

Their book is divided into 22 chapters, but less obviously, into three overall sections. The first dissects the forces that act on an automobile (from tires and aerodynamics) and examines how these forces affect handling. The middle section is a sort of mental intermission where you can stop biting your pencil, put your feet up and follow a wonderful history of chassis engineering written by some of its contributors. The last section climbs down the ladder of technical abstraction a few rungs to deal with some specific subjects (tire slip angles, ground effects, types of suspensions and so on).

I'd start with the historical section. Not only is it fascinating, but it might hook you hard enough on this subject to pull you right on through the rest of the book. (If I were the Millikens, I'd consider making this section available separately for nontechnical automotive historians.)

In it, Bill Milliken explains, "For me, it all began when I drove my newly acquired Type 35 Bugatti up in front of the old Flight Research hangar of the Cornell Aeronautical Laboratory in Buffalo in the fall of 1946." Finding that even in the late Forties comparatively little was understood about how cars handle, he visited

GM and had a crucial meeting with their handful of chassis engineers.

"I was asked to recount our [Cornell's] work in aircraft dynamics. Suddenly, in the course of this recitation, [Maurice] Olley literally jumped to his feet and shouted, 'We should do it!'—meaning, as we soon found out, that GM should engage our services for applying techniques successfully used for aircraft to the automobile. Thus we found ourselves with an initial \$25,000 contract the next day."

If you're deeply interested in automotive design, you should know about people like Maurice Olley. Who? That's what I mean about the section's value. The "marquee" car designers—Ferdinand Porsche or Ettore Bugatti, to pick two—occupy most shelves dedicated to automotive books, but in my opinion, about 99 percent of the modern automobile's real excellence is owed to quiet men we know absolutely nothing about. GM's Maurice Olley, for example, started out by building a number of original devices to study ride quality: a mechanical "bump rig" to simulate road conditions, a machine to swing cars around to measure their inertias, and a test car with which he could redistribute masses and fiddle with spring rates. What

Olley ultimately found was that good ride quality required softer springs in the front suspension than rear, but simultaneously that soft springs with a front beam axle resulted in wild shimmying. The solution? Independent front suspension by double A-arms, and by the Thirties Olley had almost single-handedly introduced them to America. They'd appeared furtively in Europe, but with Olley, the design for once rested on solid engineering.

By the late Thirties, Cadillac had also innovated car skidpadding. "Don't let anyone persuade you that the skidpad tests are meaningless," Olley said. "They mean pretty much everything if we will just take the trouble to interpret them." Music to this road tester's ears.

Olley was followed at GM by several others whose work the Millikens similarly describe. But even if you're not historically inclined, the book's theoretical and technical sections (its vast majority) make for a definitive work on chassis dynamics, meaning that if you are an armchair John Barnard (or *are* John Barnard), you might want to box a dozen or so of your Porsche or Bugatti books to make some room on the bookshelf for *Race Car Vehicle Dynamics*.—Kim Reynolds