



**E**UROPEAN DESIGN philosophy, as evidenced in both BMW and Rover (Page 60) test cars, places greater value on chassis integrity and suspension capability than does its American counterpart. Performance standards, in terms of straightforward acceleration and top speed, also are subject to divergent values. As a result, the European car more often comes out a car for the driver, where the domestic product seems more to be a car for the driven. There are equally good arguments in support of both philosophies, and doubtlessly room for both in the automotive world.

The BMW (for *Bayerische Motoren Werke AG*—Bavarian Motor Works) 2000 TI embodies virtually all the qualities the European motorist seeks in a passenger car—if he can afford them. Road-holding and handling are of the highest order, comfortable cruising speeds are exceptionally high, exterior and interior design and finish impeccable (by European standards). The actual driving of the car is pleasurable and comfortable, the car delivers acceptable fuel economy, and the overall dimensions are modest enough to permit the car's utilization of

# BMW 2000 TI



COMPACT EXTERIOR, full-sized interior and a highly tuned, rally-ready engine are the best features of the 2000 TI.



DENNIS SHATTUCK PHOTOS

narrow European roads. In short, it is a European car designed by Europeans for European conditions, just as American cars are . . . etc.

Basic to the BMW design are unitized body and a full independent coil spring suspension. To this are added a highly tuned 4-cyl. single overhead cam engine, a remarkably smooth transmission and disc/drum combination brakes. Light alloy is used extensively in the power train, and the inherently lighter weight of a medium-small unitized body keeps the BMW to an admirably low, 2510 lb. total—ready to go.

**T**HE 4-DOOR body/chassis is built up from a rather extensive platform construction. (See illustration.) A deep box-like well forward contains engine and mounts upper front suspension components. The cowl section ties this to a deeply stamped floorpan with a tunnel backbone. Rear fender-well arches are box-capped to bridge the opening and provide rear suspension support. A deep-dish well at the rear carries the spare tire.

Separate sub-frame crossmembers carry lower suspension system mount-

ings. The front sub-frame extends across under the engine, terminating in pivots for the lower A-arms; upward projections mount the steering gearbox, and the engine bearers. In assembly the sub-frame ties directly into the body extension and the MacPherson strut vertical suspension component fits into sockets in the upper surface. The rear sub-frame ties into the body just forward of the wheel-arches and its rearward extension, which actually is the differential housing neck, mounts at a body crossmember at the rear. Coil springs fit in fender-well pockets, as do the upper ends of the telescopic shock absorbers. Rear suspension trailing arms pivot off the sub-frame and serve as hub-carriers. Open cross-type universal joints are used at the inboard, differential ends, while enclosed U-joints and sliding splines are at the outboard ends of the half-axes. Drum rear brakes, 9.85 in. in diameter, mount inside the wheel, but outside the hub-carrier. In this type of independent rear suspension, all locating duties and acceleration and braking loads are taken by the trailing arms. With extensive rubber bushing between arm and sub-

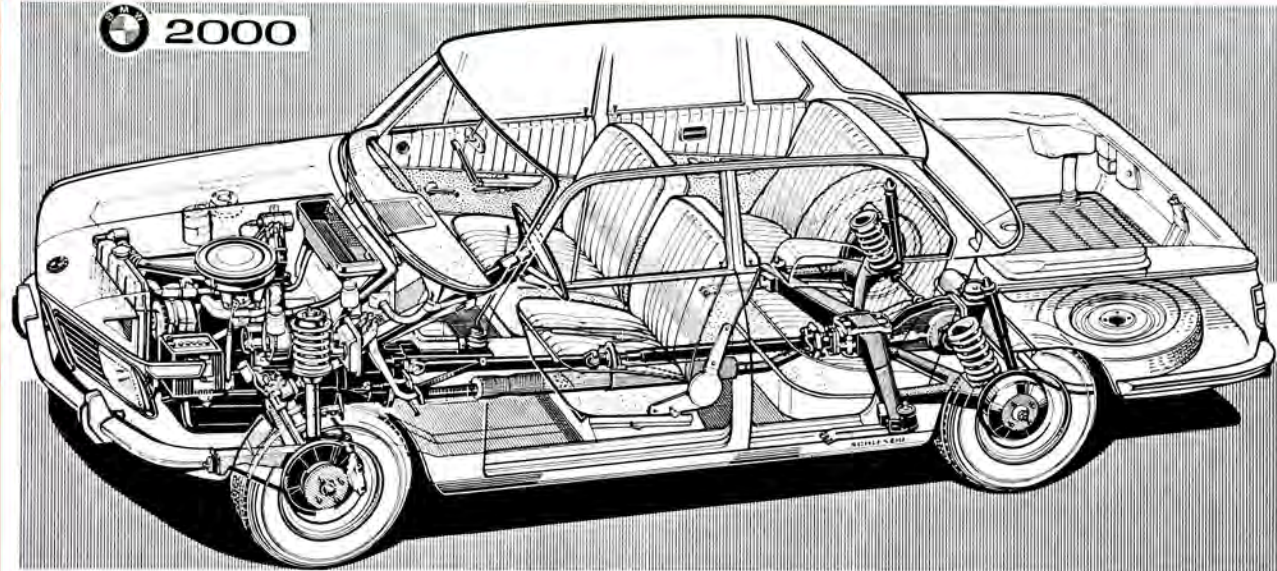
frame, and between sub-frame and body, little or no road noise is transmitted to the body itself.

Brakes, in front, are German ATE, which in reality are English Dunlops, manufactured under license. These have 10.7-in. rotors, with 2-cylinder calipers powering a pad against each side. Swept area is 280 sq. in., which is most generous for a car of this size, but which are completely in keeping with its high cruising speed. CL's usual two stops from 80 mph were tried and they produced 28 ft./sec./sec. deceleration with no locking or fading. A third stop also repeated the reading, as did fourth and fifth stops. The BMW's brakes, despite a solid, non-vented rotor and two fewer cylinders than contemporary U.S.-made discs, must rate as excellent for the task. The swept area dimension is equal to or larger than that for the majority of U.S. disc-equipped cars, of which many must stop half again as much weight, so brute force may be a key to good braking. Pedal pressure seemed reasonably light and the progressive responsiveness was most reassuring.

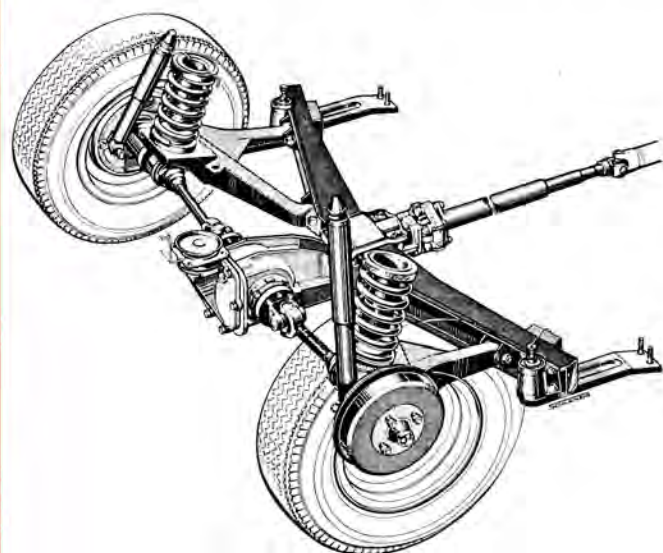
BMW fits 6.95-14 Continental Super Record (6-ply rating) tires to 5.5 JK

## ***Conservative Corners Mask a Rascal***



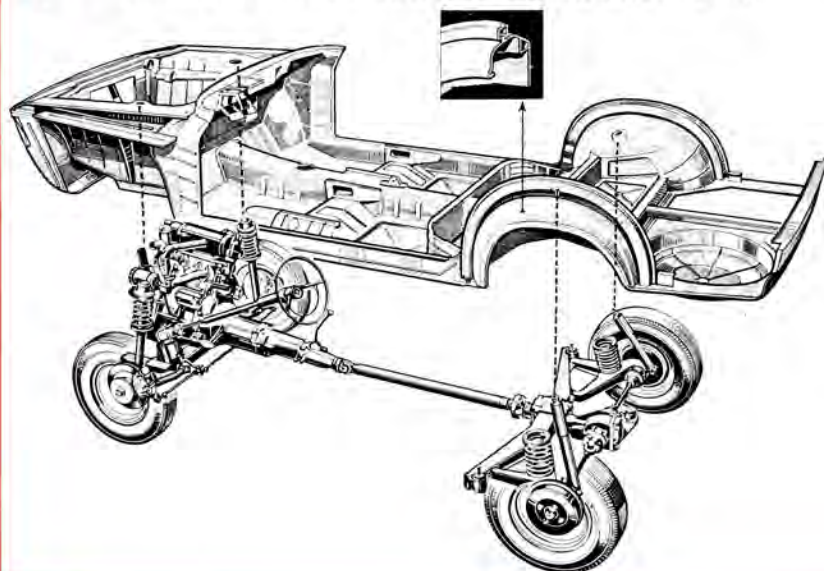


BY MOUNTING the engine forward of the front wheel centerline, BMW engineers gave driver and front seat passenger ample leg room. Body height and deep footwells provide comfortable accommodation for rear seat passengers.

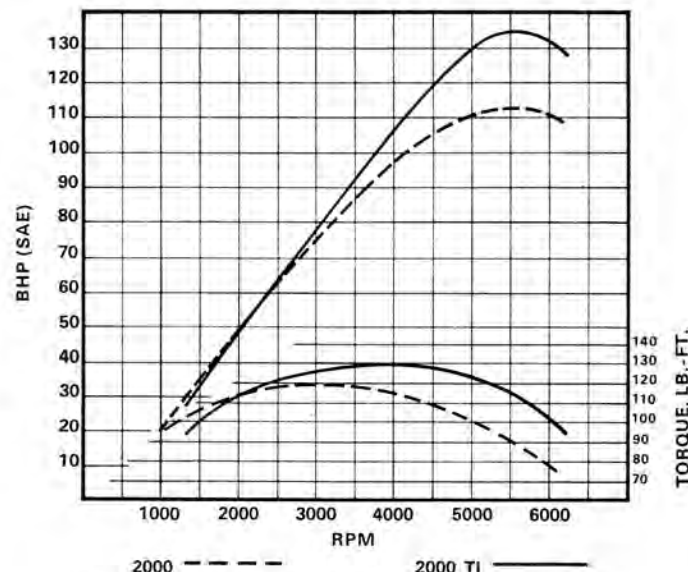
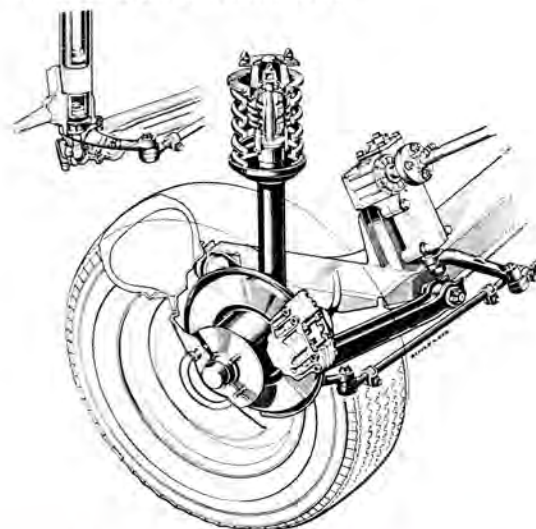


REAR SUSPENSION trailing arms pivot off the sub-frame crossmember and are hub-carriers.

PLATFORM CONSTRUCTION is basic to BMW design. Stamped floorpan, tunnel, engine compartment and fender-well unit drops over front and rear sub-assemblies.

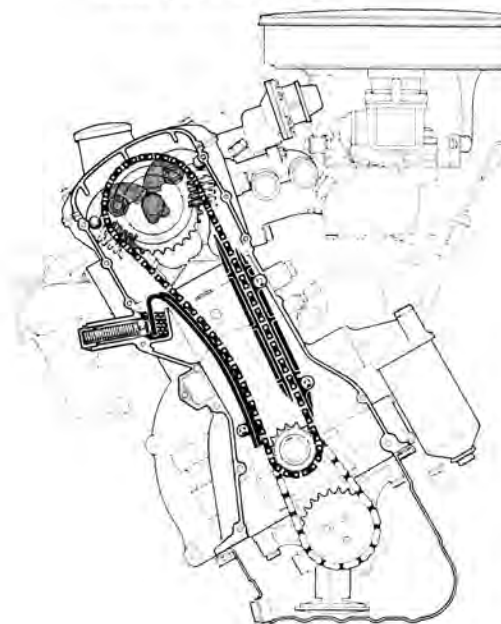


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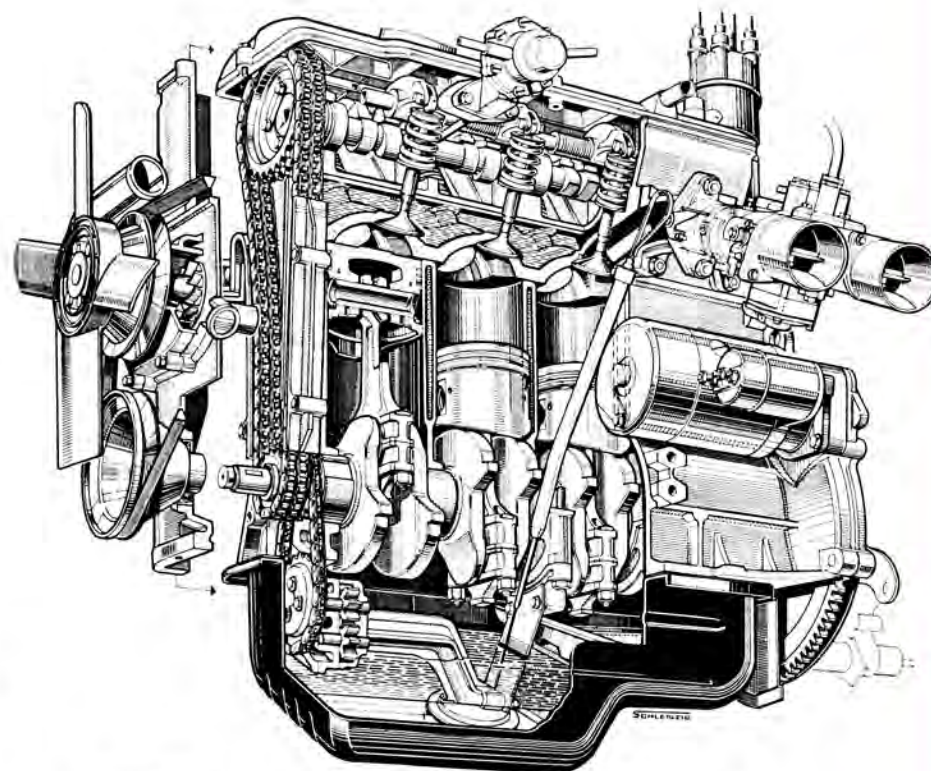


CURVES SHOW performance differences between BMW's standard 2000 and the highly-tuned TI variant.

SINGLE LOOP of duplex roller chain drives sohc valve train off crank. Oil pump is chain-driven gear unit.



VALVE AND port arrangement is designed to produce efficient fuel/air mixture swirl.



BORE AND stroke of 3.50 x 3.15 in. give piston displacement of 120.8 cu. in. A pair of 2-throat Solexes help produce 135 bhp at 5800 rpm.

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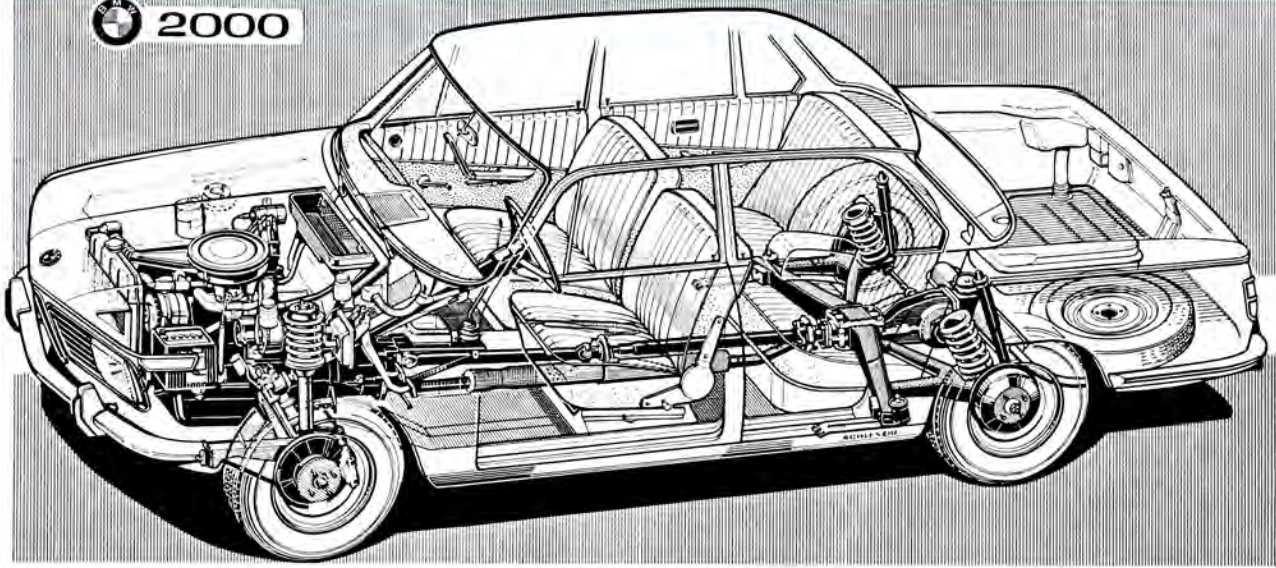
Final drive, as mentioned, is a chassis-mounted differential of conventional hypoid design. Gearing is 3.9:1 which, with the 6.95-14 tires, produces 18.4 mph per 1000 rpm in high gear. The transmission is a German-made ZF 4-speed all-synchromesh unit with 3.83:1 first gear, 2.05 second and 1.35 third. This gives the car maximum in-gear speeds (at 6200 rpm) of 29, 53, 81 and 109 mph—a range of extreme versatility for a 4-door touring sedan.

THE TRANSMISSION'S synchromesh is the Porsche servo-ring type and was impossible to fault. Smooth and precise in its gear changing, it compared favorably with the best transmissions available—probably because most of the world's best manually shifted transmissions use this type of synchronization. The shift lever itself is a large chromed stalk jutting upward from the tunnel top.

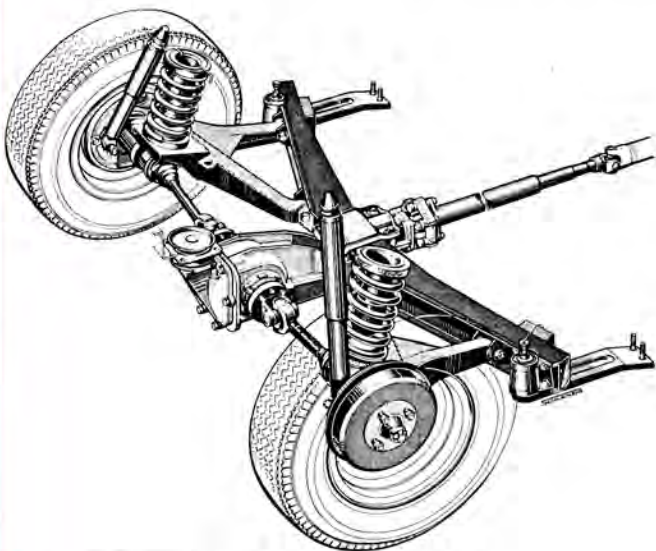
BMW makes available an automatic transmission with the normal 2000 engine, rather than with the sports-tuned 2000 TI. This is a ZF 3-speed unit with torque converter and a 2000 so equipped is virtually the same price as the 2000 TI.

The 2000 series engines stem from a 1500-cc (91.5 cu. in.), 4-cyl. unit which powered BMW's 4-door sedan for the 1962 model year. From the original 90-hp rating (SAE), the power output has been increased, through the normal methods of boring, stroking, compression and carburetion increases, to the present 135 bhp at 5800 rpm. In terms of specific output, this is an increase from 0.98 bhp/cu. in. to 1.11 bhp/cu. in. Intermediate developments were engines of 1600- (97.6 cu. in.) and 1800-cc (110 cu. in.) displacement, both of which are still offered in lower-priced models; the 1500 was replaced by the 1600.

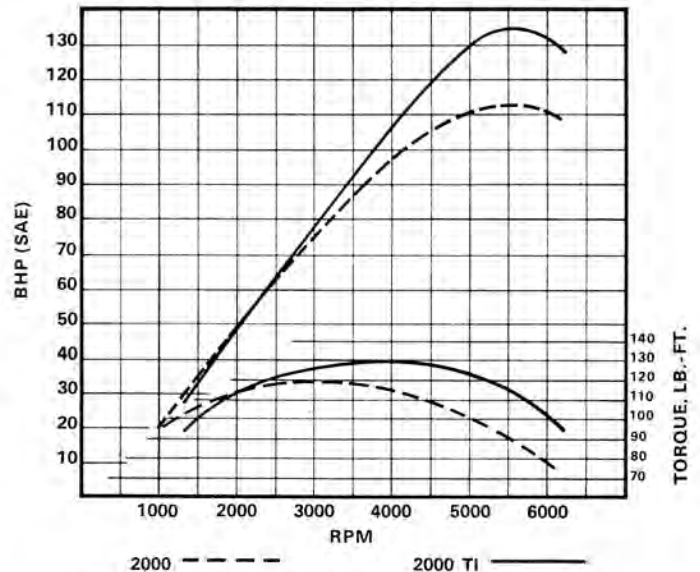
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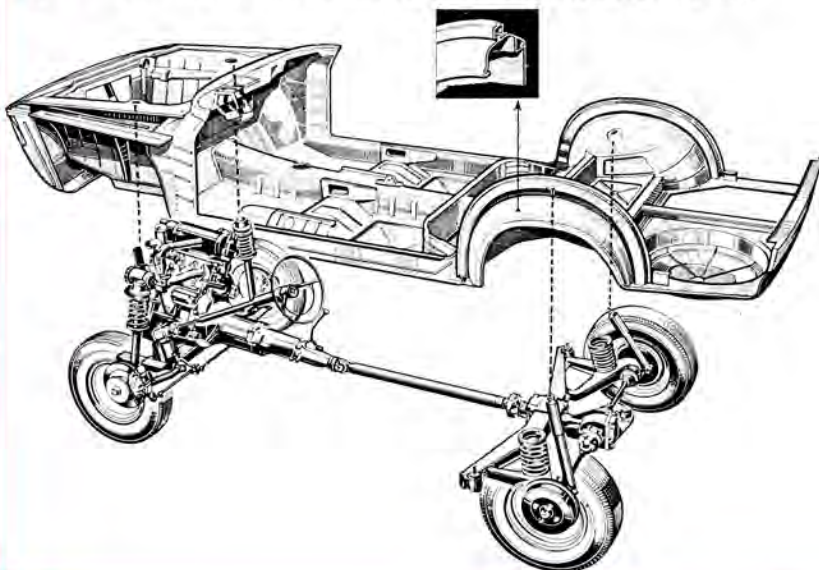


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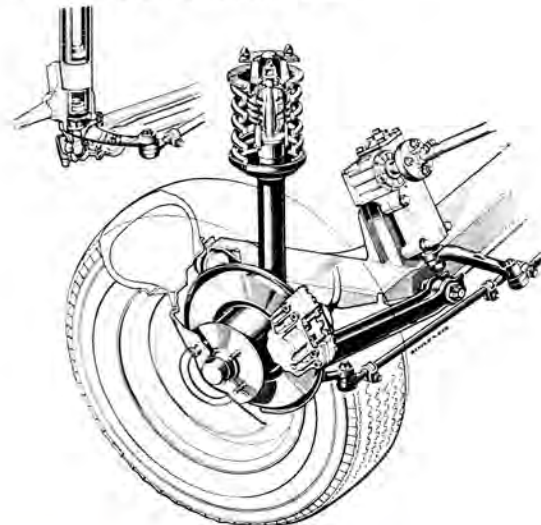


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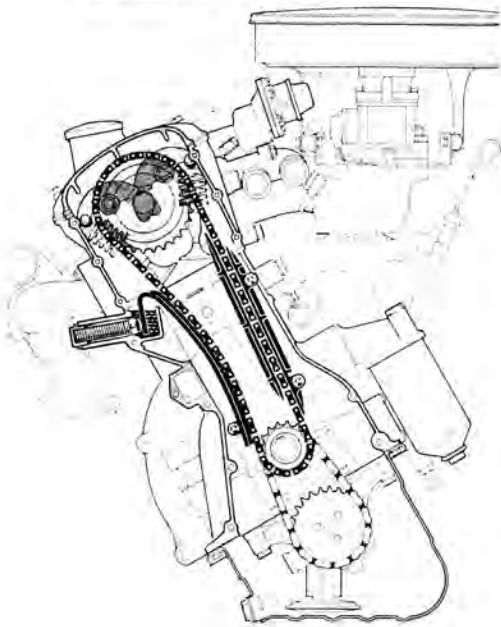


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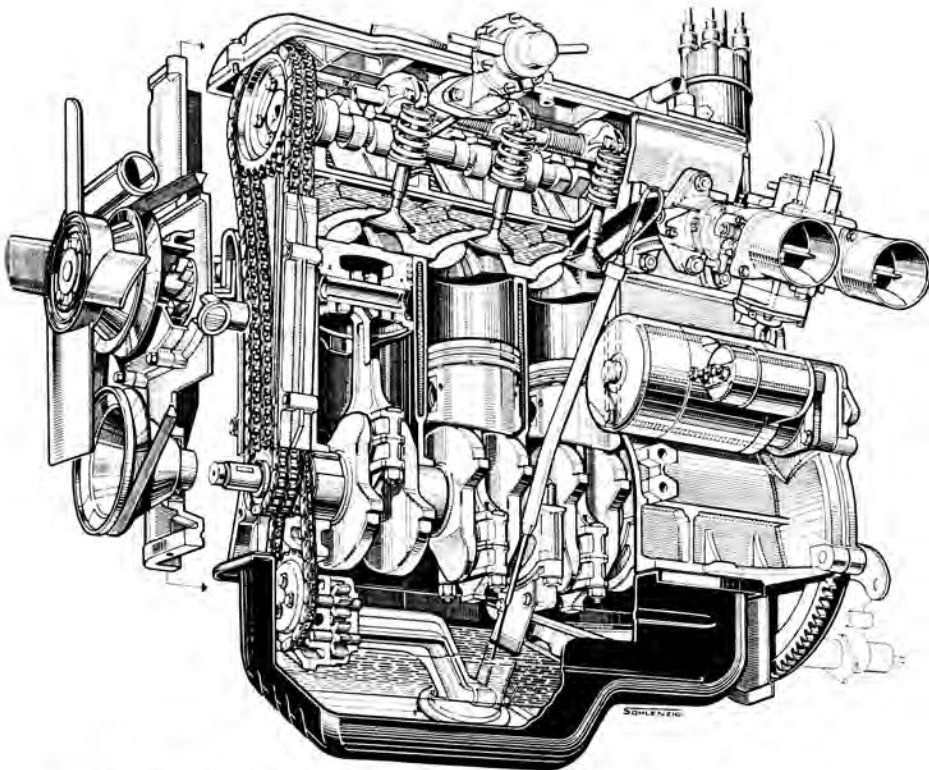


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pair of huge Solex side-draft, dual-throat carburetors.

The overhead camshaft is driven by a single loop of duplex chain off the front of the crankshaft. Another, shorter, single chain off the crankshaft sprocket drives the gear-type oil pump. The overhead camshaft operates the valves through rocker arms, which pivot on parallel countershafts—one shaft for the intake side rockers and another for the exhaust side. Lobes, rockers and shafts are spray lubricated directly on their operating surfaces. This layout gives the valves an inclination of 30° off the vertical and allows relatively large valves in the hemispherical combustion chamber. Intakes are 1.73 and exhausts are 1.50 in. Camshaft timing gives a mild valve-open duration of 264°, but is such that it has a rather healthy overlap of 132°. The scavenging effect of such an overlap may be one of the hidden contributors to the impressive power output. Valve springs are single-wound chrome-vanadium steel, producing higher engine rpm before valve bounce than the concentric double-wound springs in the normal 2000.

Solex carburetors are 40 PHH versions, which have barrels of 40 mm (1.26 in.) diameter and, in effect, serve

as a single carburetor for each cylinder. Although inhaling through a relatively large throttle area when wide open, 3.96 sq. in., the engine would pull smoothly and steadily from just over 1000 to maximum rpm in any gear. Apparently quite efficient, these carburetors on the highly tuned engine delivered an overall fuel consumption of 20.6 mpg, with a high of 22.3 during a period of steady freeway cruising. Neither hot nor cold starting offered trouble, and many of the cold starts could be made without the use of the hand-operated choke. In fact, there were few operating or external hints that this is a "hot" engine. With 9.3:1 compression, the engine required premium grade gasoline. Pulling from low engine rpm, as mentioned, produced no fussing. Neither did long periods of stop-and-go trafficking. The idle characteristic of the engine was a bit lumpy, but not enough to turn a head at the drive-in. Yet, when throttle is down to the floor, this engine winds in whirlwind style and easily will exceed the 6200 red-line. An imprudent driver, unfamiliar with such characteristics, conceivably could run the tachometer to 7000 before encountering valve bounce.

This mechanical melange, whose

specification is well worthy of a sporting 2-seater bodywork, is camouflaged in rather austere, square-cornered surroundings. Although of modest relative size (about that of a Rambler American or Plymouth Valiant), it has a Teutonic solidity of appearance that belies its potential vitality. Unlike a good many less-sporting cars, the BMW 2000 TI appears to be standing still even when it's going fast.

In overall size, at 177-in. length, on a 100.5-in. wheelbase, 67.25-in. width and 56.75-in. height, it is dimensionally a small car by U.S. standards. By German, and Continental standards, it probably rates as a reasonably large car. For comparison, the Volkswagen 1600 Fastback *CL* tested last month had an overall length of 166.3 in. and a height of 58.1., which isn't much smaller than the BMW.

WHAT IS MOST impressive about this 4-door sedan body, however, is its good use of the available space. By placing the major portion of the lightweight engine forward of the front wheel centerline, BMW designers provided good leg space for the front seat passengers. And, by allowing the body to be on the tallish side, they offered those passengers ample headroom as

## 1966 BMW 2000 TI SEDAN



### DIMENSIONS

Wheelbase, in.....	100.0
Track, f/r, in.....	54.7/54.17
Overall length, in.....	177.0
width.....	67.0
height.....	53.0
Front seat hip room, in.....	2 x 23.5
shoulder room.....	51.5
head room.....	32.0
pedal-seatback, max.....	41.0
Rear seat hip room, in.....	54.0
shoulder room.....	51.0
leg room.....	n.a.
head room.....	33.0
Door opening width, in.....	33/29
Floor to ground height, in.....	7.0
Ground clearance, in.....	5.9

### PRICES

List, pac. Pacific Coast.....	\$3955
Equipped as tested.....	4035
Options included: None.	

### CAPACITIES

No. of passengers.....	5
Luggage space, cu. ft.....	21
Fuel tank, gal.....	15
Crankcase, qt.....	5
Transmission/diff., pt.....	2.2/2.0
Radiator coolant, qt.....	8

### CHASSIS/SUSPENSION

Frame type: unitized	
Front suspension type: Independent by lower A-arm and MacPherson strut; anti-roll stabilizer and telescopic shock absorbers.	
ride rate at wheel, lb./in.....	n.a.
anti-roll bar dia., in.....	0.71
Rear suspension type: Independent; semi-trailing arms and coil springs; telescopic shock absorbers.	
ride rate at wheel, lb./in.....	n.a.
Steering system: Z.F. Gemmer, worm and roller; ball-joint steering knuckles.	
gear ratio.....	15.5
overall ratio.....	17.58
turns, lock to lock.....	3.25
turning circle, ft. curb-curb.....	33.1
Curb weight, lb.....	2486
Test weight.....	2880
Weight distribution, % f/r.....	53.7/46.3

### BRAKES

Type: single line hydraulic, front caliper disc, duo-servo shoes in cast iron rear drums.	
Front disc, dia. x width, in. 10.7 x n.a.	
Rear drum, dia. x width.....	.9.85 x n.a.
total swept area, sq. in.....	380
Power assist: vacuum, double acting ATE (lic. Dunlop)	
line psi @ 100 lb. pedal.....	n.a.

### WHEELS/TIRES

Wheel size.....	14 x 5.5JK
optional size available.....	none
bolt no./circle dia., in.....	4/4.0
Tires: Continental Super Record	
size.....	6.95-14
recommended inflation, psi.....	28
capacity rating, total lb.....	4840

### ENGINE

Type, no. cyl.....	sohc, I/L-4
Bore x stroke, in.....	3.504/3.150
Displacement, cu. in.....	121.86
Compression ratio.....	9.3
Rated bhp @ rpm.....	135 @ 5800
equivalent mph.....	102.5
Rated torque @ rpm.....	123 @ 3600
equivalent mph.....	63.5
Carburetion.....	2 x 2 Solex 40 PHH
barrel dia., pri./sec.....	1.015/1.015
Valve operation: Chain-driven single overhead cam, rocker arms on parallel shafts.	
valve dia., int./exh.....	1.73/1.50
lift, int./exh.....	0.354
timing, deg.....	TDC
duration, int./exh.....	236/264
opening overlap.....	104
Exhaust system: Individual headers, dual inlet pipes, single tailpipe.	
pipe dia., exh./tail.....	n.a.
Lubrication pump type.....	gear
normal press. @ rpm.....	50 @ 3000
Electrical supply.....	alternator
ampere rating.....	41 @ 12v.
Battery, plates/amp. rating.....	n.a./44

### DRIVE-TRAIN

Clutch type: Single plate, dry.	
dia., in.....	9.0
Transmission type: Z.F. manual 4-speed, balk-ring synchronizers.	
Gear ratio 4th (1.00) overall.....	3.89
3rd (1.35).....	5.25
2nd (2.05).....	7.97
1st (3.83).....	14.89
synchronous meshing?.....	all four
Shift lever location.....	floor
Differential type: Hypoid bevel.	
axle ratio.....	3.89

well. Two rear seat passengers have adequate knee and foot room, though the drive-line tunnel projects into the usable floor space. Deep footwells in the floorpan help add extra inches.

Body finish of CL's test car was impeccable; there were neither gaps between panels, nor flaws in the paint. The car appeared hand-formed by the finest of old Bavarian craftsmen. The interior, if Spartan by American tastes, is nonetheless impressive. Everything was logically placed, well thought out and sturdily constructed. Upholstery material, paint and bright metal finishes appeared to be of very high quality.

A molded tray with deep sides topped the drive-tunnel ahead of the shift lever and provided a very handy place for maps, cigarettes, sunglasses, and other odd little pieces of traveling paraphernalia. The handbrake was in a logical, quickly usable place between the front individual seats. The instrument panel is laid out in three round dials. The left one contains a large speedometer, the central, smaller face holds a tachometer, the right, large dial has warning lights for low fuel, low oil pressure, generator non-charge, the coolant thermometer and fuel gauges, and the clock. Everything

necessary to keep the driver informed of his vehicle's condition is concentrated in one area.

The designers' thoughtfulness extended to the exterior of the car, too. Here BMW hinged the engine hood at the front so that it exposes the entire engine compartment for quick and efficient servicing. At the rear are extension arms on the decklid hinges so that it pivots up at a high sharp angle to provide easy access to the capacious trunk's contents.

**I**F THE DESIGNERS have considered the needs of the traveler and the service attendant in the creation of the BMW sedan, even more talent has been used to make the driver happy. The BMW sedan is a delightful experience for the enthusiastic driver.

Hurting over the secondary roads hardly fazes the 2000 TI; after all, Europe's main highways are little better. Flogging it down the worst roads one can find is better proof of its agility, and it meets the challenge with neither a squeak nor rattle, nor a moment of uneasiness.

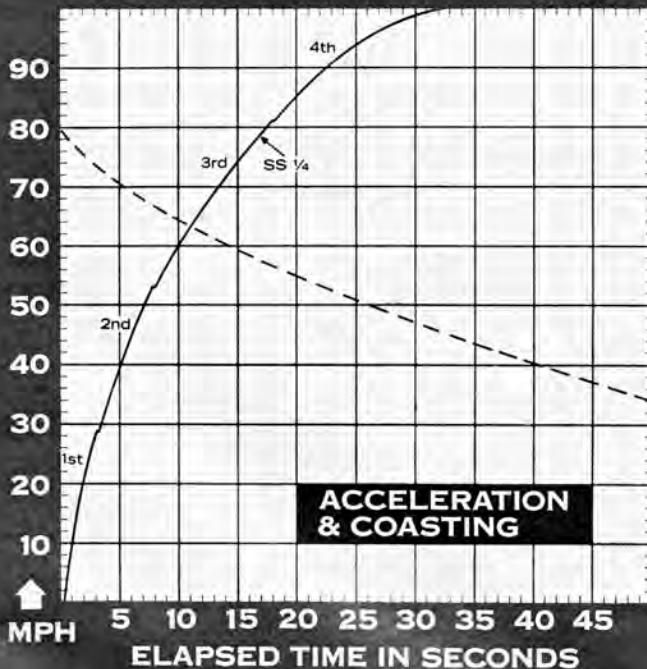
The surprising thing is that it can be trickled back through town, idled through traffic, parked in a place that won't hold a Chevy or filled with gas

without destroying the family finances. The 2000 TI is virtually a Jekyll-and-Hyde kind of car—one minute it's the kindly family servant and the next it's a rally-running rascal.

The price of all this happiness is what will prevent more enthusiastic drivers from becoming more so; it's a husky \$3955 (West Coast port of entry—slightly less on the East Coast). And service, although it shouldn't be needed for more than the routine things, won't be available at the corner filling station. BMW is establishing key dealers around the country through its importer (Hoffman Motors Corp., Suite 3409, 375 Park Ave., New York, N.Y. 10022), so the astute imported car specialist should have little trouble obtaining basic pieces.

There are less expensive models, such as the BMW 1600 at \$2940, and more expensive, the Corvair-ish sports coupe at \$5180, to tempt the buyer who desires something a little different and more fun for his money, but probably the best all-around model is the 2000 TI. It combines a compact car wheelbase and exterior dimensions with full-sized car interior and performance—with brilliant handling and fine craftsmanship as added fillips in the package. ■

## CAR LIFE ROAD TEST



### CALCULATED DATA

Lb./bhp (test weight)	21.5
Cu. ft./ton mile	95.3
Mph/1000 rpm (high gear)	17.6
Engine revs/mile (60 mph)	3400
Piston travel, ft./mile	1785
Car Life wear index	60.7
Frontal area, sq. ft.	19.7
Box volume, cu. ft.	362.8

### SPEEDOMETER ERROR

30 mph, actual	27.4
40 mph	37.5
50 mph	47.6
60 mph	57.2
70 mph	66.8
80 mph	78.0
90 mph	89.5

### MAINTENANCE INTERVALS

Oil change, engine, miles	4000
trans./diff.	16,000
Oil filter change	4000
Air cleaner service, miles	8000
Chassis lubrication	4000
Wheelbearing re-packing	8000
Universal joint service	8000
Coolant change, mo.	8000

### TUNE-UP DATA

Spark plugs	Bosch W225 T2
gap, in.	0.028
Spark setting, deg./idle rpm	n.a.
cent. max. adv., deg./rpm	37/2400
vac. max. adv., deg./in. Hg.	n.a.
Breaker gap, in.	0.016
cam dwell angle	60
arm tension, oz.	16-20
Tappet clearance, int./exh.	0.006/0.008
Fuel pump pressure, psi	2-3
Radiator cap relief press., psi	10

### PERFORMANCE

Top speed (6200), mph	109
Shifts (rpm) @ mph	
3rd to 4th (6200)	81
2nd to 3rd (6200)	53
1st to 2nd (6200)	29

### ACCELERATION

0-30 mph, sec.	3.3
0-40 mph	5.1
0-50 mph	7.2
0-60 mph	10.0
0-70 mph	13.8
0-80 mph	17.9
0-90 mph	22.5
0-100 mph	32.1
Standing 1/4-mile, sec.	17.3
speed at end, mph	78.5
Passing, 30-70 mph, sec.	10.5

### BRAKING

(Maximum deceleration rate achieved from 80 mph)	
1st stop, ft./sec./sec.	28
fade evident?	no
2nd stop, ft./sec./sec.	28
fade evident?	no

### FUEL CONSUMPTION

Test conditions, mpg	20.6
Est. normal range, mpg	20-24
Cruising range, miles	300-360

### GRADABILITY

4th, % grade @ mph	10 @ 66
3rd	15 @ 60
2nd	23 @ 45
1st	34 @ 27

### DRAG FACTOR

Total drag @ 60 mph, lb.	128
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