



PHOTOGRAPHY: PHIPPS

Road Research Report:

ROVER 2000

A great new middle-sized sedan with a truly sporting nature—from the (hitherto) builders of cross-country vehicles and old men's cars

About 15 years ago, a 2-liter Rover Special was competing regularly in British Formula Two races. It was built and raced by two young men named Peter Wilks and Spencer King, and one of its chief features was a rear suspension layout that used fixed-length drive shafts and a variable-length de Dion assembly. Today Peter Wilks is Engineering Director of the Rover Company, and Spencer King is in charge of new vehicle projects. Co-incidence perks up its ears.

Five years ago the Rover design team—again headed by Wilks and King—was ordered to produce a new model, something to advance the company's image. Rover was then considered to be in business to make cars for going cross-country, or for going to dignified clubs—cars for explorers, and cars for old men. The new project was intended to redress the balance in both directions—to appeal to a new young clientele of sporting drivers, and to increase total car production. (Actually, the Rover Motor Company makes more Land-Rovers than cars, exports them to almost every country in the world, and has a long waiting list for them.) Initial target for production of the new car is over five hundred per week.

The designer's brief for the 2000 was quite formidable. It had to look attractive, be comprehensively equipped, handle and ride exceptionally well, and incorporate traditional Rover standards of quality and reliability. It also had to be marketable at a price within reach of the young executive.

It wasn't easy to fill the bill, but the new 2000 does it. Development was slow, and the lengths necessary to meet the demands of the original concept were such that the resulting car bristles with technical ingenuity. (Among other decisions that the brilliant young design

team finally arrived at: keeping their original racing de Dion layout.) How well the Rover people feel they've fulfilled the order for the car is evinced by the \$30 million capital outlay for a completely new factory at Solihull to build the car. Backing this confidence up are firm orders from dealers for the first 18 months' production.

The basis of the 2000 is an integral chassis structure, with deep box-section members under the door sills and a very robust front cowl. This "base unit" is very carefully checked in an acceptance jig, and then the mounting points for all the components of the car and the exterior body panels are drilled and spot-faced. In the first stages of assembly the base unit is inverted to facilitate the fitting of under-floor sub-assemblies. When all the mechanical components are fitted, the car is given a roller test (it can even be driven on the road if necessary), and not until it has passed this are the body panels bolted on. This procedure prevents scratching paint-work on the body panels—it also permits quick removal and replacement of body panels which suffer damage after the car is sold and in actual road use. Great care is taken to ensure consistency of color. When the body panels have been fitted, the car is given a shaking test—to check for squeaks and rattles—and a "storm" test to check for leaks under a 70-mph spray of water from all directions. After it has passed these, the car is road-tested on the company's proving ground.

The engine of the 2000 is an all-new 121-cubic-inch 4-cylinder unit, with in-line vertical valves operated by a single overhead camshaft, which is driven by a double roller chain in two stages—the short jackshaft on which the intermediate sprockets are mounted also drives the Hobourn-Eaton oil pump, which in turn drives the fuel pump and the distributor.

The most unusual feature of the engine is the formation of the combustion chambers in the crown of the pistons, an adaptation by Rover engine-man Jack Swaine of diesel-engine practice. The cylinder head is absolutely flat, while the combustion chambers are countersunk into the tops of the Bricomatic pistons, resulting in a compression ratio of 9.0 to one. The obvious advantage of this practice is that the combustion chamber shape and volume can be cast to a fine tolerance, while only one machining operation is required on the head. Offsetting this, the piston is somewhat on the heavy side at 26.75 ounces, including steel insert, rings and wrist pin.

The block is unlined cast-iron, with square cylinder dimensions (85.7x85.7mm), and the forged steel crankshaft (with vibration damper fitted at the front end) runs in five main bearings. The head is an aluminum die-casting, with integral inlet manifold and six camshaft bearings. Valve sizes are fairly generous for a two-liter at 1.535 in. intake, 1.222 in. exhaust. But the valve timing is very mild, and the engine seems deliberately strangled by the use of a single carburetor. Of course valve timing and carburetion can be improved later much more easily than valve size! The weight of the engine, complete with all accessories is a moderate 360 lbs.

The engine requires premium gasoline with a minimum of 95 Octane (Research Method). It develops maximum power at 5000 rpm, but willingly runs up to 6000 before it runs out of breath. With different carburetion and manifold, power output could no doubt be raised considerably beyond the 100 bhp developed—but that output figure is more than adequate, sufficient to give the car a top speed in excess of 100 mph.

The transmission is relatively straightforward, with a very light but slip-free diaphragm spring clutch and



David Bache styled the T-4 gas turbine prototype, then the Rover 2000—so any resemblance is more than coincidental. High ground clearance, easily detachable and replaceable body panels, are evident in front and rear views. It's also fairly clear that a hard-headed effort was made to get as much use as possible out of a minimum space. It's all very compact.

ROVER 2000 CONTINUED

a four-speed gearbox with remote control floor shift and unbeatable baulk-ring synchromesh on all four forward gears. At the rear end, the chassis-mounted differential unit has a long forward extension with its nose surrounded by a harmonic damper. It also has two widely-spaced rubber-bushed mountings at the rear and a Panhard rod to take out lateral suspension loads.

The most significant feature of the rear suspension, however, is the telescopic joint (by means of sliding bronze bushings) in the de Dion tube. This eliminates the need for variable-length drive shafts—and for lateral location of the tube. The drive shafts locate the wheels laterally, and the fore-and-aft Watt linkages position them longitudinally. Thus the de Dion tube has merely to keep them upright, which it does much more effectively than most independent layouts.

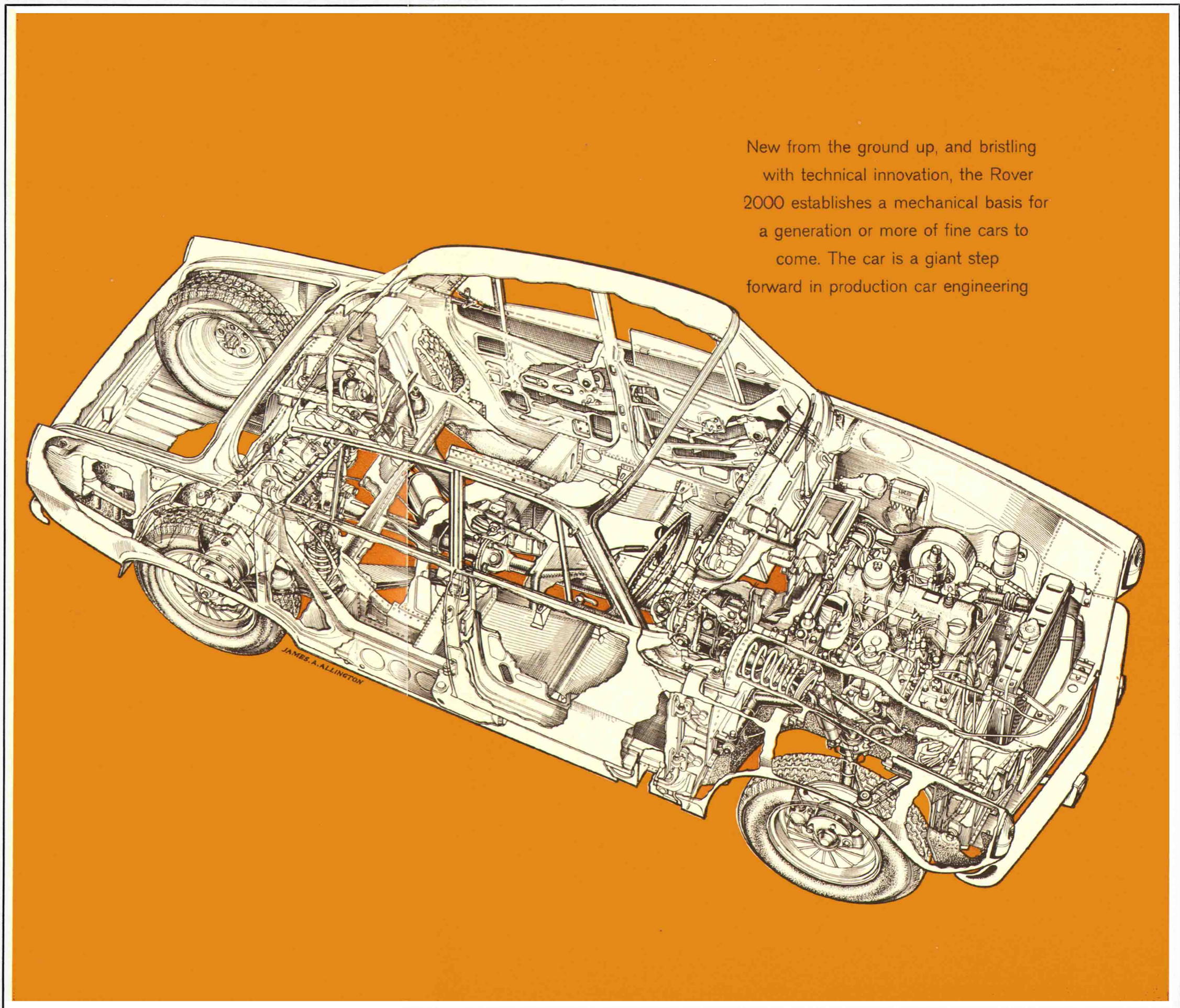
The front end, too, is somewhat complex, being what amounts to a MacPherson system taken one step further. Suspension loads are taken out into the cowl via coil springs operated by lever arms from the top of the tall king-posts. The top "leading arms" also act as anti-dive members during braking, and are interconnected by an anti-sway bar. By contrast, the lower wishbones are entirely conventional. The worm-and-sector steering box is mounted on the cowl and connected to the king-posts by long tie-rods; the system also incorporates a hydraulic damper. Roll centers are relatively high all around at seven inches front, 12.5 inches rear.

All this cleverness results in really extraordinary handling—which, coupled with the standard equipment Pirelli Cinturato tires, allows remarkable averages to be put up. The top speed is not astonishing, and the acceleration is inferior to quite a few English, and nearly all American, products. Still, on give-and-take roads, the Rover 2000 will record averages equal—or superior—to those of much more exotic machines. For instance, we averaged over 80 mph with the Rover on one 20-mile section of English 3-lane road, comparable with our best XK-E time and decidedly quicker than we could manage in an Austin-Healey 3000. These handling characteristics can best be summed up as consistent slight understeer, with very light, precise (if a bit slow) steering, and very good directional stability. Once set up for a corner, the steering seldom needs much more movement.

With suspension frequencies of 73 cycles/min front, 68 cycles/min rear, the 2000 is relatively softly sprung. On really bumpy roads, the suspension is both heard and felt, particularly at the front, but the Rover can nevertheless be driven over such surfaces much faster than the majority of cars. Its unusually generous ground clearance (8.5 inches) is also a help under rough conditions.

The first impression, as you get into the Rover, is similar to the 3-Liter—very comfortable bucket seats, soft under the posterior while still firm enough beneath the thighs, and very snug about the small of the back. The rear seats are individual too, and though the wide central arm-rest can be folded away to make room for a third passenger if necessary, this is basically a four-seater car. Each seat has its own deep foot well, sumptuously carpeted, and there are cut-outs under the backs of the front seats to increase rear seat leg room.

The interior is stylish and practical. A ribbon-type speedometer that reads in mph and kph (and more accurately than is usual for this type) is flanked by water and temperature gauges, and surmounted by a battery of warning lights, all of which spell out their messages in distinctive colors. The front seats adjust



New from the ground up, and bristling with technical innovation, the Rover 2000 establishes a mechanical basis for a generation or more of fine cars to come. The car is a giant step forward in production car engineering

Road Research Report: Rover 2000

Importer: Rover Motor Company of North America, Inc.
405 Lexington Avenue, New York, N.Y.

Number of U S dealers: 300

Planned annual production: 40,000

ENGINE:

Water-cooled	Four-in-line, cast iron block, 5 main bearings, aluminum head.
Bore x stroke	3.375 x 3.375 in, 85.7 x 85.7 mm.
Displacement	120.8 cu in, 1978 cc.
Compression ratio	9 to 1.
Carburation	Single SU type HS6.
Valve gear	Single overhead camshaft
Valve diameter	Intake 1.535 in, Exhaust 1.222 in.
Valve timing:	
Intake opens	18° BTDC
Intake closes	42° ABDC
Exhaust opens	48° BBDC
Exhaust closes	12° ATDC
Electrical system	12 volt, 60 Amp-hr battery
Valve lift	0.370 in.
Power (SAE)	100 bhp @ 5000 rpm.
Torque	113.5 lbs ft @ 2750 rpm.
Specific power output	45.5 bhp per liter
Usable range of engine speeds	1000-6000 rpm.
Electrical system	12 volt, 60 Amp-hr battery
Fuel recommended	Premium
Mileage	20-28 mpg
Range on 14.2-gallon tank	240-336 miles.

DRIVE TRAIN:

Clutch 8.5 inch single dry plate with diaphragm spring
Transmission 4-speed all-synchromesh gearbox

Gear	Ratio	Over-all	mph/1000 rpm	Max mph
Rev	3.430	12.140	-5.7	-34
1st	3.625	12.832	5.4	32
2nd	2.133	7.550	9.1	54
3rd	1.391	4.924	14.0	84
4th	1.000	3.540	19.5	105
Final drive ratio				3.54 to one

CHASSIS:

Monocoque base structure with detachable exterior panels.

Wheelbase	103.375 in
Track	F. 53.375 in, R. 52.5 in
Length	178.5 in
Width	66.5 in
Height	54.75 in
Ground Clearance	8.5 in
Dry weight	2727 lbs
Curb weight	2804 lbs
Test weight	3140 lbs
Weight distribution, front/rear %	54/46
Pounds per bhp (test weight)	35

Suspension F: Ind, leading top link, transverse bottom link, coil springs, telescopic dampers
R: Variable-length De Dion tube, radius arms (forming Watt linkage) Panhard rod, coil springs, telescopic dampers

Brakes Dunlop disc, 10 3/4 in front, 10 1/4 in rear, mounted inboard at rear, 436 sq in swept area

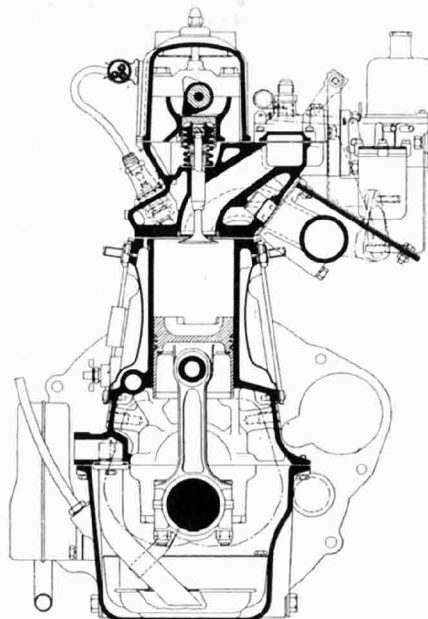
Steering Worm and roller
Turns lock to lock 3 3/4
Turning circle 31 ft 6 in
Tires 165 x 14 Pirelli Cinturato or 6.50 x 14 Dunlop SP
Revs per mile 863

MAINTENANCE:

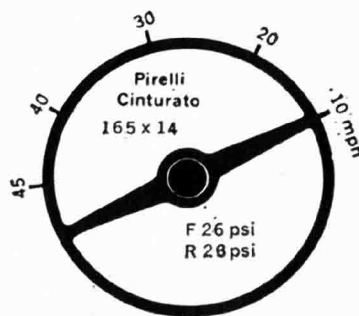
Crankcase capacity 5 quarts
Oil change interval 5000 miles
Number of grease fittings 1, every 5000 miles

ACCELERATION:

Zero to	Seconds
30 mph	4.6
40 mph	7.0
50 mph	9.8
60 mph	14.4
70 mph	19.9
80 mph	27.0
Standing 1/4 mile	19.2

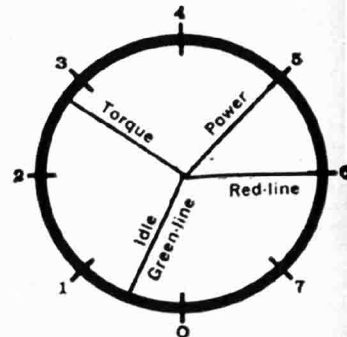


1/8 SCALE

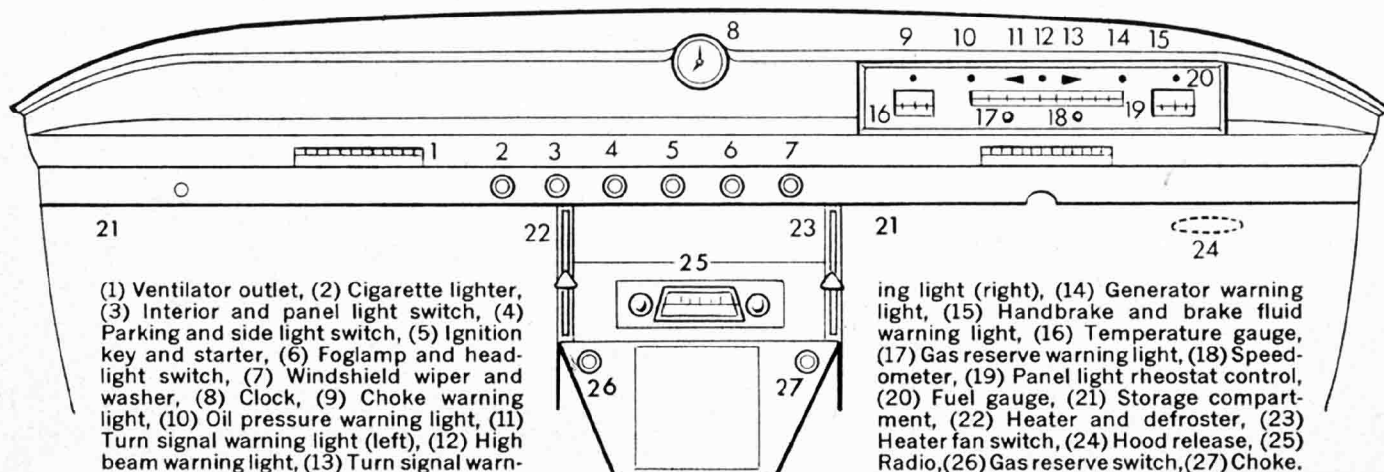


Steering Behavior

Wheel position to maintain 400-foot circle at speeds indicated.

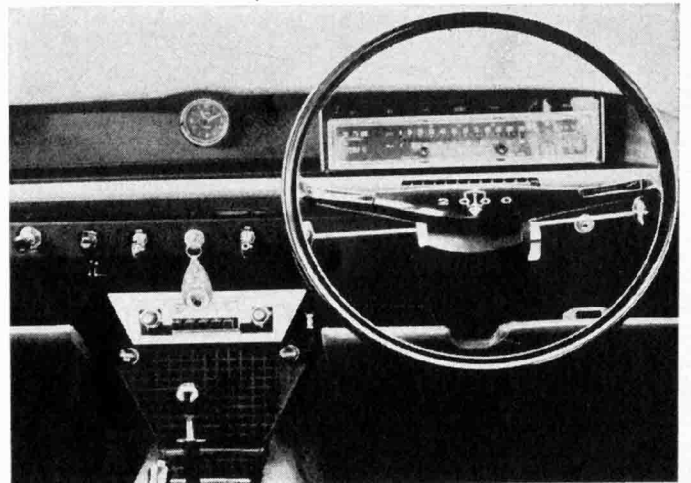
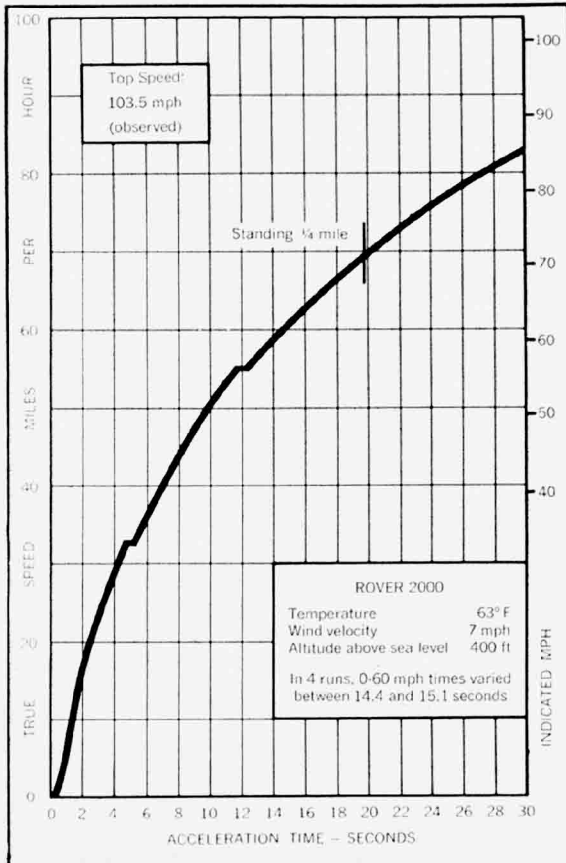
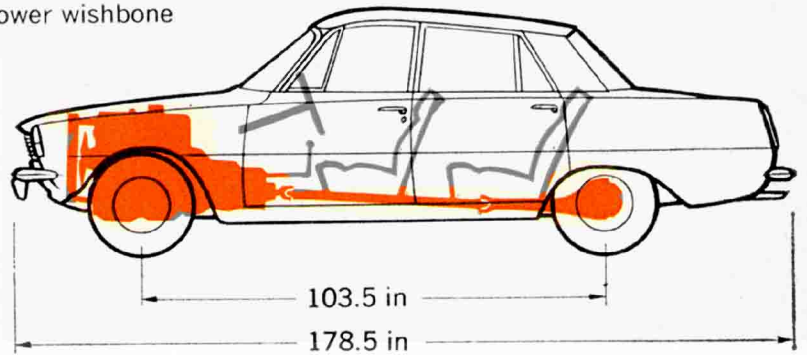
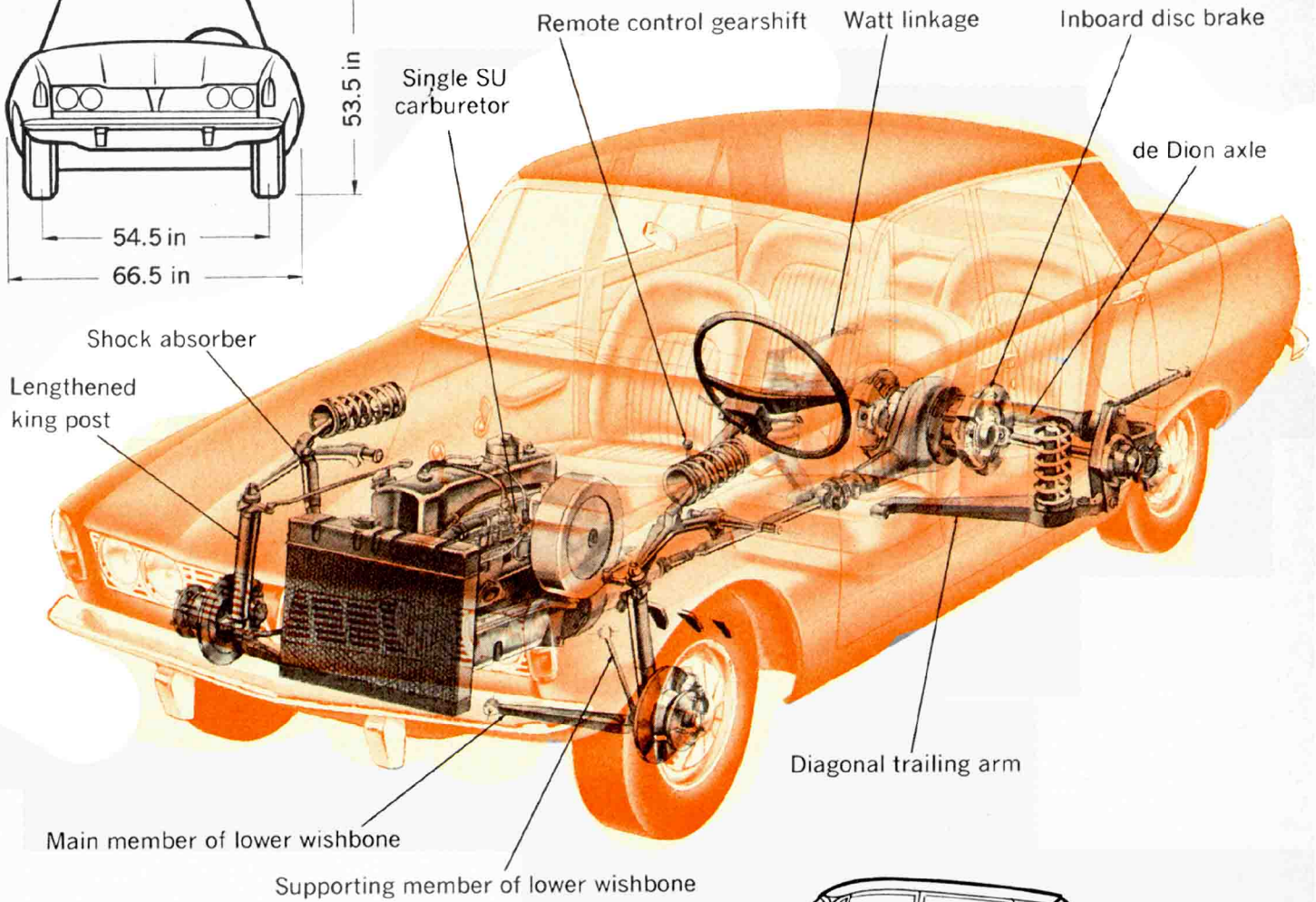
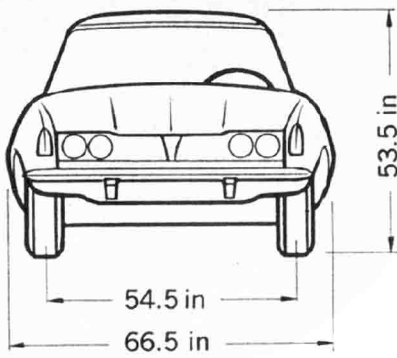


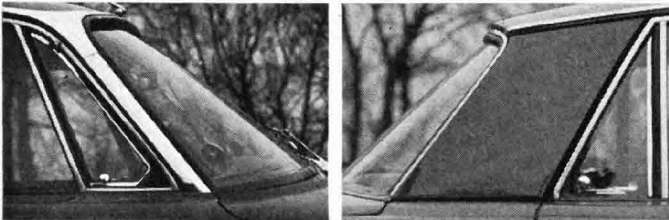
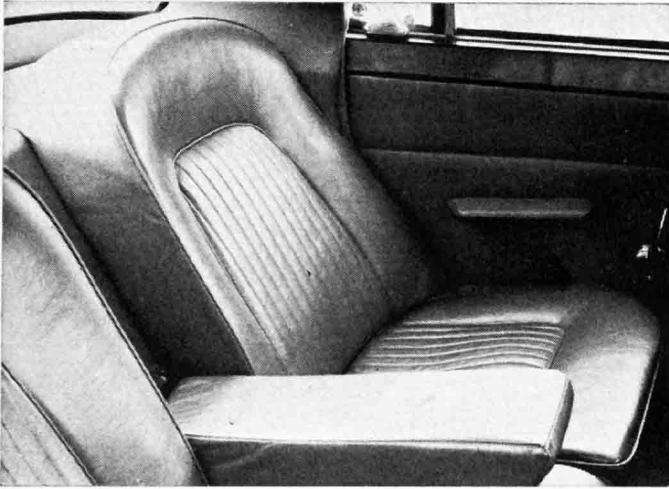
Engine Flexibility
RPM in thousands



(1) Ventilator outlet, (2) Cigarette lighter, (3) Interior and panel light switch, (4) Parking and side light switch, (5) Ignition key and starter, (6) Foglamp and headlight switch, (7) Windshield wiper and washer, (8) Clock, (9) Choke warning light, (10) Oil pressure warning light, (11) Turn signal warning light (left), (12) High beam warning light, (13) Turn signal warn-

ing light (right), (14) Generator warning light, (15) Handbrake and brake fluid warning light, (16) Temperature gauge, (17) Gas reserve warning light, (18) Speedometer, (19) Panel light rheostat control, (20) Fuel gauge, (21) Storage compartment, (22) Heater and defroster, (23) Heater fan switch, (24) Hood release, (25) Radio, (26) Gas reserve switch, (27) Choke.





Traditional Rover comfort is maintained in the two-liter line with luxurious leather-covered individual-seats. Sharp new roof line follows current styling, using compound curve glass front and back. On the assembly line, the basic unit is checked completely for conformity to spec, then drilled for mounting of all components. Bolt-on body panels go on much later, and the car can be road-tested before the body panels are fitted. The line forms to the left for one-off-minded Italian body-designers.

through 8.5 inches of fore-and-aft travel, and both seat backs recline, while the steering column is adjustable for height.

The engine starts instantly from cold, provided the choke is pulled out. You just drive away and forget about it until the yellow choke light appears above the speedometer, which means the engine is sufficiently warm to do without extra enrichment. Driving the car for the first time you notice that the steering is a little on the heavy side at slow speeds, but not excessively so. You also notice a distinct whine from second gear, and a substantial amount of engine noise above 4500 rpm in the lower gears. If you are driving in heavy traffic you may be aware of a certain amount of transmission snatch at part throttle on the over-run. You'll never get this sensation with your foot well down—in fact you probably won't get it, or the noisy second gear, at all in a production model; the car we tested was very much a pre-production prototype.

But beyond these items, there is nothing else we could find to complain about in the Rover 2000. Both engine and wind noise are remarkably low at speed, and with the engine's smoothness and economy, 4600 rpm—90 mph—is a practical cruising speed. And you can expect a minimum of 22 miles per gallon no matter how flat-out you drive. (The 14.2 gallon tank has a 1.25-gallon reserve, controlled by a pull-out knob.)

Other features which emphasize the sporting character of the car are the absolutely superb power-assisted Dunlop disc brakes (inboard at the back) and the remote-control gearshift, with its very short, notchy movement. The brakes cannot be faulted; they slow the car consistently, on both dry and wet surfaces, with very moderate pedal pressure and with never a hint of locking or pulling to one side. The gearshift is precise and absolutely fool-proof, but not quite as fast as it might be because of a slight resistance as each gear goes in. The lift-up "lock" guarding reverse is very useful, preventing inadvertent selection and at the same time allowing intentional engagement easily enough. A back-up light, wired through the gearshift, is included in the specification.

A great deal of attention has been paid to the layout of controls and instruments. A stalk on the right of the steering column operates the turn indicators and blows the horn (by pulling it towards the wheel rim). A matching stalk on the left of the column selects low and high beam for the headlights, and flashes the high beams when pulled toward the wheel—so if you grab the little dear by both ears and yank, you get flashing lights and honking horns and everything. Four switches in the center of the dash operate: side, tail, and unilateral parking lights according to position; wipers and washers; head and fog lights; and interior lights. Unfortunately, these switches aren't illuminated at night.

We were very enthusiastic about the 2000 on our first encounter with it (*C/D*, Dec. 1963) and longer acquaintance has done nothing to dispel the first careless rapture. It is not difficult to foresee something of Rover's future. The 2000 can be made to hold a larger engine than the two-liter, and we expect that within a year's time the heavy 3-Liter, introduced in 1958, will be phased out (since it's already out-performed by its little brother) in favor of a new six-cylinder somewhere between 2.6 and three liters, for the same basic structure as the 2000. Such a car would be even more suitable for the North American market, and we have every confidence that Rover can arrive at a realistic price for such a car. It will certainly be expensive, but Rover always offers exceptional value and outstanding quality. Meanwhile, the 2000 is a very worthy newcomer to these shores.

c/d