

Specification for Performance . . .

by Donald Healey, M.S.A.E.

(Editor's note: This article appeared in AUTOCAR in 1945. In the article Mr. Healey describes the characteristics he felt were important to a sports car. It wasn't until eight years later that the Healey 100 was introduced. Article submitted by Gary Hodson, Kansas City.)

Judging by what one reads in the motoring Press and by the fervour displayed when the enthusiasts get together, there is an increasingly lively interest in the special kind of car usually known as the sports type, a subject over which I have worked and dreamed and worked again.

It will be granted that the first requisite of an "enthusiast's," or "sports," car, as it is commonly termed, is performance. Performance in the broadest sense is signified, meaning that this ideal car must be capable of covering the kind of road on which it is intended to travel in a better, far better, style than the orthodox car. Furthermore it must give to its driver an unusual sense of gratification by reason of its absolute obedience to his skill.

Getting down to a definition, the chief requirements of a sports car are that:—

- (a) It must be much more readily controllable than the usual car by a reasonably expert driver, even if to obtain this quality may mean that a novice will find the car "difficult."
- (b) It must have a high cruising speed, and enough power in reserve at such a speed to have an acceleration in the order of 5ft. per sec. per sec. This calls for an engine which gives plenty of power where required, and carefully chosen gear ratios. Top gear performance at 10 m.p.h. is not an essential.

In order to satisfy requirement (a) the various components of the car must be maintained in their proper position and alignment under all conditions. We all know how badly a car behaves after it has been "bent" in a crash, and not straightened out properly. Moreover, it is not difficult to imagine what happens when a frame weaves, twists and bends at high speed, or when springs and radius arms deform and allow the wheels to take up whatever positions they like.

A Rigid Main Frame

The most important single component of a car, and especially so of a fast car, is the main frame, and unless this is really rigid in all directions it is not much use trying to design suitable springing and steering, for the model will be vicious and liable to "pile up" only too often.

Many people understand why a frame must be torsionally rigid, but very few know how rigid a frame should be in a horizontal plane. Yet it is easy to see that centrifugal force, acting at the centre of gravity, tends to bend the frame like a bow, bringing the inner wheels together, and causing perhaps a serious tendency to "over-steer." A number of well-known drivers came to grief because of this; it was a marked fault of a number of Grand Prix cars up to about 1934.

I would put a correct, quick and sensitive steering as the second essential; steering connections must be rigid; flimsy steering arms, bent track or push and pull rods and badly supported boxes have no business in a fast car. Some designers mask faults of steering geometry by introducing springiness or sponginess in the connections—such people cannot have had any experience of fast driving.

The steering geometry must be such that a slight "under-steer" is present. It must be borne in mind that in order to have a side thrust the wheels must be turned a fraction, and that the tyres will deform like a spring, and tend to "straighten back," so too much under-steering is undesirable. About the best compromise is to have a slight over-steer at low speeds and large locks, and a slight under-steer at high speeds and small locks.