



## ROAD RESEARCH REPORT:

# BMW 2000 CS

A thoroughbred GT car squares off with some pretty stiff competition

At last count, 28% of all the BMW owners in this country were reading *Car and Driver*. Obviously, the BMW is *Car and Driver's* kind of car . . . and vice versa. As the word gets around, more and more non-enthusiasts will discover the pleasure of BMWs, and owning one will not be quite the connoisseur's private preserve it now is. It has to happen. The 1600/1800 sedan series is already gaining acceptance as an enthusiast's utility car; the TI is becoming the standard mode of transportation for off-duty race drivers and the TISA is going like stink in FIA sedan races. Now the 2000 Coupe is after the specialty car market—bound and determined to succeed.

At first glance, we thought the BMW Coupe was some kind of sports car. It sure looks like one. But it's got four seats—four *usable* seats. So maybe, we thought, it's a "personal" car like the Thunderbird, Toronado and Riviera. But it stops and handles like a thoroughbred GT car such as the Porsche 911 or the Mercedes-Benz 230SL. What has happened is that

BMW has broken new ground once again—the 2000 is a 4-seater GT car. Not a “two-plus-two” with occasional seats in the rear, like the expensive Ferrari 330/2+2, the Aston Martin DB-6, the Iso-Rivolta, or the upcoming Jaguar 2+2 XK-E . . . or even like the cheaper Mustangs, Barracudas and Marlins . . . most of which have comfortable, roomy seats in front and thinly-disguised torture chambers in back. Enthusiasts have been hollering for a full four seats in a reasonably-priced sports car. Okay, men—simmer down—it’s arrived.

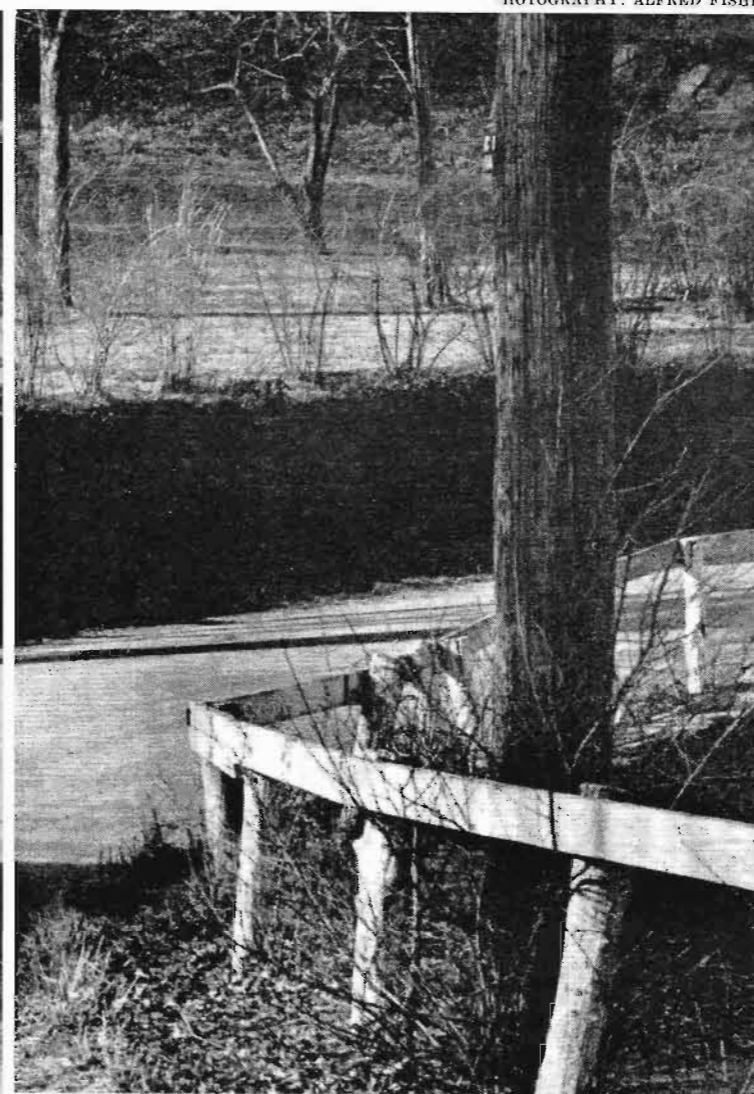
More accurately, *they* have arrived. The 2000 CS boasts a 135-hp 4-cylinder engine and a 4-speed, all synchro gearbox, while the 2000 CA features a 120-hp version of the same single overhead camshaft engine, coupled with a brand new ZF automatic transmission. We secured a CS for this Road Research Report, but promise a follow-up road test of the CA as soon as we can get our hands on one.

There are several ways of stacking the BMW up against its competition. One of the most illuminating is by price. Both the CS and the CA sell for \$4985 POE New York (the first time an import has even been offered with an automatic transmission at no increase in cost), which seems like only a few dollars short of being a very large sum of money. But \$4985 is substantially less than the prices of BMW’s closest competition—the Porsche 911 and the Mercedes 230SL—not to mention the Jaguar XK-E. And it’s about half the price of the imported 2+2s like the Ferrari, Maserati, Aston and Iso.

Actually we don’t know how BMW can build the Coupes the way they do, and sell them at the price they do, and make anything like a profit. The level and control of quality are on a par with the Porsche and Mercedes, and superior to virtually every other car mentioned. The 2000 is far and away the best combination of luxury and price we’ve seen yet.

Of course, BMW made its reputation with enthusiasts as builders of sporting machinery, and the 2000 is more civilized than the TI sedan—somewhere, say, between the Porsche 911 and the Mercedes 230SL, certainly insofar as ride and handling are concerned. The only area where the 2000 doesn’t meet or exceed the competition is in straight-line performance. The 2000 CS will get to 60 mph in 10.6 seconds, through the quarter-mile in 17.7 seconds at 79 mph, and reach a top speed of 115 mph. The 911’s figures are 7.0 to 60, the quarter-mile in 15.6 at 90, and a top speed of 130 mph; and the 230SL’s are 9.9, 17.0 at 86, and 125 mph. These two cars cost \$1200-1500 more than the BMW; a more direct comparison could be made with the 4-cylinder Porsche 912 (11.7 seconds to 60, 18.1 at 77 mph in the quarter, 115 mph top speed), which sells for \$4690, including a 5-speed transmission. But if flat-out acceleration and speed are of paramount importance, the BMW isn’t quite going to fill the bill in that class.

Certain particulars of the 2000’s styling are unfortunate. The 1600/1800 sedans are conventional and undistinguished, but also simple and uncomplicated. The overall shape of the 2000 is squat, bulbous, Corvair-inspired, but basically handsome—especially from the beltline up, where it resembles the big, beautiful Bertone-bodied BMW 3200 CS Coupe. The 2000’s tail is not imaginative, but hardly offensive. Its grille is traditional BMW. The beholder’s eye, however, is irresistibly drawn to those headlights. Oh dear. “Somebody,” opined a Mercedes man, “stayed a few hours too long adding final styling wrinkles.” The idea, apparently inspired by the Mercedes-Benz *Lichteinheit* headlights, was to integrate all the lights . . . not only



PHOTOGRAPHY: ALFRED FISHER

with each other, but also with the surrounding bodywork—a Wagnerian unity of form. Oh well . . . it doesn’t look so good on the Mercedes either.

Actually, no photograph of the 2000 has done the car justice. It looks about 100% better in the flesh than on paper, and better out on the road than in the confines of a showroom. And from a practical viewpoint, the headlight treatment makes the directional signals visible from the side as well as the front; the body shape has sculptured edges to help the driver judge the width of the car, and the Coupe has a 6% smaller frontal area than the sedan for better aerodynamic efficiency. None of the odd ornamentation was added frivolously; even the disconcerting vertical slots behind the front bumper are functional.

The Old World craftsmen at BMW are naturally fanatics about quality, and their damn-the-expense approach is apparent even from the outside. That cone-shaped rear view mirror on the left-front fender is expensive, but standard equipment. What chrome there is is well-applied to what feels like very hefty-gauge sheet metal. All the mouldings, doors and decklids fit properly; the paint is flawless and the window glass is commendably free of distortion.

The elegant nature of the 2000 is most notable from within. Normally, we are absolutely nonplussed by appliques of wood veneer in the interior, but the use of walnut in the 2000 so impressed us with its taste and beauty that we couldn’t imagine the car any other way. It gleams deeply, like the storied 14 coats of hand-rubbed lacquer. It extends the full width of the dash and is full of compound curves that reflect like fine porcelain china, and a second strip is inlaid in the horizontal center piece of the steering wheel. A padded dashboard, padded and recessed sun visors and full pile carpeting are all standard equipment. Padding is also employed around the instrument hood and underneath the dash.

Instrumentation is fairly complete, although pastel-colored lights substitute for an ammeter and oil temperature gauge. There are four round dials ranged in front of the driver: an electric clock, a speed-, odo-, trip-meter, an 8000 rpm tachometer (redlined at 6500 rpm), and the warning lights dial—which also contains lights for high-beam indicators and low (less than two gallons) fuel reserve. The small controls are logically arranged and positioned, with the exception of the key/starter and the choke, which are on a crackle-finished casting underneath the steering column. (Whatever hardware isn’t chromed is invariably a solid casting, finished off in one opulent texture or another.) The vent pane knobs are difficult to operate—it takes an unnatural motion, and about as many turns lock-to-lock as an old VW heater knob.

The hardware is where the BMW really shines . . . literally. Its aesthetic appeal is that of a Bauhaus or Raymond Loewy award-winning design. Everything operates with the precision of a key turning a Yale lock, and it’s obviously built to outlast the tomb of Tutankhamen. The ventilation outlets on the dash are typical: chrome louvres which twist through 360° and are ganged to open and close together to expose a heavy wire screen. And the glove box, which hinges down as a unit like a bank vault door. And the combined arm rest/door pull, which provides a ledge over the squeeze-type door handle—a good safety feature. Everything in the car is not only sturdy and well made, but thoughtfully laid out as well.

The trunk, incidentally, is gigantic (16 cu. ft.) by sports car or GT standards—not bad even for a small

## BMW 2000 CS *CONTINUED*

sedan. It features counter-springing by crossed torsion bars, full carpeting and a little light that goes on when the lid is lifted. Nice touches. Additionally, there is ample storage space within reach of the driver, in the form of trays, pockets, shelves and compartments.

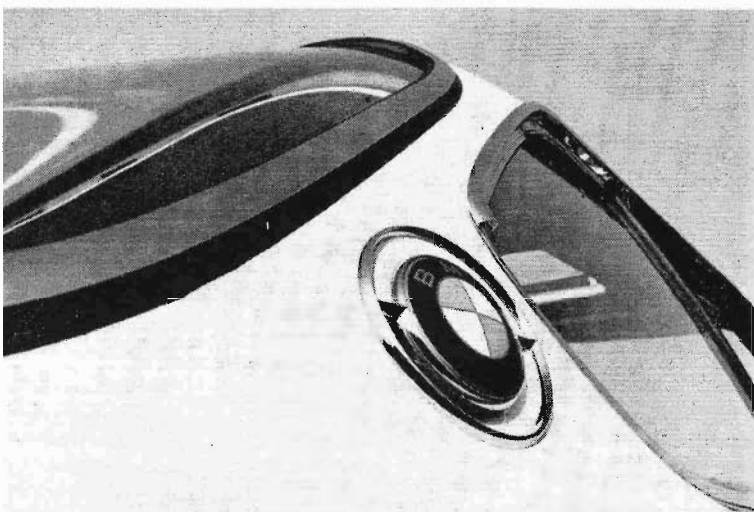
Our test car had optional electric door windows and an electric sun roof. The rear quarter windows are electrically operated as standard equipment, on the theory that the driver shouldn't have to reach around behind him to get at the crank. The motors are irritatingly noisy, however, and maddeningly slow to operate, so we would recommend the manual door windows. The sun roof is a keen idea if you're less than six-foot-two, since the mechanism occupies over an inch of headroom. It had one unusual feature worth mentioning: as the roof section slides back, a spoiler pops up to cut wind roar and buffeting at high speeds.

The heating and ventilating system is extensive and effective. Fresh air is ducted in through a radiator and a 3-speed blower, and thence to six separate outlets: two to defrost the windshield, two for side-window defrosting and high-level heating, and two for foot-level heating. In summer, these outlets plus the two directional vents in the dash are used to bring fresh air in, with or without the help of the fan. The rear window is defrosted in winter by air passing between it and a slot at the rear of the headliner. Stale air is drawn into this slot to emerge through vents on the outside, between the rear quarter window and the backlight, disguised to look like BMW emblems. (BMW emblems, symbolizing a whirling propeller, are visible from almost every angle, but that's the only pair that's functional.) The heating and ventilating devices are controlled by four levers above the console; their operations are obvious after a bit of experimentation, but are just out of reach without leaning forward.

The front seats are the Reutter type, with full adjustment for back rake as well as an enormous range of fore-and-aft travel. The leather upholstery has a basket-weave pattern in the center which "breathes" to keep the occupant's back and bottom cool. The seats are anatomically contoured to support pressure equally over as wide an area as possible, making them extremely comfortable. Also, their bucket shape offers good resistance to being shifted around in corners or over rough roads—even without a seat belt. The rear seat is a contoured bench with a center arm rest; shoulder room is identical with that in front, but head- and hip-room suffer somewhat, and leg-room is definitely less, although this may be alleviated by positioning the front seats farther forward.

The driving position is excellent—as good as the Mercedes—although not quite up to the standards set by the Porsche, and—strangely enough—by the BMW's own sedans. The steering wheel is set fairly low, but well forward. The seat is low and the pedals are high, which could prove tiring to some drivers on a long journey. The relationship of the seat to the steering wheel, pedals and gearshift is quite natural for drivers steeped in the classic European semi-reclining style of driving, but perhaps a bit racy for T-Bird and Impala owners.

The pedals are large and well spaced, but not so far apart that heel-and-toe maneuvers can't be practiced. The pedal pressure for both the brake and the clutch is moderate, although the steering is quite heavy at low speeds and while parking. (Power steering is not offered, even for the female-orientated 2000 CA.) The gearshift lever is something of an arm-stretcher getting into third gear, but using it is an enthusiast's de-





light. The BMW's gearbox is one of its most appealing features, with unbeatable Porsche-patent synchromesh and a light, positive throw.

Entering or leaving the 2000 calls for a minimum of calisthenics, even for rear seat passengers. The doors are unusually wide (38 inches) and open far enough to be out of the way. The engine fires up readily and is notably quieter than the TI's engine at idle. The clutch bites firmly but progressively, and pulling power is evident even at low revs. Almost at once, the car imparts a feeling of solidarity—there are no thumps or metal-to-metal noises or body panels working against each other. It feels all of a piece, rather than screwed together from innumerable bits out of a parts bin.

The ride is that usually associated with a much larger, heavier car. It approaches the ride quality that only Mercedes has achieved in the past—maybe it's becoming a Teutonic trait. Unlike the TI, which treads with a springy, almost giddy step, the 2000 stays glued firmly to the road, planted four-square on its big fat tires. But it isn't, after all, a weighty, long-wheelbase car, as the 2000's quick responsiveness soon proves.

As the car picks up speed, the absence of road-, engine- and wind-noise becomes more and more remarkable. The engine is tractable, flexible and makes itself felt only at speeds over 5000 rpm on full throttle, when a trace of roughness appears and the engine note starts to growl.

The impression of stubborn stability is carried over to the 2000's handling characteristics. In addition to the heavy steering already mentioned, there is a strong initial suggestion of understeer—it feels as if it would rather return to a straight line. Then it settles into the turn, and the steering becomes lighter and more sensitive, as the car's cornering attitude approaches neutralsteer. Pressed hard, it lowers its nose like a bulldog; the tail rises slightly; the inside rear wheel starts to lift and the steering characteristic reaches oversteer just before breakaway. This is all done with great deliberation and without any sudden surprises. It would seem ponderous except that the car is getting around the corner much faster than expected. Our test car exhibited excellent adhesion with the standard tires. Radially ply tires are optional and would stick even better, perhaps even reducing the initial understeer tendency. Like previous BMWs, the 2000 is nearly fool-proof in a corner, and it is surprisingly easy to alter its direction while cornering even when heavily committed to a line near the limit of adhesion. It's a car you just get into and drive, without any "getting used to" period.

The torque and flexibility of the 2-liter engine suffice to keep the car lively in one gear lower or higher than the optimum for any given condition. It revs reluctantly above 5000 rpm, but there is more than enough punch from 1500 rpm on up. In normal driving, there is no need to wind it up to its 6500 rpm maximum, but it's reassuring to have that margin there if you need a few extra moments of full power while passing a truck on the open highway.

The disc-front, drum-rear brakes are power assisted and highly effective, although not quite as stable in a panic stop as a 4-wheel disc system. What small tendency there is to act untidy in emergency-situation braking is counteracted by the car's natural running stability and positive steering control. Fade resistance is excellent; in fact, the brakes seemed to get better the harder we used them.

Comfort for long trips is assured by the secure driving position, the directness of the controls, and the

*(Text continued on page 83 Specifications overleaf)*

## Road Research Report: BMW 2000 CS

Importer: Hoffman Motors Corp.  
443 Park Ave.  
New York, New York

Hoffman Motors Corp.  
1862 S. La Cienega Blvd.  
Los Angeles, Calif.

### PRICES

Base Price: \$4985

### ENGINE

Water-cooled..... 4-in-line, cast iron block, aluminum head,  
5 main bearings  
Bore x stroke..... 3.504 x 3.150 in, 89.0 x 80.0 mm  
Displacement..... 123 cu in, 1990 cc  
Compression ratio..... 9.3 to one  
Carburetion..... 2 2-bbl. Solex 40PHH sidedraft  
Valve gear..... Single overhead camshaft, chain driven  
Valve diameter..... Intake 1.73 in, exhaust 1.50 in  
Valve lift..... 0.354 in  
Valve timing (at checking clearance)  
Intake opens..... 19° BTC  
Intake closes..... 66° ABC  
Exhaust opens..... 66° BBC  
Exhaust closes..... 19° ATC  
Power (SAE)..... 135 bhp @ 5500 rpm  
Torque (DIN)..... 123 lbs-ft @ 3600 rpm  
Specific power output..... 1.10 bhp per cu in, 67.8 bhp per liter  
Usable range of engine speeds..... 800 @ 6500 rpm  
Electrical system..... 12-Volt, 44 amp-hr battery, 500W alternator  
Fuel recommended..... Premium  
Mileage..... 14-22 mpgs  
Range on 16-gallon tank..... 224-352 mile

### DRIVE TRAIN

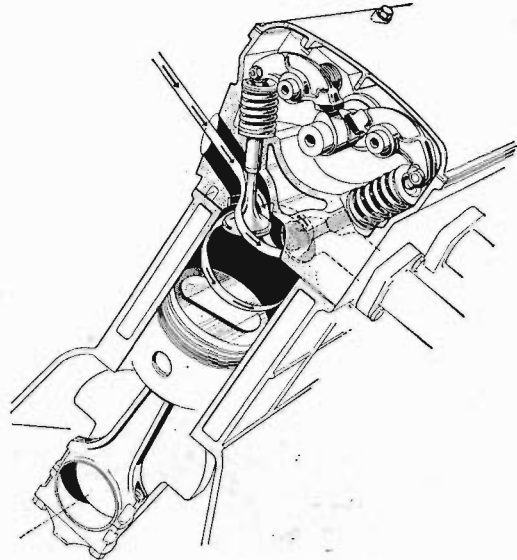
Clutch..... 7.9-inch single dry plate  
Transmission..... 4-speed manual, all-synchro  
mph/1000 Max  
Gear Ratio Over-all rpm mph  
Rev 4.18 16.26 -4.5 -30  
1st 3.83 14.89 5.0 32  
2nd 2.05 7.97 9.3 60  
3rd 1.35 5.25 14.1 92  
4th 1.00 3.89 19.1 115  
Final drive ratio..... 3.89 to one

### CHASSIS

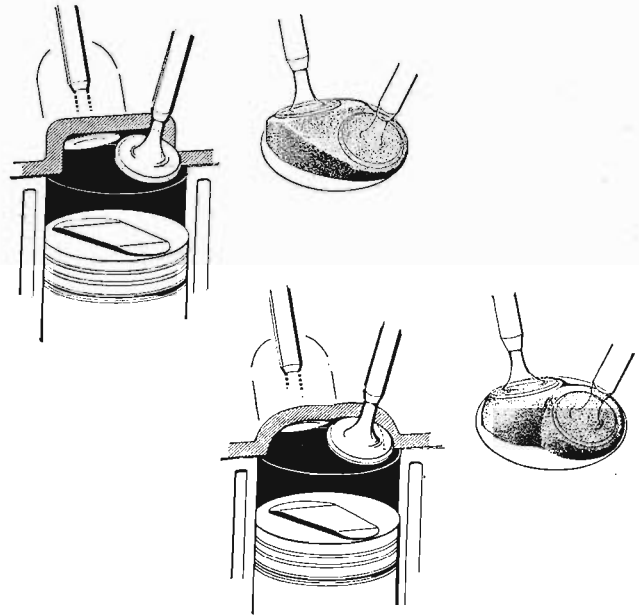
Wheelbase..... 100.4 in  
Track..... F 52.5 R, 53.8 in  
Length..... 178.0 in  
Width..... 66.0 in  
Height..... 50.9 in  
Ground clearance..... 5.9 in  
Curb weight..... 2649 lbs  
Test weight..... 2845 lbs  
Weight distribution front/rear..... 55/45%  
Pounds per bhp (test weight)..... 22.1  
Suspension F: Ind., lower wishbone and MacPherson strut, coil springs, anti-sway bar  
R: Ind., Semi-trailing arms, coil springs  
Brakes..... F: 10.5 in discs, R: 9.84 in drums, 378 sq in swept area  
Steering..... ZF-Gemmer worm-and-peg  
Turns, lock to lock..... 3.3  
Turning circle..... 32 ft  
Tires & Wheels..... 175-14 on 5JK rim

### ACCELERATION

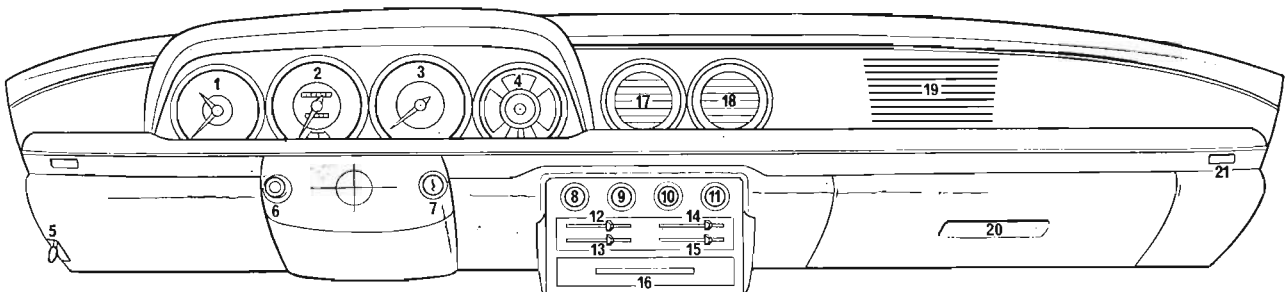
Zero to Seconds  
30 mph..... 3.8  
40 mph..... 5.8  
50 mph..... 7.9  
60 mph..... 10.6  
70 mph..... 14.2  
80 mph..... 18.0  
90 mph..... 22.8  
100 mph..... 30.3  
Standing ¼-mile..... 7.9 mph in 17.7



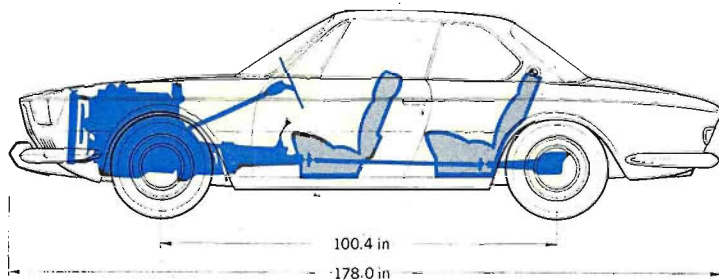
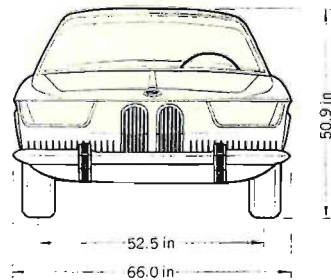
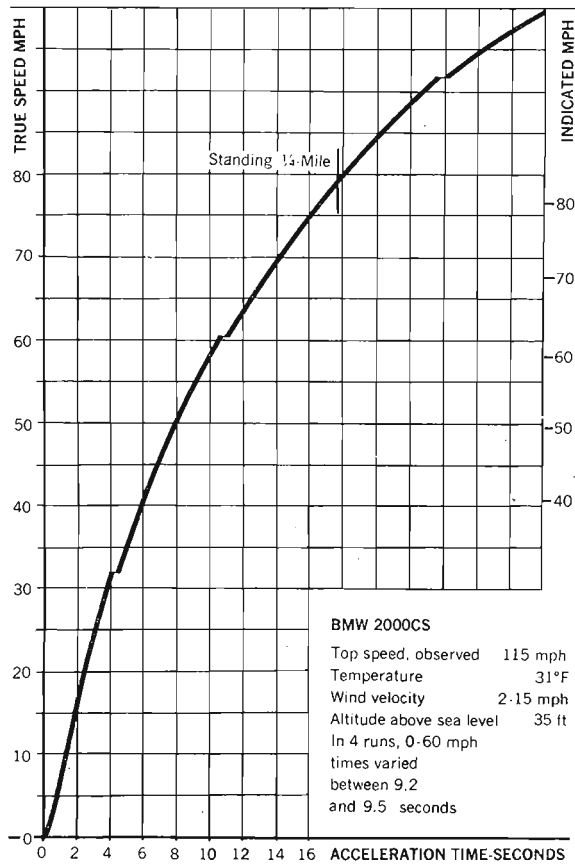
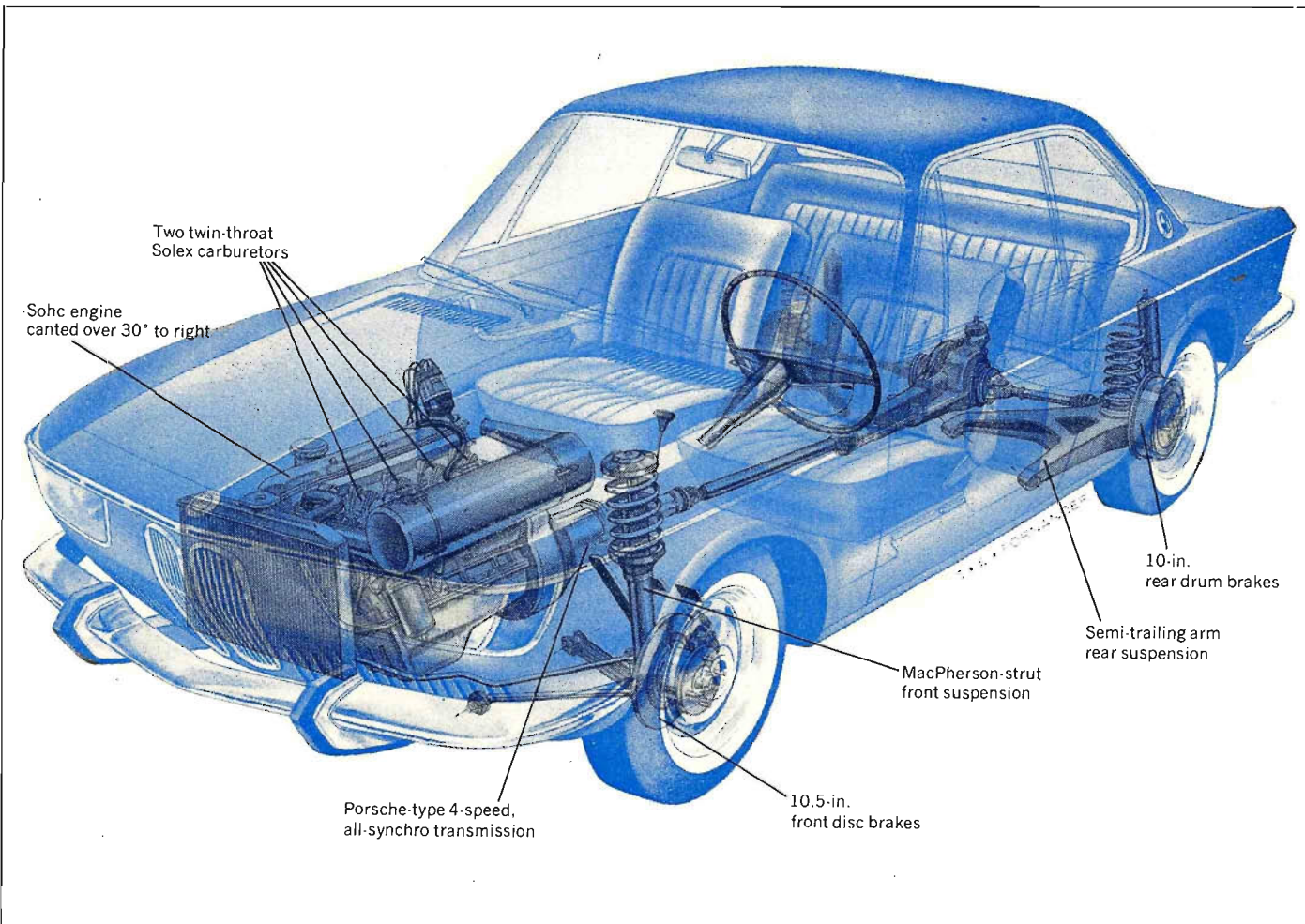
Detail of the single overhead cam engine. The arrows indicate the flow of air through the ports and into the combustion chamber. Note counterclockwise swirl.



The old combustion chamber (above) compared with the latest high-turbulence design (below) used in the CS.



(1) Electric clock, (2) Speedometer, odometer, tripmeter, (3) Tachometer, (4) Fuel gauge, water temperature gauge, oil pressure warning light, turn indicator light, oil temperature light, ignition warning light, (5) Hood release, (6) Choke, (7) Ignition switch and starter, (8) Light switch, (9) Windshield wiper, (10) Heater-blower, (11) Cigarette lighter, (12, 14) Heater, front seat, rear seat, (13, 15) Fresh air, front seat, rear seat, (16) Ashtray, (17, 18) Fresh air vents, (19) Radio speaker, (20) Glove compartment, (21) Side window defroster.



freedom from noise, vibration and harshness. The most often-needed secondary controls (horn, headlight dimmer, etc.) are close at hand, to be found without groping or taking one's eyes off the road. With a huge glass area, vision is excellent in all directions—nearly as good as a full-size American sedan, except for the low height of the BMW. Unlike the Volvo 1800-S, for instance, the belt-line is very low in relation to the driver's position, and forward vision is unobstructed even for short drivers. The ventilation is draft-free, the windshield wipers and washers do a fine job of keeping the view ahead clear in poor weather, and insulation from inclement elements is almost total. There is sufficient room to move around inside without getting claustrophobia, and enough range of seating adjustment to vary one's position from time to time. The BMW is so comfortable, however, that we often forgot to do anything but sit for hours in the same position we'd started with, and enjoy the driving.

The 2000 Coupes are based on the chassis and running gear of the 1600/1800 sedans, with entirely new coachwork. The chassis-body is built as a unit, like the sedans, and is amazingly stiff in torsion and strong of beam. If the experience of the sedan is anything to go by, the body-chassis of the 2000 should hold up for a very long time, even under heavy abuse.

The engine is an enlarged version of the 1800cc engine used in the sedans. The idea of boring it out to two liters first occurred to British racing engine tuners. When queried, BMW told them it couldn't be done. The cylinder walls were only 6mm thick, said BMW, and boring out 5mm would leave the walls paper-thin. So the British took a block, bored it out from 84mm to 89mm and sent it triumphantly to BMW. BMW responded by providing special oversize pistons and beefing up the block so that they could make their own production two-liter with the proper cylinder wall thickness. The 2-liter racing engines nearly dominate their class of sports/racing car events, while BMW's 1800 TISA, a racing version of the TI, is almost unbeatable in sedan racing.

The BMW engine is an in-line 4-cylinder, mounted at a 30° angle in the passenger cars, and featuring a chain-driven single overhead camshaft. The cylinder head is an 8-port design cast in aluminum; the block is cast in iron and supports the crankshaft in five main bearings.

Two rocker shafts are used, with the cam lobes actuating the rocker arms directly on the valves, which are placed at an included angle of 55°. Running clearances are set by means of an eccentric roller on the valve end of the rocker arm. The complete weight of the engine, less flywheel, is under 300 lbs.

For the 2000 engine (actually 1900cc), the number of counterweights was increased to eight for smoother running and less vibration at high speeds. The 44mm intake valves and 38mm exhaust valves of the TISA are used in the 2000, and the valve springs were changed from duals in the 1800 TI to single, progressively-wound springs, raising the onset of valve bounce to over 6500 rpm (vs. 6200 rpm in the TI). But the big change was in the shape of the combustion chamber. Advantage was taken of a slight bend in the intake port to impart a swirling motion as the mixture enters the combustion chamber. Inside the chamber, a controlled turbulence is set up as the piston approaches top dead center on the compression stroke. Finally, a strategically-placed squish area marshals the charge and squirts it past the spark plug toward the exhaust valve at the moment of ignition. All this adds up to a very efficient—and clean—burning of the mixture, reasonable gas economy, freedom from pre-detonation, and easier cold starting. The lubrication system, originally designed for an engine 25% smaller, is still more than adequate for the 2000; oil flow during the critical first few revolutions of a cold engine is plentiful, and almost 500 gallons per hour course through the engine at 6000 rpm.

The power output of the CS, 135 horsepower, is remarkably good for a production two-liter, especially in view of its smooth running characteristics and wide operating range. The CA, with its automatic transmission, uses a milder 120-horsepower engine with an even broader torque curve, pulling a tighter rear axle ratio (4.11 vs. the CS's 3.89). Carburetion in the TI and the CS is by a pair of giant Solex 40mm dual-choke side-draft units. In the past, these carburetors (also used in the Renault R-8 Gordini) have tended to be troublesome unless tuned for each particular car. We are assured that the big Solexes are now absolutely untemperamental, and if our test car is any indication, it's absolutely true. The CA gets around all this by using a tiny single-throat Solex PSDIT, which is dead consis-

# LOTUS

It is an incredibly safe car, forgiving and vice-free and so obviously comes from a parent-hood of racing knowledge; it is essentially a sports car, and as Colin Chapman says, it is a fun car. It is not cheap, but then nothing that is good is cheap, but to anyone contemplating buying a cheaper 2-seater sports car, and there are many of them, I would say "Sell the television set, the washing machine, the wife's car, give up smoking, even give up drinking, but scrimp and save and buy an Elan, you won't be disappointed." It is a car that every young man should strive his utmost to acquire, and a lot of old men too. ☺

Denis Jenkinson  
MOTOR SPORT  
MAY 1965



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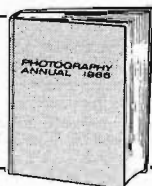
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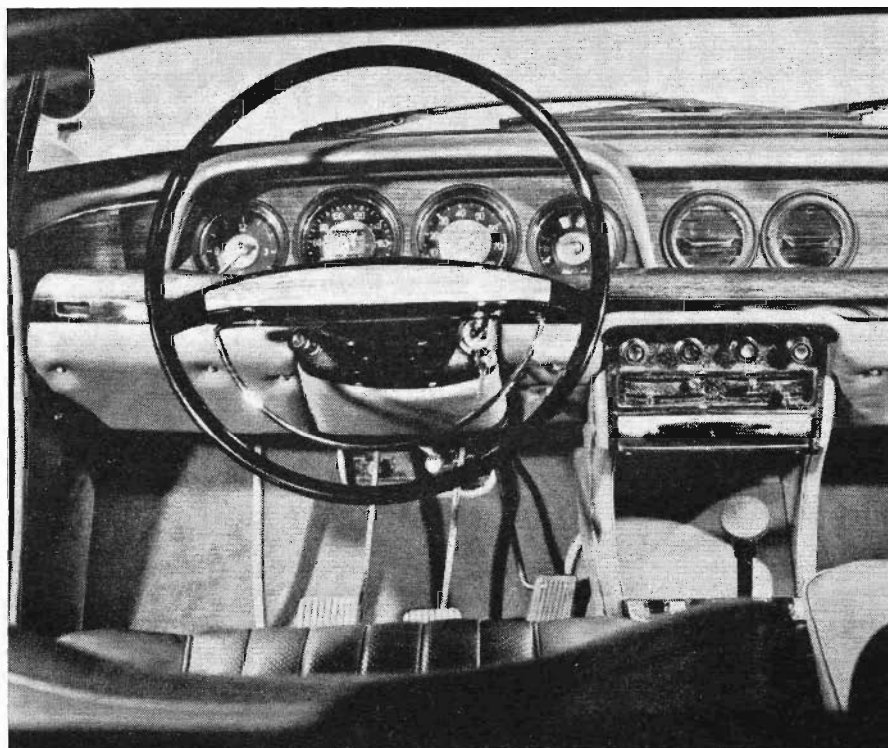
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## BMW 2000 CS CONTINUED

tent at the expense of top-end breathing ability. The CA also uses a lower compression ratio (8.5 to one vs. the CS's 9.3 to one), for operation on regular fuel.

The transmission of the CS is completely straight-forward, with an excellent 4-speed, all-synchro manual borrowed directly from the TI. As the CA's transmission is one of Europe's rare automatics, it deserves mention here, but we will save a full description for our forthcoming road test. It is not actually made by ZF, but was developed in close cooperation between that firm and BMW, and is similar to the ZF automatic used by Peugeot. It con-

The semi-trailing arm rear suspension is an adaptation of the swing-axle system, but with suitable modifications to keep camber changes in bounce and rebound to a minimum. At high lateral accelerations, the outside rear wheel may assume a slight positive camber (its static position is slightly negative), while the inside wheel is strongly negative—unlike the bowlegged aspect of a pure swing-axle system in a corner. The MacPherson strut front suspension banks the wheels into the turn like a motorcycle rider, reducing understeer. It feels a little soft in roll stiffness at the front but a heavier anti-sway bar might



sists of a fluid-drive torque converter coupled to a 3-speed planetary transmission with intermediate ratios of 2.56 and 1.52, i.e., quite similar in specification to a standard American automatic. BMW claims that acceleration times don't suffer with the automatic, but the top speed is reduced to 107 mph.

The 2000's suspension is basically that of the 1500/1800 series, though certain details, such as the rear spring placement, are different, and the ride characteristics have been considerably refined. A large amount of vertical compliance is provided for, with 6.6 inches of wheel travel at the front and 7.8 inches at the rear. Little of this is used under side-loading, however, because the fairly high roll centers and low center of gravity result in a modest amount of body roll.

make the front tires plow, and stiffer springs would upset the balance of what is now a near-perfect ride.

The steering is ZG-Gemmer worm and peg, like that of the old 356-series Porsches, but with a 3-piece track rod and a gear ratio of 17.6:1. The brakes are 10½-inch Ate-Dunlop discs at the front and 9⅞-inch drums at the back, with servo assistance.

That about sums it up. The BMW 2000 packs more luxury, comfort, and over-the-road performance into a taut, sophisticated, beautifully-built package than anything else available within its price range. It takes aim at several well-established Grand Touring cars that don't have nearly as much to offer. The competition is tough, but the BMW comes on strong, and we predict it will score a bulls-eye. **cjo**