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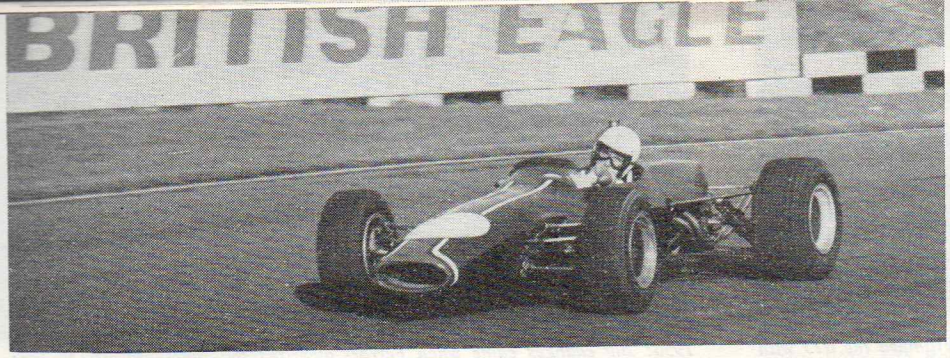


In corners the Titan felt very stable indeed, and responded remarkably well to changes of line which would normally upset a car.

MOTOR RACING TRACK TEST

C. LUCAS ENGINEERING'S F3 TITAN-FORD

No. 68 by John Blunsden

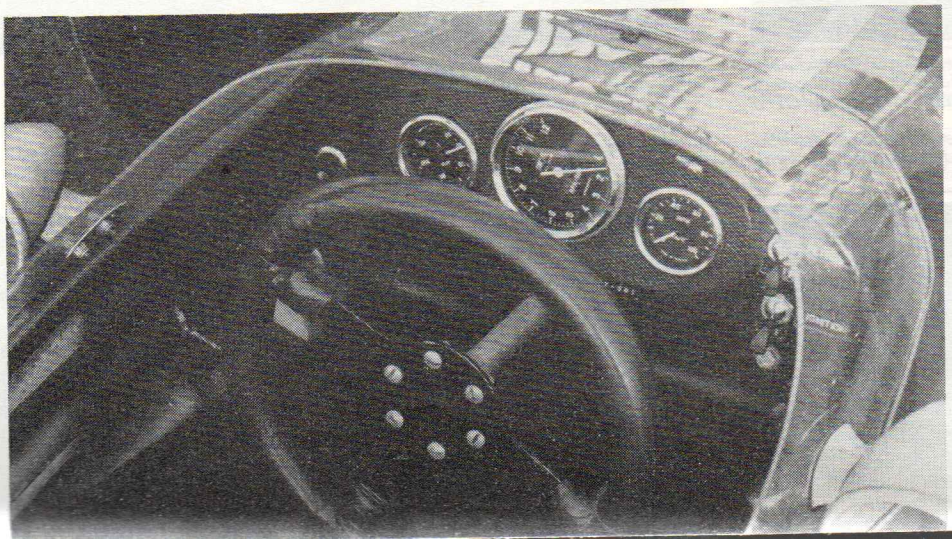
IT came as no great surprise to hear that the Titan is going into series production. From the moment Roy Pike lined up in pole position on the Formula 3 grid at Silverstone on GP day, the car seemed destined to become much more than a one-off special produced by Charles Lucas Engineering. Since that day Pike has pulled off four 'firsts' with the Titan in the most hotly contested branch of motor racing, proving conclusively that this newcomer to the F3 ranks has something special to offer, apart from a sleek line in bodywork. Exactly what, we were able to discover when the talented young Californian paid a return visit to Brands Hatch two days after his most recent race victory (on Boxing Day) and submitted the Titan for track test.

We also discovered that the car was built up from scratch in about two months, because although the team had been considering building their own Formula 3 car (having previously run Brabhams and Lotuses) the decision to do so was not made until their Formula 1 project (they were planning to use one of Ted Martin's lightweight V8s) had to be abandoned when Piers Courage had a 'big one' at Snetterton and wrote-off the Lotus chassis.

The F3 Titan is built up around a space-frame chassis of $1\frac{1}{8}$ inch, 16 gauge, longitudinal members and $\frac{3}{4}$ inch or $\frac{7}{8}$ inch, 16 or 18 gauge diagonals and other members, the transverse bulkheads being formed mostly from flat-sided oval tubing. The main chassis members are used to transport the oil and water both ways between engine and front-mounted Serck coolers, and a main diagonal is used as a breather for the systems. The frame is nickel-bronze welded throughout.

Upper and lower front wishbones connect the chassis frame to the familiar modified Herald-type uprights and operate Armstrong No 2 dampers inside coil springs rated at 140 pounds/inch. At the rear the almost universal lower-wishbone-and-single-top-link layout, with radius arms pivoting from the cockpit bulkhead, is coupled to Lucas-designed cast magnesium uprights, supporting Armstrong No 4 dampers inside 165 pounds/inch springs. Roll bar sizes are $\frac{5}{8}$ inch at the front and $\frac{9}{16}$ inch at the rear, both bars being mounted with trailing ends.

CLE's neat cockpit design includes this simple instrument panel, with water temperature gauge on the left, tachometer in the centre and oil pressure gauge on the right.



In the absence of any Firestone 125 'R spec' tyres on the test day, the car was run on the Firestone 125s with a 115 mix which were used for the Boxing Day race. They were fitted to four-stud Crosslé wheels—525/975 x 13s on 8 inch front rims, and 625/1250 x 13s on $10\frac{1}{8}$ inch rear rims. Charles Lucas Engineering, however, are in the process of having their own F3 wheels cast, which will have 9 and 11 inch rims respectively. Normal tyre pressures are 22 psi.

CLE have their own steering rack housing cast, Cam Gears supplying the internals, which provide $2\frac{1}{4}$ turns of the very compact steering wheel from lock to lock. Lockheed alloy brakes are used all round with $9\frac{3}{4}$ inch front discs and $9\frac{1}{2}$ inch rear discs, the master cylinder sizes being $\frac{5}{8}$ inch and 0.7 inch, respectively.

The Titan conveniently weighed out at just 2 pounds over the minimum limit, so that no ballast has to be carried. The wheelbase is $92\frac{1}{2}$ inches, the front track $53\frac{1}{2}$ inches and the rear track $55\frac{1}{4}$ inches, while the overall body width is a modest $24\frac{3}{4}$ inches.

Although CLE continue to buy a lot of their F3 engine parts from Cosworth Engineering they are now doing all their own cylinder head work themselves from scratch, and of course they incorporate their own highly successful downdraught induction system. The normal 1968 specification lists a compression ratio of 12.5 to 1 and a minimum gross horsepower rating of 110 bhp at 9,250 rpm and torque rating of 69 pounds/feet at 8,000 rpm.

The valve mechanism includes mushroom-type chill-cast iron tappets running directly on the iron three-bearing gear-driven Cosworth A6–106 camshaft. The 1.4 inch inlet and 1.25 inch exhaust valves are in nimonic alloy with a 45-degree seat angle, controlled by double springs, the outers wound with a variable pitch, rated at 260 pounds/inch.

A Weber 46 IDA carburettor (with one choke blanked off, of course!) is flexibly mounted by an 'O' ring to the Lucas cast aluminium alloy manifold, and the 10 mm plugs are sparked by a Lucas (Joseph, not Charles, in this case!) Opus 3 12 volt transistor-assisted set comprising distributor, amplifier, coil and ballast.

The engine is fed from a 10.4 gallon combined seat and side tank, chief engineer Roy Thomas (who is responsible for all the CLE engine work as well as chassis design) rightly feeling that it is safer to use one big tank all the time than to use the normal 7 gallon tank and have to suffer a supplementary knee tank and all the plumbing involved when using the car in long-distance races.

The Titan had required nothing more than a precautionary check-over between the Boxing Day race and the track test, but just to confirm that all systems were 'go' Roy Pike first took the car for a few warm-up laps, casually slipping in one at 53.5 seconds in the process, the track being in pretty good shape, but with the odd damp patch here and there.

I then slid down into the cockpit, and found that it was a bit of a tight 'un as well as a Titan, although once you get your shoulders tucked beneath the top lips of the body sides there is a fair amount of working room. Because of the lack of clearance between the bottom of the steering wheel and my legs I found it best to sit a little higher up in the cockpit than I

might otherwise have chosen, and this in turn made the pedals about an inch too far away. In fact they are adjustable, but I decided to first try them as they were for a few gentle laps and then, having discovered that I could still work them reasonably well I decided to leave them alone, because by this time I was really beginning to enjoy the car.

The instrument layout is simple and to the point—a central rev counter flanked by a water temperature gauge on the left and an oil pressure gauge on the right. The starter button is on the extreme left and the fuel pump and ignition switches on the extreme right. No confusion at all. There is the usual right-handed shift, of course, for the Hewland gearbox, which had a really light and quick engagement, although I had to make fairly ponderous shifts from second to third because of the slightly awkward wrist movement involved (for me, at any rate).

Previously when driving Formula 3 cars I have always had to work harder to achieve a given standard of performance than with any other type of car, but this didn't seem to be the case this time. It may be the result of having a few more miles under my belt, but I prefer to put it down to the considerable increase of power available (this particular engine was delivering a corrected 115 bhp at 9,500 rpm), coupled with the Titan's very predictable handling and in particular its performance under braking and on acceleration out of a turn. All this means that you don't have to screw yourself up into a ball in order to get anywhere near a respectable time.

Even bearing in mind the track conditions at one or two points, my best time of 54.6 seconds was still about 2 seconds off the pace, but the significant thing was that it all came so easily without any sweat (literally!), and I felt that I might have found another second with more familiarisation.

It was the first F3 car which I felt I could throw about with any degree of confidence, and this was allowing me to pick up quite a lot of time in the corners. The relatively soft front end is a contributory factor to the superb braking for the front wheels really seem to dig in instead of pattering along over the rough patches (and you can usually reckon that the roughest patches on a circuit are going to be in the braking area, due to the pounding). A limited amount of anti-dive has been built into the suspension, the desirability or otherwise of which remains one of the big debating points of chassis design, and on which I am certainly not competent to comment. All I can say is that at the level provided on the Titan the theoretical advantages of anti-dive did not appear to be eclipsed by the driver's inability to cope with it! In other words, I don't think I was ever in any danger of falling off the island!

Rear suspension, with reversed lower wishbone, single top link and twin radius rod layout. The engine in the test car was peaking at 115 bhp at 9,500 rpm and had bags of torque.

Once in a corner the Titan felt almost perfectly balanced. There was no excessive understeer, and the chassis responded immediately and very precisely to steering adjustments. The back wheels could be broken away quite easily at the hairpin, then steadied by the use of power and the steering wheel so as to improve the exit line from the corner. A certain amount of care was necessary to keep the car properly balanced over the rough stuff at the top of Clearways, but full power could be applied quite early coming out, the car merely performing a mini-tail-slide to the left as a momentary rise in revs revealed some wheelspin. The other outstanding feature of the car in a corner was its manoeuvrability. Even when travelling reasonably fast into or through a bend I found that if I had mis-aimed it (a not infrequent occurrence, when track-testing, I might add!) I could adjust my line without apparently losing time, as a result of the excellent steering response. So often, if you are running wide, I find you have to let it all slow down before you can make the necessary adjustments, or else become terribly ragged.

With the four-speed box geared for Brands Hatch (ratios 3.17, 2.00, 1.63 and 1.43) the shift points were completely conventional, third being taken on a flying lap after braking for Paddock, second before the hairpin, third (a bit early) just before Bottom Bend, second at the braking point before Clearways, third coming out of the curve, and top in front of the pits.

The red line is at 10,000 rpm, but I studiously followed Roy Pike's theory that if you start thinking about shifting when the needle is on the top side of 9,500 you actually stop the needle at about 9,800 rpm. Ideally, you try to keep the revs between 8,000 and 10,000 rpm all the time, but when this is not possible it is useful to find that the engine will pull pretty well from 7,000 rpm, and is certainly doing a useful job by 7,500 rpm, when it is delivering between 101 and 102 corrected bhp. (As a matter of interest, the corrected figures at 500 rpm intervals from 7,500 rpm for this engine—the first of the 1968 CLE Fords—are 101.7, 107.0, 112.3, 114.4 and 115.0 bhp.) During the test the water temperature remained at 75 degrees C and the oil pressure close to 100 psi, figures on the low and high side, respectively, due to the very cold ambient temperature and possibly to a switch of lubricant (normal pressure about 85 psi). Inevitably the engine is fairly top-endy, but even when it is running too slowly to carburate cleanly there is immediate throttle response to help it back on to the cam, and once there it has that indefinable 'strong' feel that suggests that it will go on running all day long.

An experimental lightweight clutch was fitted which, if it proves it can take the torque reliably should be a considerable asset in a long race because it has a very light and pleasant action. The brake pedal had just the right degree of firmness for my own liking, with a slight build-up in pressure requirement towards the end of about 20 laps of the Club circuit.

Having seen Roy Pike make an absolute copybook start from the grid on Boxing Day I concluded the track test with what I knew would be a vain attempt to emulate him. Following his instructions, I took the revs up to 9,500 rpm, banged in the clutch and simultaneously floored the accelerator. A fraction too many revs (10,400), a bit of a tail slide, and then too quickly a rev drop, through not retaining just a fraction of clutch slip at the end of the travel. I tried again, and this time I kept the revs to 10,000 all right, but again the rev drop was a little too rapid, although I managed to get much better rear wheel bite and ended up with a fairly reasonable start.

So ended a test of a very fine Formula 3 car which, within the limits of my own experience I would rate as second only to a Matra in its braking and cornering performance. If I was impressed I seem to be in good company, for already eight orders have been taken for replicas (six F3s and two FFs), and more seem imminent. Charles Lucas Engineering have already established themselves as engine specialists and now seem assured of building an equal reputation as constructors. Their decision to expand into a new factory at Kings Lynn is linked with a number of interesting plans for the future, but meanwhile a 'fleet' of F3 Titans in good hands in '68 is the best possible way for them to publicise the high quality of their first formula car.

Front suspension follows conventional practice, with upper and lower wishbones locating the modified Herald-type uprights. Lucas' own steering gear is used.