

The HotchKiss Amilcar

A flexible mind solved problem of chassis rigidity

By Roger Barlow

The car with the cast iron frame. All right, a cast aluminum frame...but that got your attention, didn't it? Why a cast frame of any material? Who needs it?

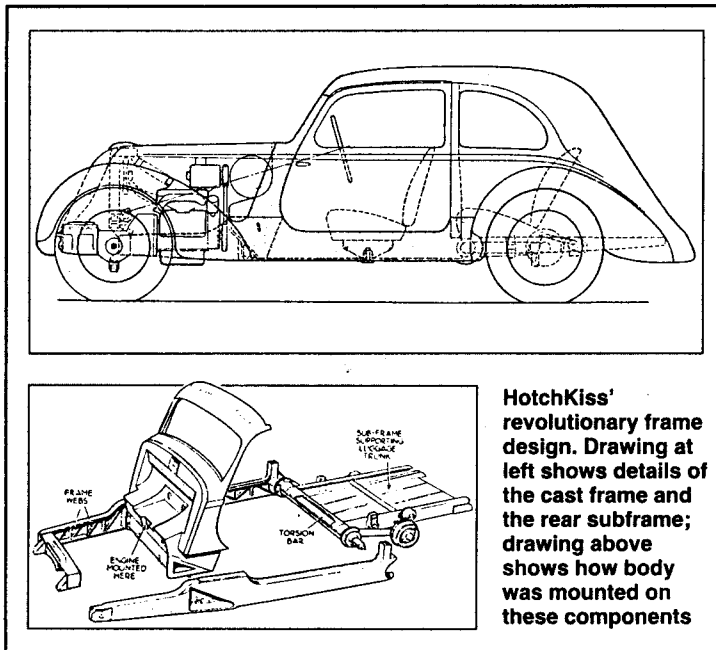
A lot of cars really did, and some still do. Anyone who has driven an open MG, SS100, XK120, a Cord 810 convertible or dozens of other such open cars on a washboard road or across railroad tracks certainly knows what is meant by chassis flex and scuttle shake. On the V8 Cord, it was positively frightening.

Chassis rigidity has always been something of a problem from the early days of the motor car. As wheelbases were extended, the situation was aggravated. When flexible engine mounts came into

use, the difficulties were further compounded as the rigid mass of the engine itself could no longer serve to stiffen up the forward part of the chassis. Engineers were caught between the need for keeping down the weight on their designs while providing a frame of adequate stiffness to support a variety of open and closed coachwork. Beam strength was less of a problem than torsional rigidity. Many quite modern cars with impressively robust looking chassis, sedans as well as open tourers, would twist or flex enough to jam their doors when jacked up at one corner...or allow one to open when negotiating some rough terrain.

Tubular cross bracing of huge girder-like frame rails and even a substantial "X" brace located amidships certainly helped, but still failed to produce a truly non-deformable chassis before WWII. Although in the '30s, Mercedes-Benz came up with one of the best designs ever—a pair of large diameter oval tubes brought close together and partially joined near the center of the car, then spread far enough at the front to accommodate the engine-gearbox unit and at the rear for the independent suspension layout, with cross bracing at both ends. It was refined and used on the new post-war 220 and 300 series cars. It may well have been the ultimate separate chassis.

Even so-called computer designed cars of recent years are far from being really rigid.



HotchKiss' revolutionary frame design. Drawing at left shows details of the cast frame and the rear subframe; drawing above shows how body was mounted on these components

Many large cars I've driven, especially station wagons, seem to have a discernible wave-like tremor that runs the length of the car that is detected through the seats themselves when sharp little road inequalities are hit at highway speeds. Breaker strips, for instance. Some current cars of unitary construction, such as the Chevrolet Celebrity, still show a surprising amount of scuttle shake on a quite normal gravel road. The problems of chassis rigidity have by no means been completely resolved yet, computers or no.

But on the HotchKiss stand at the Paris auto show of 1937 there appeared a truly revolutionary approach to this aspect of automotive design. The "solid as cast iron" frame had arrived! Only it was cast in an aluminum alloy known as ALPAX. It was not only absolutely rigid, but also it resulted in a car that was 200 to 400 pounds lighter than any conventional vehicle having the same 98 inch wheelbase. However, this chassis was not produced as one single casting but, for practical reasons, in five sections: a pair of deep side rails, a front cross brace, a large scuttle unit that incorporated the windscreen pillars and header, and a tubular rear cross member that tied the frame together, plus providing a home for the torsion bars of the rear suspension. Where these five separate castings were joined they were machined, fitted and bolted together so as to

form a unit that was truly as solid as if it had been produced as a single casting. Everyone who drove this car used the words, "absolutely rigid."

Additionally the HotchKiss-Amilcar "Compound" was a front-wheel-drive design with rack and pinion steering and four wheel independent suspension; the rear utilized rubber elements in conjunction with transverse torsion bars. In the front, there were two transverse leaf springs.

This radical concept was not developed by the rather moribund HotchKiss engineering staff, but came in its entirety from outside the firm...from the fertile but practical genius of J.A. Gregoire, who had pioneered front-wheel drive in France since 1927 with his Tracta sports cars and advanced homo-kinetic constant-velocity joints which were clearly superior to the rather crude, but cheaper, solutions opted for by Citroen which gave their Traction Avant a 40 foot turning circle (compared to the 29.5 ft of the HotchKiss with its Gregoire Tracta CV joints.)

Unfortunately, HotchKiss had no small engine to match with a 1.2 liter side valve unit whose only bow to modernity was a light alloy head!

Nevertheless, with its light weight, clean lines and flat undertray, the "Compound" was capable of almost 70 mph. Excellent for its class in those days and equal to that of the 1.6 liter Citroen.

In 1938, before this HotchKiss came onto the market, the English automotive journalist, W.F. Bradley drove one from Paris to London in 49 days...by way of Baghdad! 8500 of the roughest miles any car could be asked to tackle; across North Africa going east and through the Balkans on the way back. A most rigorous testing of the strength and durability of this radically new chassis.

Bradley pointed out that his car left Paris without a sign of body rattle and returned the same way, despite the literal beating to which it had been subjected. Even to falling into a huge hole in a Bulgarian "road" and breaking a front spring leaf.

Was this most advanced car of the late '30s a success? It never had a chance, what with the failing HotchKiss Co. being slow in getting the car into full production and the imminence of the war. Less than a thousand were produced before hostilities halted car production. But a handful of them had engines with a new OHV head boosting performance to 75 mph. I wish I could find one today. ■