset to allow the connecting rods to pass each other, there is a small rocking couple–the engine oscillates around a vertical axis through the engine's center of mass. The need to minimize this rocking motion dictated use of a two-bearing crankshaft; a third bearing, between the con-rods, would accentuate this motion. The R1100's con-rods are made nearly to net shape by powder metallurgy. Long used in the high-volume automotive world, so-called "powder parts" are sintered from metal powder of precise composition, then hot forged into complete solidity. Dimensional accuracy is excellent and little post-machining is needed. The new Twin's cam lobes are likewise powder parts. Each connecting rod is forged as one piece, then the big-end caps are created by intentional fracturing. The irregular fracture surfaces form a joint that is self-locating (no dowels or tabs needed to align the halves) and eliminates an expensive precision machining process.

The best combination of power with ridability is provided through use of four valves per cylinder, which can flow plenty of air without needing the long cam timings that make engines peaky. Use of four-valve heads in the Boxer

R1100RS prototypes. From left to right, the 1989 version, the 1988 version (with K100 fairing) and the 1990-91 version.

Panic-brake testing on a wet surface. Guess which RS prototype is equipped with anti-lock brakes.

More testing. Here, both bike and rider have been outfitted with various electronic measuring devices.

After each test run, data is downloaded into a computer for evaluation.

R1100RS team portrait: Fourth from the left is Dr. Burkhard Göschel, in charge of motorcycle development for BMW.

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Twin presented special problems, however. The Boxer design was originally created to provide excellent air-cooling (German aircraft engines of WWI were noted for their well-thought-out cooling arrangements), but it's hard to cool a modern four-valve head with air.

Why? To provide a compact combustion chamber without an intrusively tall piston dome, the angle between intake and exhaust valves must be small. But this makes it hard to get cooling air into the critical region between the valves. Also, the more holes you cut into a cylinder head, the weaker it becomes, inviting distortion or cracking. The region between exhaust-valve seats is especially tricky. BMW decided to supplement air cooling with considerable internal oil circulation–including a passage to cool the exhaust seats. To prevent oil in that region from coking after engine shutdown (when circulation would stop, and heat soak-back would overheat the region), a standpipe was created to hold enough oil in the hot region to handle the heat without reaching coking temperature.

For sporting performance, a motorcycle must be capable of large angles of lean; but pile too much machinery on the Boxer's projecting heads and you have a grounding problem. To meet noise standards, the former Twin's long pushrods

R32: TAPROOT OF BMW'S FAMILY TREE

Just another old crock that's too valuable, and too maintenance-intensive, to ride? Take another look. This is the BMW R32. It is more than a motorcycle. It is an internal-combustion cornerstone of one of today's most significant and influential companies, and in its own way it is a two-wheeled bookmark in the volume of 20th-century time.

The R32 is also the bootstrap that helped BMW lift itself from the chaos of post-WWI Germany. It was designed by Max Friz, an engineer hired in 1917–the year of the Russian Revolution, the year the U.S. entered the war, the year John F. Kennedy was born and the year Buffalo Bill Cody died–to help build aircraft engines for Germany's warplanes.

Max Friz, 1883-1966

The end of the war in 1918 brought the Treaty of Versailles, which forbade the construction of most German aircraft. So Friz was asked to produce a motorcycle. He moved a drawing board and a stove into the guest room of his house at Riesenfeldstrasse 34, near BMW's Munich factory, and in December, 1922, after about four weeks of work, emerged with the engineering drawings for the R32, a bike which carried some of the same design parameters as the new R1100RS.

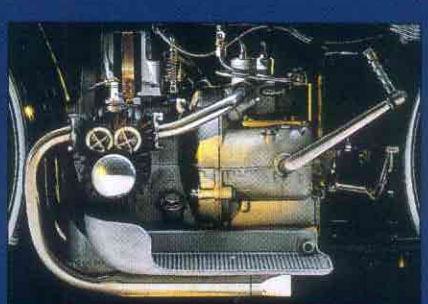
Neither the opposed-Twin motor nor the shaft drive were new concepts, but it was left to Friz to mount the Boxermotor longitudinally in a double-loop frame so that a driveshaft could run directly from the engine's transmission output shaft to the rear wheel's bevel drive.

In spite of difficult economic circumstances that gripped all of Europe, it didn't take BMW long to turn Friz's drawings into metal. In 1923, the R32 was introduced at the Paris Motor Show. It developed 8.5 horsepower at 3300 rpm from its 486cc engine, which drove through a three-speed, hand-shift transmission to haul the 265-pound machine to about 60 miles per hour. The buying public, worried about the bike's relatively low power output, about the vulnerability of its cylinders, and about power loss from the shaft drive, was unconvinced. Still, by the time it was superseded in 1926, about 3100 R32s had been built.

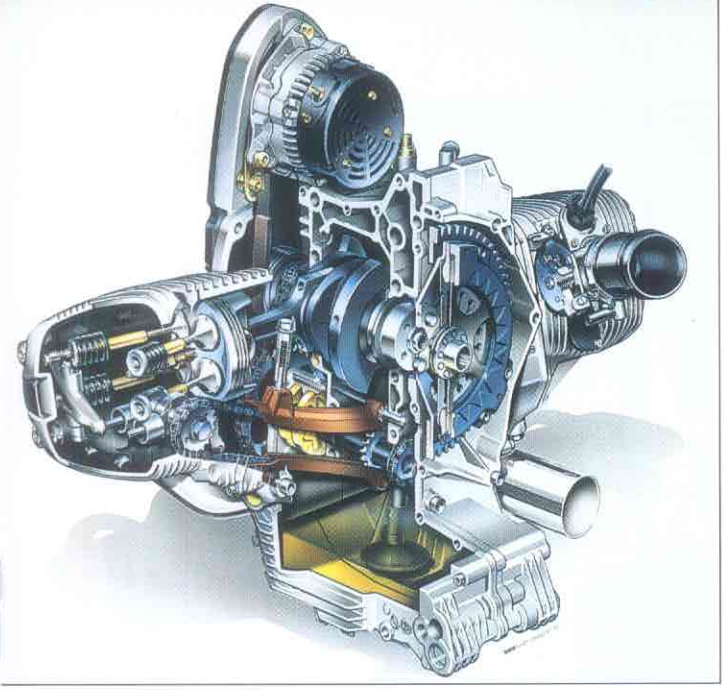
Now, according to Evan Bell, owner of Irv Seaver BMW in Orange, California, about 10 running examples remain. Bell owns two of them. One is a 1923 model and is the 41st machine off the production line. The other is a 1924 model, about 600 units into the total production count. He says of the R32, "I've ridden a lot of old bikes you're glad to get off of, but this is very ridable. It always starts with one or two kicks, and it runs good."

But Bell says the R32 is more important for the tradition it represents than for its performance. And he says the 1993 R1100RS is equally important for the continuity it mirrors: "It's the concept BMW started. BMW has survived by building a motorcycle of this basic concept, and now they're updating it. I'd say that original concept was a pretty good idea, pretty good basic engineering."

–Jon F. Thompson



The R32's engine showed lots of technology, including one-piece heads and barrels, sidevalves, and an aircraft-type generator and voltage regulator.



The Type 259 motor: lightweight pistons, sintered connecting rods, intentionally fractured con-rod bosses, four valves per cylinder, "cam-in-head" actuation, 6000-mile adjustment intervals.

had to go, yet the new valve drive would have to be capable of the short, abrupt action that four valves require. That, in turn, called for the lightest possible valvetrain.

The obvious answer–overhead cams–was out; they would be "under the tar" in fast turns. Whatever the choice of machinery, it would have to fit into the confining wedge formed between right and left angles of lean.

BMW's solution is similar in concept to that on Moto Guzzi's new four-valve 1000 Daytona. A half-time shaft beneath the engine is chain-driven from the crank. Chains from it drive a camshaft located under each head. Bucket tappets and stub pushrods actuate a pair of vertically disposed, forked rockers to operate the paired 36mm intake and 31mm exhaust valves. Chain noise is suppressed by rubber-faced tensioner/dampers.

Emissions reduction dictated the use of fuel injection; the R1100's automotive-style three-way exhaust catalyst system (standard in the U.S., optional in most of Europe) requires accurate feedback control of fuel mixture. An oxygen sensor in the pipe, working with the fuel-control computer, keeps the fuel/air mixture cycling narrowly between rich and lean, guaranteeing that the catalyst receives only exhaust from near-stoichiometric (fancy, mouth-filling word for chemically correct) combustion. In this narrow mixture range, carbon monoxide, unburned hydrocarbons and oxides of nitrogen can all be converted to plain old carbon dioxide, water and nitrogen with fair efficiency.

This new engine couples to a five-speed gearbox through BMW's familiar direct-coupled flywheel/single-disc clutch.

Simple, readable instrumentation and BMW's now-familiar hand controls. Also visible on the right side of the dash is the optional instrument pod that gives time, oil temperature, fuel level and gear selected.

And now for the radical chassis and suspension. Innovation is all very well, but new features have new costs. Clearly, a new kind of chassis would be needed for the new Twin, one with stiffness adequate to exploit the powerful grip of modern tires. The twin-loop, steel tube chassis is receding into the past. A multi-tube chassis like Ducati's has attractions, but its bulk and many joints are problems. What about an aluminum-beam chassis? New equipment for forming and welding aluminum would have to be bought for the production line, and many problems of corrosion and fatigue resistance would have to be addressed. Costs would be heavy.

Why not just do away with the chassis, as with the classic Vincent motorcycle, or more recently, in the John Britten V-Twin? An engine as stiff as the new Type 259 would be

R1100GS: NEXT NEW TWIN?

The next new-style BMW Twin to hit the streets will most likely be the R1100GS dual-purpose bike, shown here in an artist's design sketch. Also look for an RT version, tailored for long-distance riding, and perhaps a standard-style model.

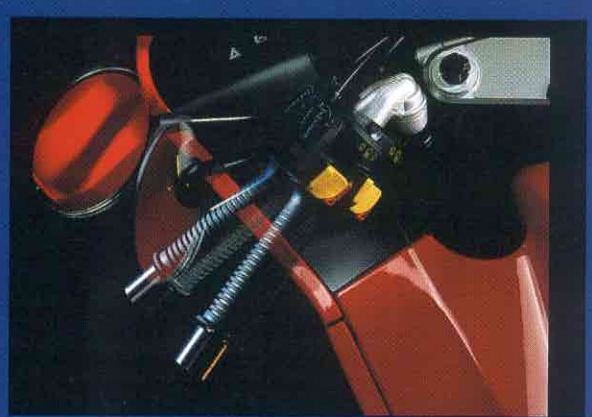
Just how close the production dual-purpose model comes to the drawing remains to be seen, but the redone GS will be equipped with the Telelever front suspension, which, a company official claimed, works "extremely well" in off-road situations.

First introduced in 1980 as the R80G/S, Boxer-motored dual-purpose BMWs have gone on to gain cult status among Beemer enthusiasts. GS-based racebikes even won the grueling Paris-to-Dakar Rally four times in the 1980s, adding to the bike's tough-as-nails reputation. Even though plans are afoot to campaign an "R1" road-racer based on the new R1100RS next year, BMW refused to speculate on the possibility of a return to big-time rally racing. ***–David Edwards***

RS ERGONOMICS: ONE SIZE FITS ALL

Better to fit machines to people than for people to fit themselves to machines. After all, people were here first. Yet how many 1971 Triumphs went unsold because few riders were tall enough to find comfort on their towering saddles? What about the sportbikes with pegs so high, and bars so far away, that they seemed built for 6-foot riders with 18-inch inseams?

With the 1100RS, BMW has adopted the handlebar-angle adjustments found on some other machines, plus fore-and-aft movement of about an inch, easily adjusted with an Allen wrench. The handlebars are not adjustable for height, but the rider's portion of the split saddle is: Metal loops attached to the seat base plug into one of three levels of plastic clips for seat-height adjustment over a range of an inch-and-a-half. Windscreen position can also be varied manually by turning a telescoping star-adjuster located between the instrument faces–higher to deflect wind overhead during high-speed cruise; lower when so desired.–*Kevin Cameron*



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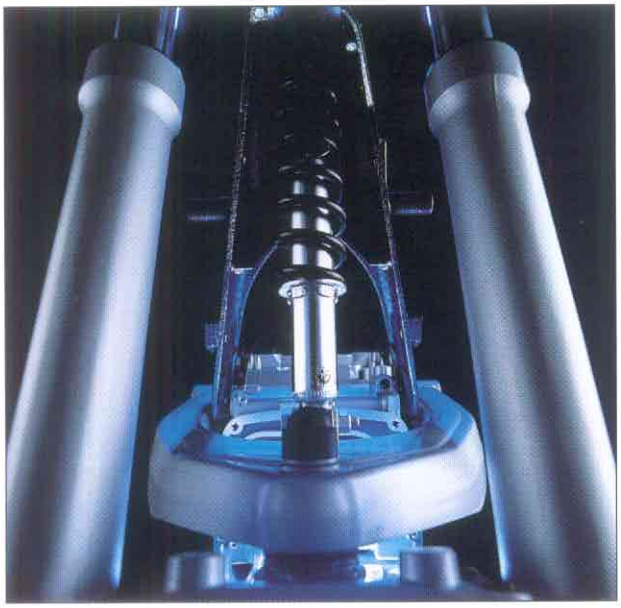
an excellent basis for a chassis. Existing factory methods could easily produce the supplementary steel-tube subframes such a design would need.

At the rear, the proven Paralever system would be the obvious suspension choice, being rugged and almost free from torque reaction. Why not just use a well-executed telescopic fork at the front? The problems with conventional telescopic forks are these: All braking and turning loads are reacted through the closely spaced fork tube/slider bearings, which bind under these loads; hard braking makes tele-forks essentially rigid; tele-forks are pro-dive and the rake of their tubes subjects them to extra compression during braking, requiring either longer travel or stiffer springs. Further, tele-forks transmit loads from the tire upward 30 inches or so to a steering head that must be heavily built to handle the leverage, and the chassis must then carry these loads back down to axle level to connect to the rear swingarm. Why pay for a rambling load path with unnecessary flex and weight? If the aim of a new chassis was increased rigidity without weight penalty, why not integrate a new front suspension into that concept?

New front-end concepts are plentiful, but many, like the Bimota Tesi's hub-center device, involve steering through linkage of some kind. Riders have generally rejected their lack of feel. This made direct steering a preference for BMW's project. Some alternative suspensions and the extremely rigid, big-tube telescopics used on current GP bikes suffer from kick-back–having essentially no flex, they pass along everything to the rider as sudden torques at the

BMW's second-generation ABS does away with the unattractive, heavy and hard-to-hide twin solenoids of the original ABS set-up. The new system's motor is hidden under the fuel tank.



A fly's-eye view of Telelever. The shock is a non-adjustable, Japanese-made Showa. The rear suspension's shock is also by Showa, and is adjustable for spring preload and rebound damping.

bars. Non-racers naturally reject this discomfort.

Another problem is appearance. To many viewers, "Buck Rogers" high-tech suspensions just look weird. BMW therefore was less attracted to solutions like the Yamaha/RADD, with visible, massive beams placed at axle level.

The front suspension developed by BMW as the Telelever originated in England as the Nicol Link. It combines major elements of a telescopic fork with the rigidity and short load path of a forward-projecting A-arm, based solidly on the engine crankcase.

Here is how it works. The two fork sliders are joined by a bridge just above the tire, and at this point, a ball-joint connects to the apex of the A-arm. The A-arm's motion is controlled by a single spring/damper unit. Thus, braking, turning and suspension loads travel a greatly shortened (and strengthened) load path through this link. The fork sliders do not end at the bridge, but continue on upward. Their great length (nearly twice that of conventional fork sliders) provides wider separation between slider bearings on the pair of inner tubes, thus cutting stiction. The two inner tubes are joined by a second bridge at their tops. Here, a second ball-joint attaches to a pyramidal structure, built upward from the front of the engine. The rider's bars connect directly here without linkage.

What lateral flexibility there is in the telescopic part of this suspension deals with the kick-back problem. Telelever is not pro-dive because brake forces react to the A-arm. Because riders prefer some dive as a means of gauging braking effort, a degree of dive is designed into BMW's new front end. As a partial result, a modest travel of only 4.7 inches is needed at the front. Telelever also satisfied appearance criteria: It looks like a telescopic, with the A-arm almost invisible below the forward part of the fairing.

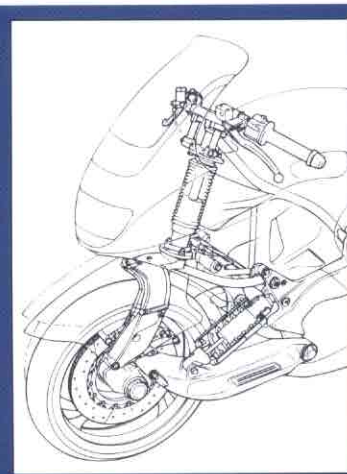
At the rear, the single-sided Paralever swingarm projects aft from the gearbox section, with its suspension load carried by a single, centrally placed spring/damper unit working without a linkage. Travel of the 18-inch rear wheel is 5.3 inches.

More capability in engine and chassis requires appropriate braking power. The RS has Brembo four-piston calipers with twin 12.2-inch discs at the front, a single 11.4-inch disc and twin-piston caliper at the rear, as on the K100. The new FAG-Kugelfischer ABS II anti-lock system will be offered as an

TELELEVER: THE VIEW FROM SANTA FE

BMW's new R1100RS is the second mass-produced motorcycle to use an unconventional front end. Yamaha's innovative GTS1000, with its swingarm front suspension designed by Sante Fe, New Mexico's James Parker, was the first. Although his allegiance lies with true swingarm designs, Parker feels that the BMW effort has potential beyond the new Boxer.

BMW R1100RS Telelever



Yamaha GTS1000 RADD

"It may be preferable for dual-purpose motorcycles and would most certainly be better for dirtbikes," says Parker. "Basically, it's a way station on the way to a direct swingarm design. From a marketing point of view, there may be advantages to having something that resembles a fork."

Parker says another advantage of the BMW set-up is a tighter turning radius than with his RADD design, but he notes that seal stiction will still be present, even if at lessened levels, on the Telelever system. "My personal feeling is that true swingarm systems are the way to go," he says.

The GTS1000 has received some negative press, especially in Europe. In response, Parker says, "I feel that the bike has been dismissed by certain people, partly because of price. I think that's unfair. Yamaha should be commended for taking a risk of this magnitude. It says a lot for the motorcycle industry and I think that should be appreciated. BMW deserves the same credit."

–Matthew Miles

BRAVE NEW BEEMER

option, though U.S. BMW officials indicate that ABS is so popular with its customers that 85 percent of R1100RS models imported will be already equipped with the system.

Anti-lock brake systems sense the beginnings of wheel lock-up, then take action to (a) isolate the brake system from the rider's master cylinder and (b) reduce brake torque enough to keep the wheel turning and under control, then (c) return control to the rider's master cylinder. The system does all of this in a rapidly repeating cycle, many times per second.

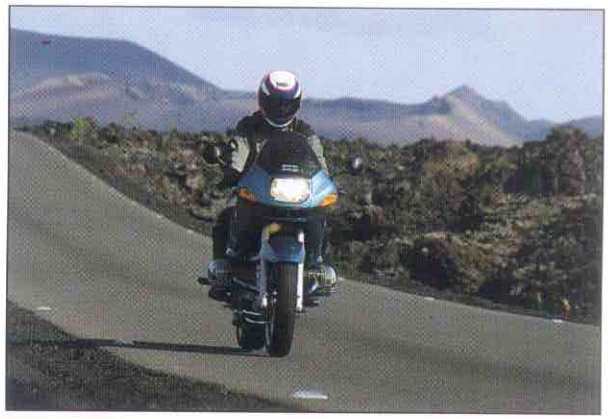
BMW's first ABS used toothed rings, attached to the wheels, with sensors to measure their speed. Multiple self-checking computers detected imminent lock-up, then ordered a hefty solenoid to first seal off the rider's master cylinder, then pull a small amount of fluid from the brake line. This dropped the pressure, allowing the wheel to regain speed, after which the solenoid restored line pressure and returned control to the rider in a cycle repeated as long as lock-up continued to threaten. The speed of this cycle was limited somewhat by the considerable mass of the solenoid's armature. Subsequently developed ABS systems from other makers have offered higher cycling speeds and, at least potentially, superior performance.

The ABS II on the new Boxer employs the toothed rings, sensors and multiple computers, together with a novel drive system. A small motor spins, and on its shaft is an electromagnetic clutch, coupled to a valve and piston much like those used in ABS I. When ABS action is ordered by the computers, a small current activates the electro-clutch, causing the motor torque to pull back the valve and piston, isolating the rider's master cylinder and pulling fluid from the line in the familiar way. Cyclic speed is increased by the low mass of the moving parts. Because only a small current is required to operate the device, electrical requirements are reduced. With the heavy linear motors eliminated, weight is likewise cut.

An interesting note is that ABS and the new front suspension complement each other. All front ends of whatever stiffness have a characteristic natural frequency of forwards-and-back vibration (older riders will remember the flutter of an idling Triumph twin's front wheel). The stiffer the structure, the higher the frequency. The cyclic action of ABS can excite this vibration disturbingly, so the high front-to-back stiffness of the Telelever suspension is an ideal platform for a high-cyclic-speed ABS.

Motorcycling is not an entirely rational undertaking. Motorcycles want to fall over when they stop, and they leak profusely in rainstorms. Cars solve both these problems, yet motorcyclists persist in their idiosyncratic choice of vehicle. Obviously, functionality is not the whole story in motorcycle choice. Do you choose friends based on their ability to run the 100 in 9.6? There are other, perhaps unanalyzable, factors in the choosing–of friends or of motorcycles. In the new Boxer R1100RS, BMW has combined elements of well-proven appeal to motorcyclists–the 1923 concept of a smooth opposed-Twin driving through a shaft–with contemporary engineering to produce a capable, modern motorcycle with strong personality. Congratulations are in order. ◻

CW RIDING IMPRESSION



ACTION PHOTOS BY BMW

ABOARD THE RS

SAMPLING BMW'S WUNDER-BOXER

AHEM. DON'T LOOK NOW, BUT BAVARIAN MOTOR Works may just have skunked the rest of the motorcycle world.

BMW's new R1100RS, it wouldn't be too hard to argue, is the most advanced streetbike ever made, despite using an engine design that first saw the light of day during the time Warren G. Harding occupied 1600 Pennsylvania Avenue. Consider the bike's features inventory: alternate front sus-

pension, engine cases that double as a main frame, single-sided shaft-drive swingarm with anti-chassis-jacking Paralever, advanced anti-lock brakes, fuel-injection, catalytic converter, adjustable ergonomics. This is one very smart motorcycle.

BMW rolled out its new *wunder*-Boxer to the world motorcycling press on Lanzarote, one of the Canary Islands, just off the coast of Morocco. Now, riding specially prepped pre-production models in an exotic, foreign locale is interesting, but it isn't the most accurate barometer of how production versions will perform, so we'll withhold final judgment until we can put an RS through our regular testing regimen here in the U.S. Still, the RS is an impressive piece.

FOBs (Friends of the Boxer) will be glad to know that the new Type 259 motor retains the familiar sound and feel of the old air-cooled opposed-Twin. There's still that characteristic shuddering that sweeps through the entire bike when the throttle is rolled on from low revs. What is different is the amount of power available. Redline is set at 8000 rpm, and the RS likes to rev. BMW claims 90 horsepower at the crank, which will translate into perhaps 75 at the rear wheel. While this figure won't have ZX-11 riders looking anxious-

ly over their shoulders, it's enough to push the neo-Beemer to a top speed of maybe 130 mph, judging from a couple of full-bore passes I made on one of Lanzarote's few stretches of straight asphalt. For comparison, the 980cc R100R Boxer tested elsewhere in this issue achieves 50 rear-wheel horsepower and runs out of steam at 116 mph.

The engine is impressive, but it's the front suspension that steals the show. Steering effort is wonderfully light at a snail's pace and remains so at speed. The Telelever system doesn't hinder the bike's turning radius either, so feet-up U-turns on backroads are no problem. And this may be the most supple front suspension ever, with very little trace of seal stiction. Indeed, from the saddle, the rider can see the fork scrapers constantly reacting, even on relatively smooth surfaces. The front shock has no adjustment for now. As one engineer confided to me, small changes make a big difference with Telelever, and BMW was afraid that some customers could set things up very wrong.

One surprise is the fitment of Bridgestone Battlax radial tires. I ask if there was any debate about the propriety of using Japanese rubber on the R1100. "Not after we tested the Bridgestones," I'm told.

Problems with the RS? One mechanical, two psychological. The in-metal problem is the gearbox, which on the pre-production machines was notchy and noisy, especially when downshifting in the lower gears. Sourced from the four-cylinder K series, the five-speed transmission apparently is reacting adversely to the different power pulses of the Twin. This isn't debilitating, but really chafes on an otherwise outstanding motorcycle. "We are working on it," one of BMW's engineers told me. "It will be better before production begins."

The in-mind problems deal with the bike's looks and its price. Those Boxer lovers who think the old Twin was designed by God and not to be trifled with probably aren't going to trade-in their mounts–for them, old-style R-bikes will be available for at least another two years. But BMW isn't counting on "switchovers," hoping instead that new buyers will be drawn from elsewhere. "For the Twin to be a success, we need more than switchovers," said one company official.

The other psychological hurdle will be sticker shock. BMW dealers can recite chapter and verse about the three year/unlimited mileage warranties, traditionally high resale values and roadside-assistance programs, but with non-ABS models right at $12,000 and the full-boat version pushing $14,000, it's going to take a serious financial commitment to become an R1100RS rider.

"We'd be in trouble if this were just a warmed-over Boxer," a BMW man said, "but this is a really advanced machine."

That kind of optimism was rampant at Lanzarote. I mention to one of the company's higher-ups that all those involved with the R1100RS project seem to have a gleam in their eyes, a supercharged enthusiasm, almost as if the introduction of this new flat-Twin marks a new beginning, a "coming home" for BMW.

He thinks about this for a moment, smiles, and says, "You have put that very well." *–David Edwards*

PHOTOS BY DAVID EDWARDS