PHOTOGRAPHY: MICHAEL COOPER

THE DOUGHTY DOWAGER COMES OF AGE

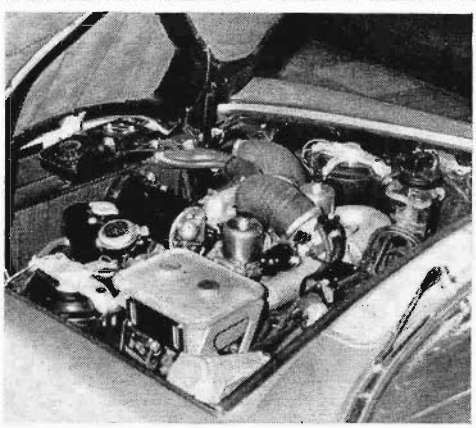
BY BILL GAVIN

The men of Rolls-Royce have this thing about building the best car in the world. They labored long and lovingly over the Silver Shadow, and after ten years of painstaking effort, decided they could come no closer to their ideal of engineering excellence.

• For half a century Rolls-Royce has made the simple emphatic claim that it builds the best car in the world. But during the past decade, critics have consistently disputed the claim, pointing out that the then-current Silver Cloud design was archaic. Compared with the massive exterior, the interior of the Silver Cloud seemed tiny; the car was too heavy; the center of gravity was quite high; the old-fashioned live rear axle setup was outdated. Rolls-Royce contended that great cars are not so much the result of brilliant design, but rather the fruit of years of painstaking development, much of it on the time-consuming trial-and-error basis. So quietly, inexorably, the men at Crewe labored at a new design, and late in 1965, the new Silver Shadow and its sister car, the Bentley T, were introduced.

More than ten years have passed since Rolls-Royce made their first prototypes incorporating the two major "new" features of the Silver Shadow—unitary (monocoque) construction and all-independent suspension. The independent suspension was a must if the car was to provide maximum ride comfort and roadholding, and the two big advantages of unitary construction were the extra stiffness it provided and the extra passenger and baggage room it offered despite a reduction in overall size. More than 50 per cent of Rolls-Royce production is destined for Britain's crowded roads, where the decrease in width (3.5 in.) and length (7.0 in.) will be

CONTINUED



greatly appreciated, while the lower profile improves both performance and economy. With modifications this drastic, there's always a catch, and Rolls-Royce soon found themselves saddled with a major noise problem: mounting the final drive unit to the body/chassis unit and suspending each wheel independently allows noises and shocks of all frequencies to reach the passenger compartment and resonate there. Carefully, methodically, Rolls engineers tackled the problem. They chose a single wishbone-cum-trailing-arm rear suspension layout because this intruded least into the passenger/luggage space. Air suspension was tried initially, but sealing difficulties caused this system to be abandoned after much frustrating development. Engineers then settled for a normal steel coil spring with Girling suspension damper. The final drive and suspension links were attached to a particularly robust sub-frame, and over the ten years of development, three different types of shock absorbers were developed to cushion the road and drive shocks. The most important of these are the Vibrashock mountings between the chassis and the sub-frame to which the final drive and suspension links are attached. These mountings consist of cylinders of compressed stainless steel mesh—Rolls is the first firm (outside the rocket industry) to use such mountings. They were selected because they have the right performance over a wide range of frequencies, i.e., little damping effect at high frequencies, but maximum damping at the low-frequency, high-amplitude shake that sub-frames are prone to at low engine speeds.

On the front transverse member of the H-shaped rear sub-frame, the Vibrashocks are mounted in a horizontal plane to limit backward and forward movements of the wishbones and wheels under braking, acceleration, etc. Skewing (and thus rear wheel steering) is prevented by the longitudinal tie rods running forward from underneath each end of the front member, which can then pivot slightly on the rubber

bushed tie rod ends to allow just enough fore and aft wheel and wishbone movement to damp out the various road shocks and noises.

There was one final hitch. Under shock braking and acceleration loads, engineers detected a disquieting noise: "We called it a zonk. That's what it sounded like, so that was the only name for it." They fixed it with what they called the "anti-zonk" damper—a small, hydraulic shock absorber mounted horizontally between the front sub-frame member and the chassis behind it. At this point, Rolls-Royce engineers decided the Silver Shadow had the sort of ride it ought to.

Brake feel or feedback hadn't been quite right on the Silver Cloud, the men at Crewe decided, where the brake pedal simply opened valves in the two high-pressure hydraulic systems. This time they coupled the pedal with a normal, unassisted brake master cylinder as well as the two hydraulic systems. This master provides about 23 per cent of the total braking effect—enough to give the driver the right "feel," as well as offering a third safety line in case both high-pressure systems fail. Girling disc brakes are used all around, and although the Shadow is the first Rolls-Royce to be so equipped, the company says it has been experimenting with discs on road cars since 1951 (longer than any other British manufacturer). Engineers are now quite satisfied that the discs are better than the Rolls-Royce drums, and they've also eradicated the major disadvantages of squeal and high pad wear. Soft iron wire coiled in the periphery of the discs damps out the high-frequency oscillations that cause squeal. Moreover, each disc is now swept with four, not two pads, so wear should be reasonable and braking excellent.

For power steering, they chose the American Saginaw system with a recirculating ball steering box. The constant quest for perfection at Rolls-Royce allows the engineers to applaud anything close to perfection, even when it's someone else's design. They speak of "our good friends at General Motors" and claim that the GM four-speed automatic gearbox design is the best they know of. Even so, they don't hesitate to improve on it: on the Shadow they have added a freewheel device to smooth the 3rd to 2nd and 2nd to 1st downshifts, and a major improvement is the eradication of the complicated mechanical linkage to the gearbox which has to be laboriously reworked with each model change. Now a fingertip control stalk at the steering wheel electrically actuates the selector mechanism housed with the electric motor just behind the gearbox.

Like the GM gearbox, the Rolls-Royce 380-cu. in. V-8 engine was worth retaining with only minor modifications. The spark plugs were repositioned so that they are now accessible without removing the front wheels.

The only thing traditional about the styling is the Rolls-Royce grille and its Silver Lady. The grille has been returned to its Edwardian proportions, while the Silver Lady ornament can now be supplied with a flexible mounting to avoid impaling serfs. But like the people who styled the Mini, the Corvair, or even the Mercedes 600, the Rolls stylists found that any shape giving a very respectable accommodation/overall size ratio is bound to be a bit box-like. The interior is pure Rolls-Royce—lots of the walnut, real leather, and padding that makes the Shadow one of the most elegant and comfortable four-seaters in the world. This Rolls has, as well, all the electrical gadgetry that the American market requires, plus redesigned heating and air conditioning systems. The latter systems were tested—repeatedly—in Canada and Arizona to ensure maximum human comfort in temperature extremes.

Speaking of gadgets brings to mind Rolls-Royce's automatic ride height adjusting system. Height-sensitive devices at both front and rear activate the valves in the high-pressure hydraulic system which pump fluid into the hydraulic rams between the top of the coil springs and their attachment to the body. The car is thus given a mean ride height irrespective of its loading, the extra soft suspension loses none of its movement, and the half shafts are not badly angled, thus sparing the load on the universal joints. The problem for Rolls was to devise an automatic system which adjusted the height immediately when the car was loaded but didn't alter ride height because of suspension movements once the car was on the move. They ended up designing two separate valves: a very slow one which would take care of gradual lightening (diminishing fuel load, etc.) as the car was moving, and a fast one to allow fluid to be pumped into the rams fast enough to achieve correct ride quickly when the car was stationary. They wired the high-pressure solenoid valve into the courtesy light circuit, since the load in the car only changes rapidly when someone is getting in or out of the car or filling up the trunk. The solenoid is also wired into the gear selection circuit and works when the lever is in the neutral position, so you're even catered to when you're taking on fuel.

Despite the fact that the Silver Shadow has been on the drawing boards for such a long time, the car will be viewed as Rolls-Royce's "answer" to the Mercedes-Benz 600. This is probably as it should be, because the two cars are aimed at the same luxury car market and are quite similar from a design standpoint. Having recently accused Rolls-Royce of "slavishly pursuing an almost baroque dedication to form, as opposed to function," *(C/D)*, July, 1965) we are delighted to see them build an automobile that is truly contemporary. However, if they'd managed to get the job done in something less than 10 years, the accusation from certain proud Teutons of being copycats would never have been voiced.

The traditionalists aren't going to like some things about the Rolls-Royce Silver Shadow—the styling, particularly. But a good chat with the Rolls people confirms that they're not really concerned with a traditionalist's sort of tradition. What they're really concerned about is their own tradition of fine engineering. You see, they have this thing about building the best car in the world. . . . C/D

Styling comparisons are inevitable: some say the Silver Shadow looks like a Mercedes 600; others contend it resembles a stretched Peugeot 403. But while traditionalists may cavil at the Rolls' new lines, the stylists at Crewe aren't really concerned. They're busy maintaining their own traditions—those of functional understatement and engineering excellence.