A POOR MAN GOES MOTOR RACING

Arthur Mallock writes about an aggressive but not war-like (Formula Junior) U2

[Photo by R. Sargent

THE ULTIMATE IN LOW-BUILD.—Other Formula Junior cars tower above Arthur Mallock's U2 on the starting grid at last year's B.R.D.C. British Empire Trophy Meeting at Silverstone. The body is 23 in. high at the uppermost point. How does a Lotus Twenty compare ?

READERS may recall from my article in MOTOR SPORT of October, 1959, that that year had marked several significant steps forward in my search for no-cost motor racing. My 1172 Formula car had been reliable and winning consistently, which had two most desirable secondary effects. Firstly, a little bit of prize money was coming my way, which more than paid for mechanical replacements, so that the "kitty" was not permanently empty and most important of all, I was able to sell the car at the end of the season, so that for the first time in a dozen years I had some real money with which to build a new car. The other important fact was the advent of Formula Junior, which looked like being the best chance for the amateur constructor to break into International racing since the early days of Formula 3 in about 1950.

Many "Special" building projects are still-born, because the builders have no very clear idea of what they are trying to achieve. Before starting, therefore, it is best to carry out an "appreciation of the situation" in the best military tradition. The "object," then, was to build a Junior, for about £400, which would not disgrace itself in International competition, with the ultimate aim of making my racing pay for itself. The "method" was to analyse the different factors which go to make up a good Junior and then try to incorporate them in the design:—

Weight.—Having been born with a spring balance round my neck there was no great problem here. By keeping the basic design some ½ cwt. below the limit, ballast could be added at undertray level to help keep down the c. of g. and also allow the weight distribution to be altered to suit the circuit.

Drag.—Anything approaching "lamina flow" is impossible, on an open-wheeled car, so the object should be to keep down the overall frontal area and minimise air disturbing projections. In 1960 Coopers proved that cutting down the body width doesn't help a lot, their "full width" Formula 1 car having a lower drag than the much narrower Lotus. The U2 has a 23-in. scuttle-height and 44½-in. track, giving a lower frontal area than any 1960 design. Exhaust pipe, wishbones, and suspension units were all enclosed.

Transmission-line loss.—The live rear axle with straight prop.-shaft has a lower loss than any other system.

Selection of gear ratios.—By using a B.M.C. gearbox and differential, four sets of gearbox gears and five or six final-drive ratios are available, to give almost any desired combination. In 1960 many of the rear-engined cars were none too happy in this respect.

Cornering power.—A study of 1959 race results and lap-speeds showed that, on tricky circuits such as Brands Hatch and Oulton Park, the 1172 Formula cars were about as fast as the Juniors, e.g. the Brands lap-records were about the same and at a combined race at Oulton Park in October the first two cars were 1172s. The faster 1172s mostly used live rear axles, swing-axle i.f.s., and asymmetrical weight distribution. Compared to the all-round-independent suspension by wishbone, popular with the Juniors, this arrangement appeared to make up for the deficiency of some 12 to 15 b.h.p. in power output. From the above analysis, the following design was derived:

Chassis frame.—Similar to my 1959 1172 but with the side-members now extending to the full width of the body, i.e. a space frame using mostly 18g. square-section tubes. Experience gained on the very conservative 1959 design allowed a weight saving of about 20 lb.

Body structure.—As in 1959, this consisted of single curvature duralumin panels secured directly to the chassis tubes. Duralumin has a tensile strength of at least 24 tons, i.e. is two or three times as strong as alloys used in conventional body construction, so that 24g. panels do the work of 18g. Chassis depth was reduced 2 in. and the undertray dropped 1 in., lowering the scuttle height to 23 in.

Rear axle.—The Austin Seven rear axle had proved very satisfactory for 1172 use, but the choice of ratios was a bit limited and I wanted an offset differential, so a Minor 1000 axle which retails at £30 was used, with one side shortened 6½ in. I used Austin Seven rear springs and had hoped to use a torque arm, but I could not see any way to mount it and in the end I settled for trailing arms *à la* Sprite, which worked very well.

Wheels.—Sprite 13-in. wheels with 5.25-in. tyres were the obvious choice for the rear, but for 1961 I am using the ex-Gilby Climax wheels with wider (4½-in.) rims. Cooper 500 front wheels fit straight on to the Ford stub axles, and save 20 lb. of unsprung weight. They look a bit queer, however, with 13 in. rear wheels, so I have gone over to 13 in. Condor wheels for 1961. These drop the front end by 1 in. Ground clearance was corrected by chopping ¾ in. off the sump.

Front axle.—This is basically as 1959, i.e. Ford swing-axle. A Standard Eight steering box replaces the Austin Seven layout and the castor angle is reduced from 6 deg. to 4 deg., which completely cured the rather heavy steering of the 1172.

Suspension.—Lotus Eleven Series I suspension units replaced the original leaf spring, saving 12 lb., and the two swing-axle pivots were made concentric to reduce the track without shortening the half-axles. Having spent a whole evening making up short track rods, I discovered that 100E rods were exactly the right length!

Gearbox.—I had intended using a Ford 105E gearbox, but when I discovered it weighed 70 lb. against 39 lb. for the A30, I decided against it and bought a secondhand A30 box for £7 10s.