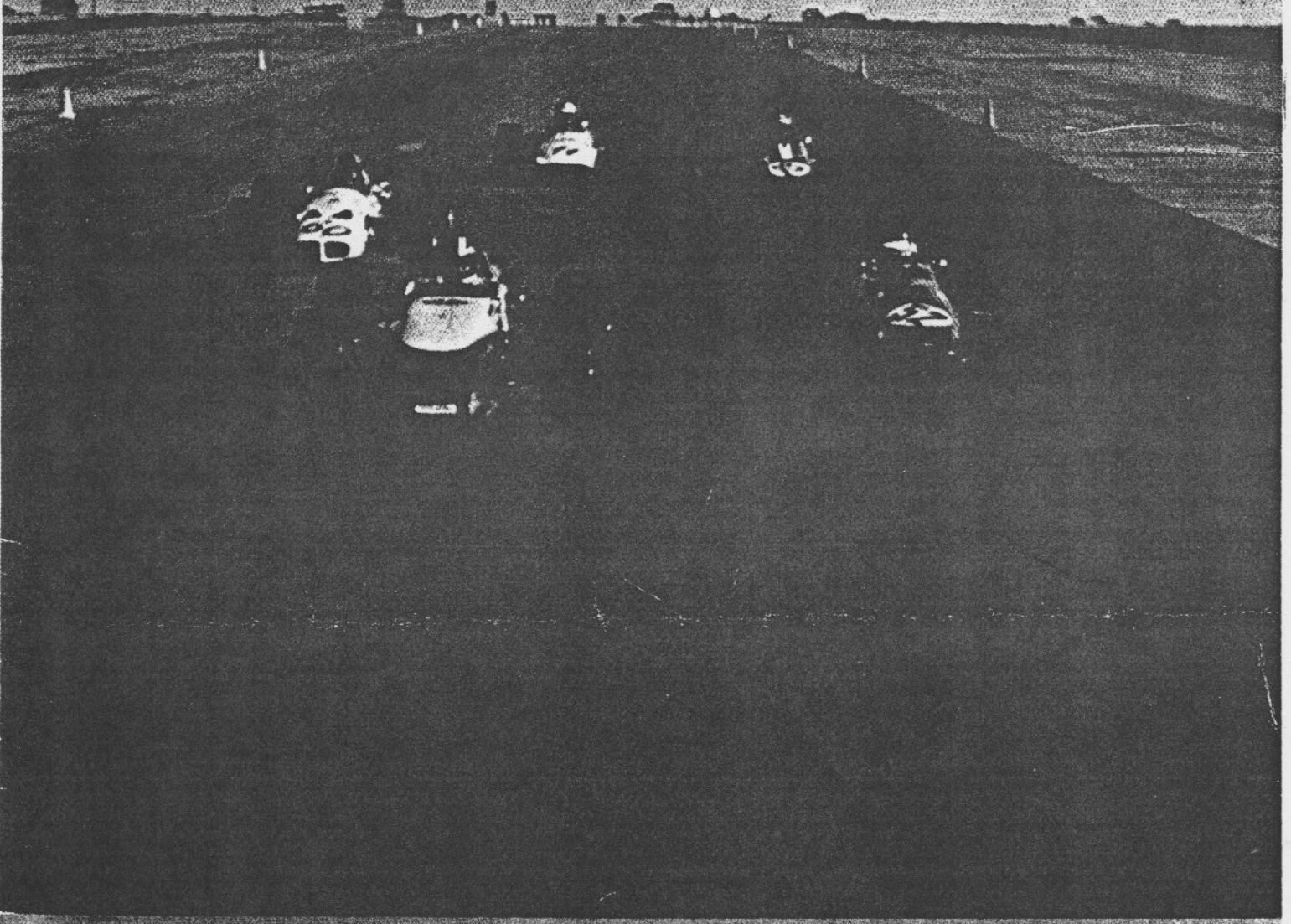


Motor

WE DRIVE 5 FORMULA 3 CARS



'70 COMPETITION RESULTS
'71 CALENDAR OF EVENTS

TOYOTA
COROLLA
COUPE
TESTED

PHOTO: JAMES S. GIBSON FOR MOTOR

GROUP TEST

F3 cars

The cars: Tony Trimmer's *Motor Sport*/Shell F3 Champion Brabham BT28, Peter Hanson's Chevron B17, a works March 703, Roger Keele's Palliser and Charles McIntosh Reid's Lotus 59.

The drivers: *Motor's* chief road tester, Michael Bowler; Deputy Editor, Roger Bell; and the only experienced F3 driver in the test crew, Peter Gaydon.

The place: the full Silverstone Grand Prix circuit

There are two reasons why this group test didn't follow normal practice: *Motor's* testers are not practised F3 drivers and the cars were racing the following weekend and so we were limited to only a few laps. And as neither Roger Bell nor Michael Bowler is suitably qualified to compare these machines Peter Gaydon stepped into the breach.

Peter is 29 and married. He started racing in 1964 with a U2 in Clubman's racing, changing to a Lotus 23 for 1966; in 1967 he joined the F3 clan with a Brabham BT18 and achieved the Grovewood Award 3rd place for his performances that year. In a Titan the following year he wasn't quite as successful, so for 1969 he changed to a Tecno powered by Jo Ehrlich's Ford. On a GP points basis for International F3 racing he was the most successful British driver, successful enough to get an F2 drive this year with Bob Gerard's BT30, a drive which fizzled out when Gerard pulled out of racing. This year he has driven in two F3 races plus the occasional outing in sports cars. With Paul Watson he is a co-director of Motor Race Consultants responsible for entering and promoting their clients. To this end he laid on our fastest group test.

The International Formula 3 is for single-seater racing cars of 1 litre capacity breathing through a 36mm choke between the carburetter and manifold; engine choice is free as long as they are from mass production units but the universal choice is Ford. All these designs are very similar with mid-engines and mandatory 4-speed gearboxes, and they all develop around 120 bhp at 9500 rpm.

Overall impressions

by Peter Gaydon

The first car I tried was the March 703. This was one of the Petonyer Works March team chassis which had been raced by Ian Ashley before he left the team, and latterly by Formula Ford driver Colin Vandervell. I liked the feeling of the car immediately. It was stable and, although slightly stiff in the

steering with little steering lock, it was easy to handle. Having raced a Tecno once in my career any other steering feels light by comparison. A feature of the suspension was the use of very stout roll bars; team manager Andrew Marriott informed me that lighter bars had been tried but that they caused the inside rear wheel to pick up in the corners, thus the stiff bars were an essential. This caused the car to break away smartly when it was pushed into the corners and I found that both the front and the rear could be broken away at will. The brakes were excellent. In F3, braking is vitally important as races are won or lost on the last corner and usually the latest braker emerges the victor. With the March one could stamp on the pedal and obtain immediate retardation with the chassis weaving slightly but not uncomfortably. I am a bit wide round the hips and I found the cockpit rather a tight squeeze, but as the seat sides were the petrol tanks no doubt a good tin basher could have effected the necessary modifications.

From the March I went to Peter Hanson's B17 Chevron. The car was in its usual trim with Novamotor engine and Dunlop 356 tyres. I had considered buying a Chevron to race in 1968 but the B9 of that year had a very narrow cockpit and I didn't fit into it. The B17 has a much wider cockpit but still I was uncomfortable and had to sit at an angle in the car. Comfort is essential for competition driving—you can't concentrate if you're uncomfortable. For a fast lap the car should be like a glove responding to every movement you make. It was unfortunate that the Nova engine was chucking out its oil. But in my few laps I was left with the impression that this was a really taut finely balanced car. The steering, which I had heard criticized as heavy, was most precise and the gearchange had a tiny travel and was so quick and smooth I did not really need to use the clutch. Designer Derek Bennett has built an understeer characteristic into the chassis which makes the car superb in a really fast corner like Woodcote, but it requires a bit of steering tweaking round the slower corners.

Next on the list was Charles McIntosh Reid's Lotus 59. This was the same chassis Dave Walker used for three races towards the end of 1969. My last drive in a Lotus, apart from a GT 47 in 1968, was at the Motor Show 200 Meeting at Brands Hatch. I was in a 41 and in the streaming wet conditions I spent a great deal of time revolving. A Lotus always feels like a Lotus. It has a personality of its own and seems more delicately balanced than any

other car and appears more sensitive to drive. However, in comparison with other cars, it is easy to drive fast and is so manageable that if you get into trouble it helps you out of it. This particular car tended to oversteer—a feature I prefer—but unfortunately it had Mallory Park gear ratios and I was unable to take Woodcote at the same speed as in the other cars. The brakes were good but not exceptional—this may have been a question of balance, rather than design, nevertheless I should have liked more effort on the front.

In F3 racing the right foot is either hard on the brake or hard on the throttle and it is during the change from hard brake to hard throttle that one notices any handling deficiencies. As I released the brakes on this car on entering a corner, the rear end slid out gently until I had the power on again when the tail came back into line. This is a feature I particularly like in a car; it allows you to take calculated late braking risks; you know that if you go too deep the tail will swing out and loose the excess speed safely. The 59 is a very good chassis indeed.

After a leisurely lunch the Tony Trimmer Brabham BS28 was wheeled out. This car, which is entered by Race Cars International who are constructors in their own right, won the *Motor Sport* Shell International Championship so I expected it to be good, and so it was. I fitted into it perfectly, so I was immediately able to forget the physical aspect of driving and concentrate on driving the car. The immediate impressions was of a large car with high cockpit sides, but I was used to this having driven Bob Gerard's BT30 F2 car during the year. The brakes felt as if they were solid, but I was soon to find they were as good as anything I had ever experienced. Tony Trimmer likes to be able to stamp on the brakes hard, achieve maximum retardation inside the minimum distance and then to power off. The chassis was adjusted to perfection and allowed me to do just this. I drove the car for five laps—Tony was due to race the same engine at Mallory Park at the weekend—but it speaks well of the chassis that in these five laps I was in the 1.38 bracket against a lap record of 1.36.4, which would have been set with a good tow. Additionally the car was very much over-gear; I was able to hold third from Stowe to Club, whereas normally one changes into top on the exit of Club. The car reached 9200 rpm on the straight against 10,000 with the right gear. While I believe I could have adjusted all the other

cars to suit me, and could probably have achieved the same result as the Brabham. I never really enjoyed the car in the most literal sense of the word, but had to work harder than with the Lotus to achieve the same result.

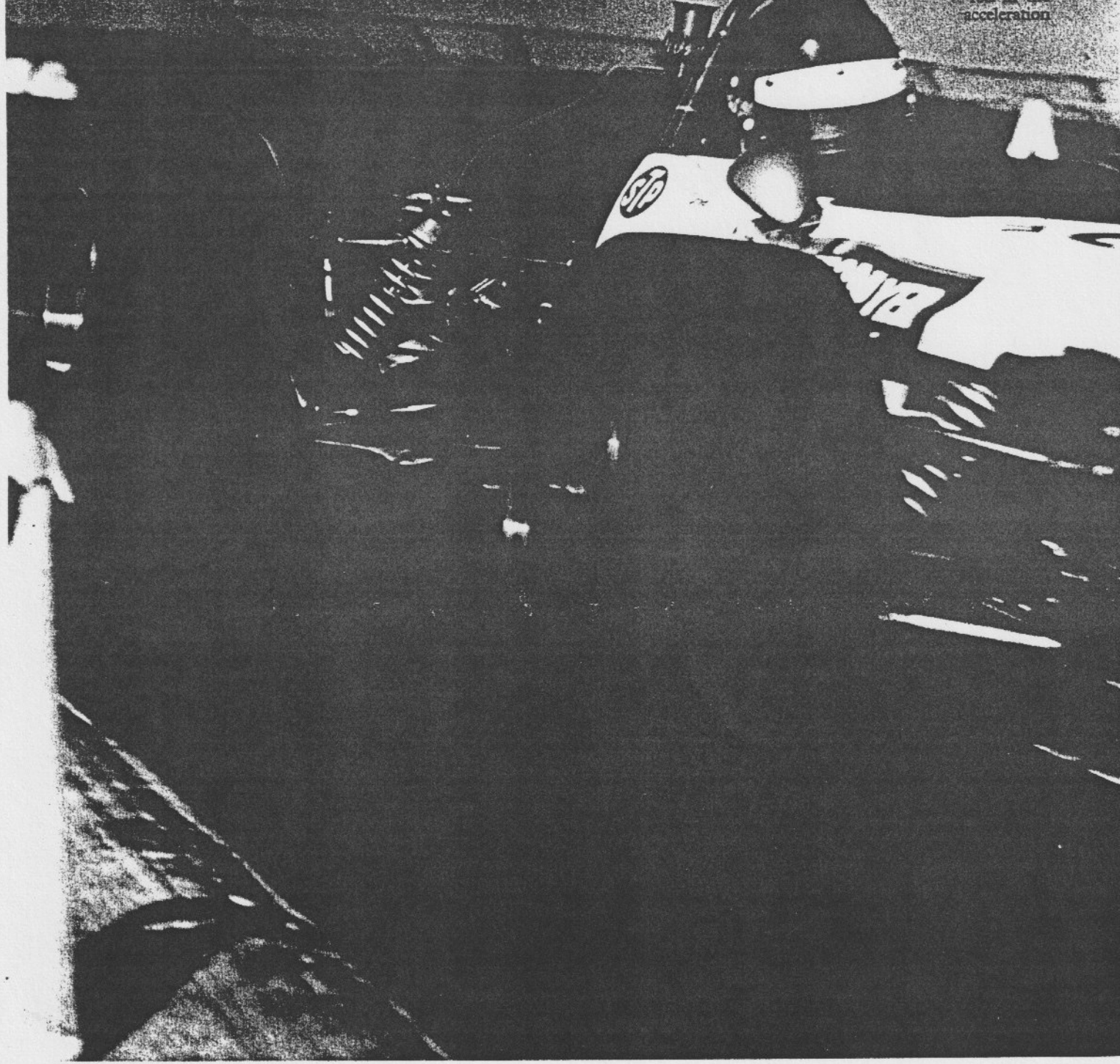
Finally I came to the Palliser, which Roger Keele had made during this season. The chassis is a product of the Palliser Works but the engine and the cockpit are very different. The cockpit was very comfortable and I was almost in a normal driving position. I would have liked to have been in the steering wheel, but the car was not straight. It is a good chassis, but with problems in the steering and straightening because of the suspension. It is a really good chassis, but the steering wheel was not in a normal driving position.

Kele's car was the car was an interesting one, but the bald front tires made the characteristic worse. In spite of this, when you finally got the car really going on the road and one can understand how Keele has managed such good results without the best of things.

The brakes were not good in operation. The initial travel was so long it was not really very hard and fast, it was a bit like a master cylinder to change the feel of the pedal when you finally got down to the point where they stopped the car quickly and easily. The front uprights of the car are of the March Herald units and the rear uprights are to the March Herald units. These should cure this problem and improve the braking. This is a really good chassis, but has yet to be

Fitted to the five cars were a selection of three Holbay engines, one Novamotor and one EMC. The Holbays were undoubtedly the best having a great surge of power from quite low revs. I used 9800 rpm for the test, but I am told that 10,200 is quite acceptable and indeed after some races this season I have seen over 11,000 on some rev counters.

Trimmer's engine was a little better than the March, but I doubt if there is more than 2 bhp in it. The EMC felt strong, the engine had been freshly built for the test by Ehrlich Engineering and it seemed to be almost as good as the Holbays, but the double acting slide throttle was uncomfortable to use in comparison to the single slides of the Holbay and Nova. With the EMC the engine was either on or off, there was no feel in the acceleration.

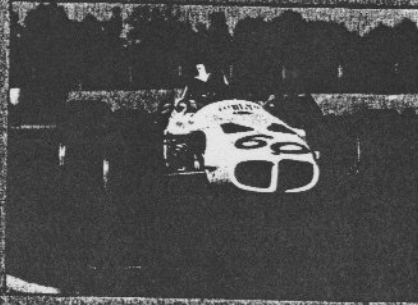


pedal thus gear-changing was difficult to accomplish cleanly.

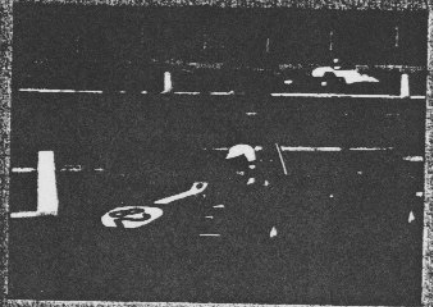
The Novamotor unfortunately chucked out its oil, but it felt much smoother at high revs than the other engines, probably a result of the aluminium flywheel. It seemed to lack a little at the bottom, but had perhaps slightly better top end performance—a very interesting engine but not overall as good as the Holbay. Unfortunately we were not able to test a car with a Lucas engine.

The Drivers

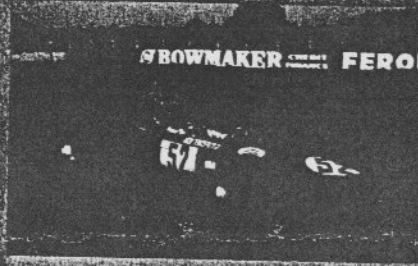
Undoubtedly the most successful machine present was the Tony Trimmer Brabham. In 1970 Trimmer won outright victories at Snetterton (three times), Monza (where he became the first British driver to win this event since Jackie Stewart's success in 1964), Brands Hatch (four times), Oulton Park, Magny Cours.



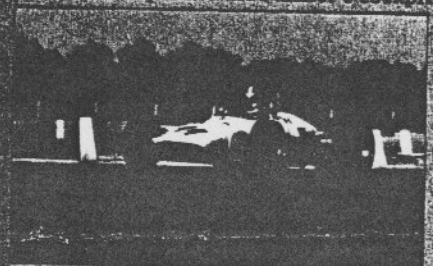
Peter Gaydon, seen by the left, took a track at a corner.



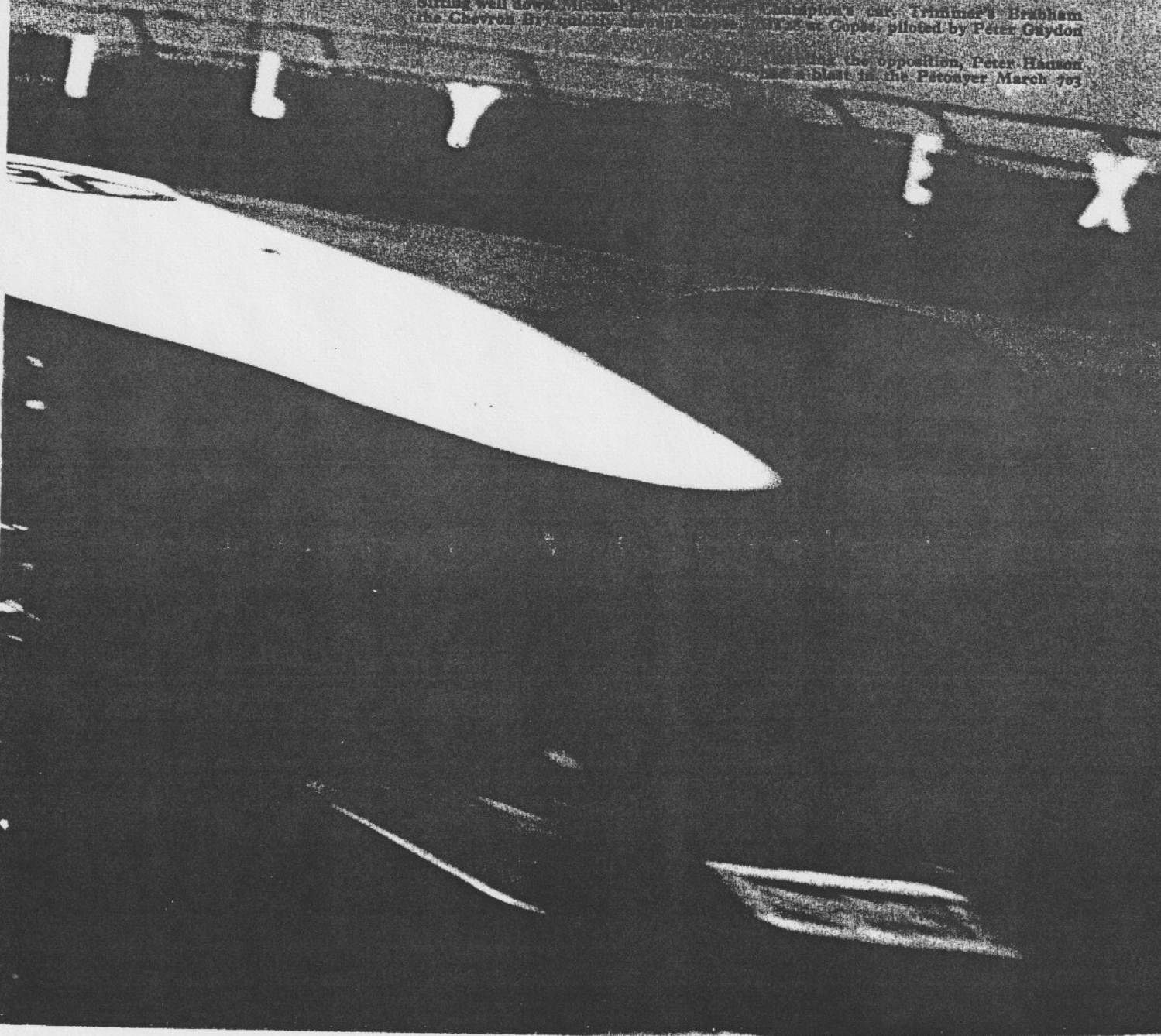
As the race over, the tall Roger Bell was seen in the depths of the Ferrari's cockpit.



Sliding well down, the car was seen in the Chevron by the left.



Champion's car, Trimmer's Brabham BT26 at Oulton, piloted by Peter Gaydon leading the opposition, Peter Hanson and a blast in the Pstraver March 703.



and Cadwell Park. He has also won the *Motor Sport Shell International F3 Championship* which must count at the premier championship in Europe. Peter Hanson, too, has had a very successful season, though the oil problems with his Novamotor have rather spoiled the latter half of it. He won the Finnish Speed Week Championship by winning outright at Hameenlinna and taking 4th place at Keimola, having led the race until a rocker broke on the last lap. He dominated the Karlskoga Swedish Grand Prix, being fastest in all the practice periods, winning his heat and winning the final. The March team backed by Petonyer have had a year of development. Most of the testing was done by their young Formula Ford recruit Tom Walkinshaw; he put up a personal best performance at Thruxton to take a new lap record but shortly afterwards broke an ankle and was put out of racing for the rest of the year. The team have lacked a top driver and thus have no international wins to their credit. Perhaps the best performance in international events was by Vandervell at the last Brands Hatch event where he finished 6th in the final, well in touch with the leading group.

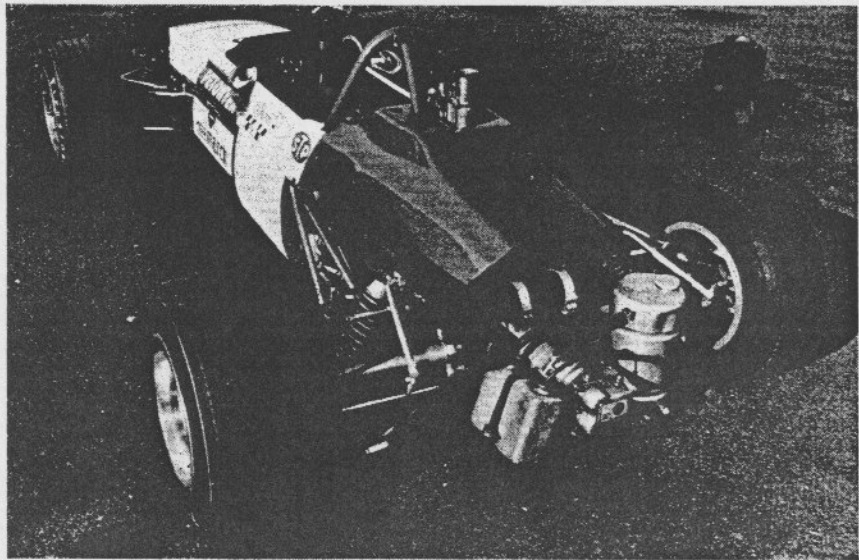
Roger Keele has had a very disappointing season with the Palliser, largely because he just didn't have the backing to get the best engines. His best result was a 2nd at the National meeting at Castle Coombe. Plainly the car could win, but without the right engines this is not possible in the fiercely contested racing that we have seen in 1970.

Charles McIntosh Reid only started racing at the beginning of this year and thus describes himself as a learner. His best effort this year was a 4th in a Snetterton libre event. McIntosh Reid has started racing in the most competitive formula there is, but he chose F3 because it is still the cheapest way of competing at International races.

How F3 has developed

by Michael Bowler

The current Formula 3 has now run for seven years and throughout its life has provided some of the closest racing to be seen in any class. It took over from the old formula Junior at the beginning of 1964. FJ started what was meant to be the cheap racing formula, using 1000 cc or 1100 cc engines with a weight penalty for the larger capacity. The variety of engines was at first quite large with Ford, BMC, Fiat and even 2-strokes, but by the time the new F3 was under way 1 litre Ford and BMC units dominated. The BMC engine led at first when in 1964 the Chequered Flag Geminis with Mike Parkes and Bill Moss ruled the roost; the following year Jackie Stewart and Warwick Banks in Ken Tyrrell's Coopers were the ones to beat. Then the Ford engine took



The March 703 has been considerably developed during the year, latterly to accommodate the low profile Firestones; front wishbones are shorter bases than F1 cars. Oil tank and extinguisher at rear increase traction

over and is now universal, tuned by a variety of British and foreign specialists. More recent widespread modifications have been to adapt the cylinder head to downdraught carburation by blanking off the side draught ports, boring through to them from above; and letting in a tube to keep the water out—adding metal to standard components is not allowed in the 1971 F3. The Weber became universal, too, once someone blanked off its second choke; some engines now use a sliding throttle under the carb rather than the normal butterfly.

Briefly the regulations stipulated that the four-cylinder engine should come from an FIA recognized car of which 1000 had been produced in 12 months; the same applied to the gearbox/final drive casings but they needn't come from the same car. Overhead camshafts were excluded and the intake system had to include a 36mm hole between carburetter and manifold through which all mixture should pass. Only four forward gears were allowed (reverse compulsory) and limited slip differentials were forbidden. Minimum wheelbase was 6ft.6½in., track 3ft.9½in. and weight 925 lb with oil and water including 44 lb. for the compulsory fire extinguishers and roll bars behind the driver's head. Maximum body width was 3ft.1½in. Safety fuel tanks were not compulsory for F3 this year but will be on the new formula so the limit is now up to 948 lb.

By the time you add 180 lb. of driver and 100 lb. of fuel, an F3 car on the line weighs over 1200 lb, which with the almost standard 120 bhp output gives 223 bhp/ton; so acceleration is pretty impressive—enough to give 0-100 mph in around 13 seconds.

Formula Junior produced pretty varied designs, including the front engine, rear drive Lolas and Stanguellinis (looking like miniature Ferraris) and the front wheel drive Bond. But F3 cars have conformed to the now classic mid-engine layout, apart from the occasional U2 or the one-off Cooper with Hydrolastic suspension.

Those we tested at Silverstone are typical; miniature formula one cars capable of lapping the outer circuit at well over 100 mph—

even my own average on the three cars I drove, excluding the undergeared Lotus, was 1m.42.5s., 102.8 mph.

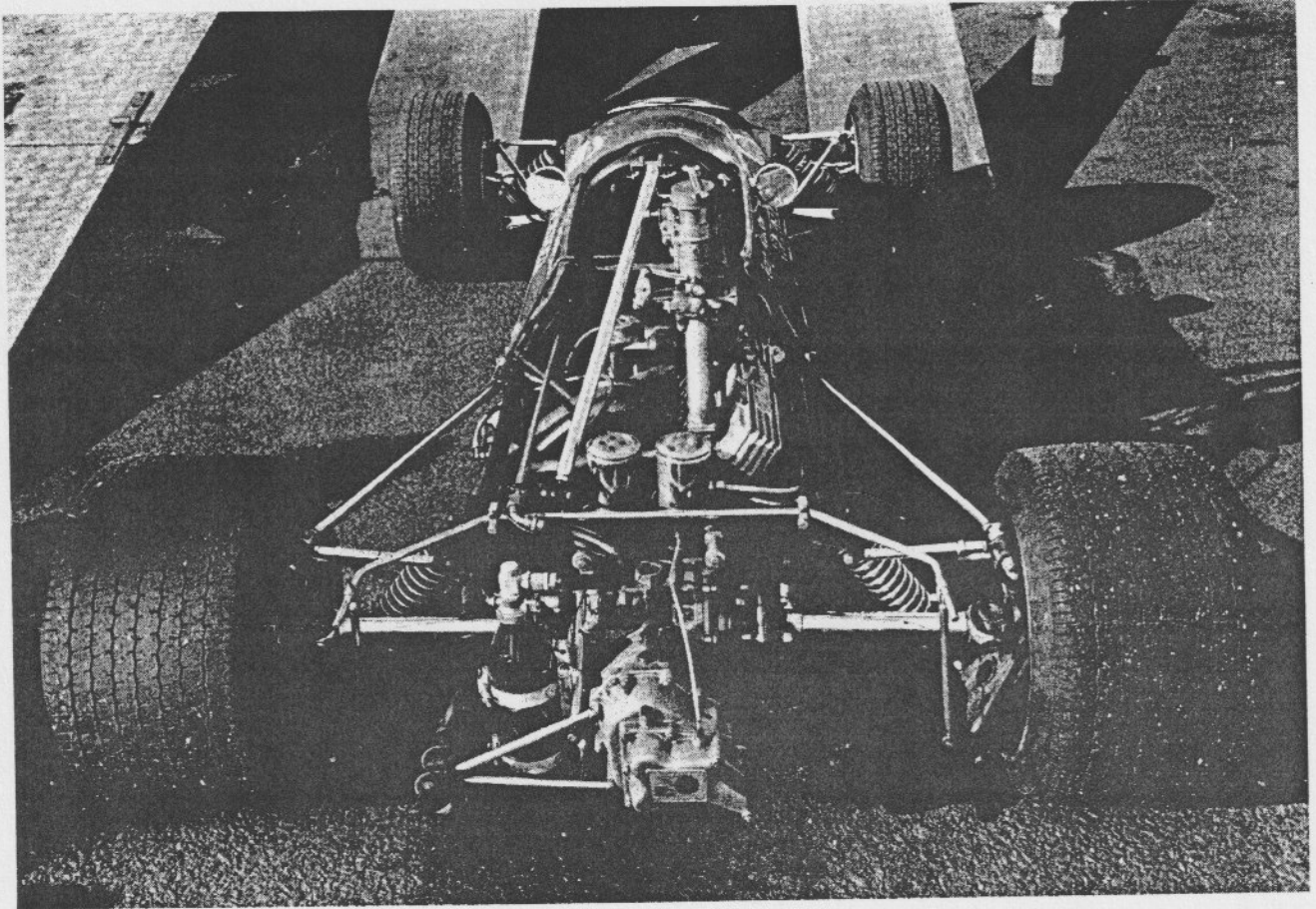
Apart from their colours it is difficult to tell the various cars apart; there are minor variations in nose shape and some have rear bodywork—only the Brabham and March were fully clad. Wings were only used as a scientific adjunct by the top F3 people; there isn't a big enough power surplus to be able to overcome the extra drag on faster circuits so none of the cars at Silverstone had wings. They tend only to use them in the wet to get the tyres really biting through the water, or at Brands and Mallory Park where the straights are not long enough for maximum power to be telling. Just looking at the five cars showed a marked similarity of design; they all use space frame construction, Ford downdraught engines behind the driver, with Hewland-modified Volkswagen gearboxes. All rear suspensions follow the same pattern as their bigger brethren with transverse links and twin trailing arms functioning as wide based wishbones. All use rubber doughnuts in the drive-shafts to absorb plunge (unlike some F1 cars which use ball-splines) and all have outboard disc brakes.

At the front there are minor differences in that the Chevron and Brabham have long upper leading arms, the rest have conventional upper and lower wishbones, the shorter base being presumed adequate to prevent brake torque wind up for these lightweight cars.

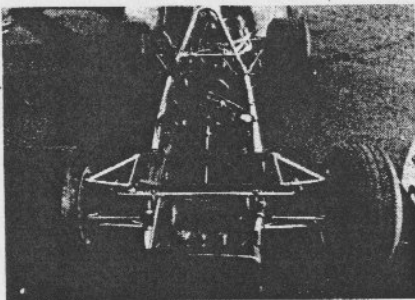
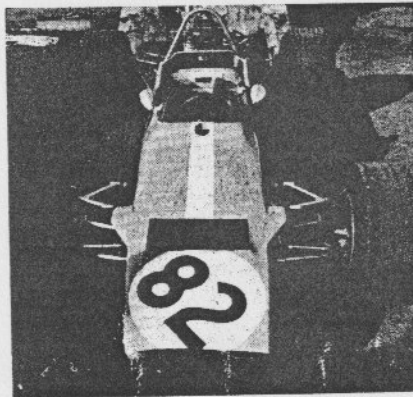
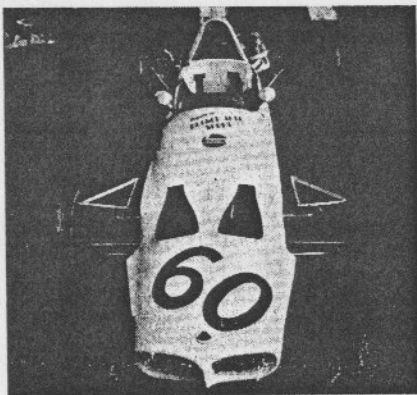
Most of the FJ cars used to use Herald uprights at the front because these were the best available to give full adjustment. Now only the Palliser (as an uprated Formula Ford chassis) uses them—and even they were about to be changed to something more rigid along the lines of the cast ones on the other cars.

All the cars had three instruments—a rev counter, combined oil pressure/temperature gauge, and a gauge for oil or water temperature; they all have right hand gearlevers of varying precision and proximity to the bodywork—I skinned my knuckles on the March.

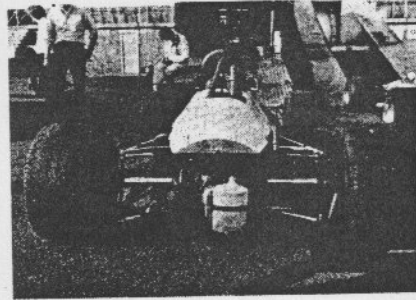
The basic ingredients suggest that all the



Peter Hanson's Chevron B17 uses the Italian Novamotor-Ford with a sliding throttle below the Weber; suspension follows F1 designs. Tyres are Dunlop low profiles with different patterns front and rear



Charles McIntosh Reid's Lotus 59 is the 1969 version shown with and without bodywork. The later 59As have different radiator and ducting to fit under the more wedge-shaped nose



Roger Keele's Palliser is developed from the Formula Ford chassis with Herald uprights. Tony Trimmer's Brabham BT28, below, uses Firestones. Trimmer won the Shell Motor Sport F3 trophy

cars could be set up for identical handling; but wishbone lengths, mounting heights, spring rates and roll bars make all the difference and the cars I drove certainly handled differently. The Chevron stood out with strong understeer which you can watch happening as the car is simply not going the way the wheels are pointing—it was a bit twitchy on bumps, too, but the understeer felt very safe through Woodcote. The Brabham certainly gave the most comfortable ride and one could feel the roll which made it seem more akin to a road car. I didn't get the March going fast enough for the inside rear wheel to start coming up so it felt very much like the Lotus, possibly firmer. Roger Keele was far too big for me to begin to get into the Palliser so no comments.

One of the changes that F3 has seen in its final year is in tyres. Firestone's ubiquitous YB11 of relatively high profile (about 50 per cent) had things all its own way throughout 1969 and most of 1970, and it wasn't until Dunlop started using lower profiles on Gerry Birrell's Brabham that Firestone moved on, using the front tyre of the Lotus 63 for the rear of an F3 car, with F2 tyres at the front—ZB11s, the Z giving the type of construction and the B11 the compound. Gerry Birrell, who did the Dunlop testing, finished up with 4.25/9.50 x 13 (40 per cent) at the front and 4.50/13.00 x 13 (35 per cent) at the back, the 4.25 and 4.50 being the section height in inches against Firestone's YB11 with heights of 5.00 and 6.25 in. With such difference in heights the suspension needs considerable modification to set up the correct ride height again without the suspension drooping too

much, possibly by altering the wishbone mounts.

Peter Hanson was using Dunlops in the 356 wet F1 compound but would have liked to try the intermediate 368; to accommodate these tyres, apart from different length spring/shocker units, Chevron took a leaf from their F2 book and built up a bracket to shift the lower rear transverse link back a couple of inches to counter some rear wheel steering.

Firestone have been ready to produce their low profile tyres for some time and the 1970 Lotus 59A was designed to accommodate them; other differences were the more wedged nose, appropriate radiator ducting and provision for fins and wings. However the Firestone testing, carried out by Tom Walkinshaw with the Petonyer March at Thruxton, resulted in quite a few changes; front and rear roll centres were lowered by dropping the inboard suspension mount, necessitating quite strong anti-roll bars; a "beard" sprouted on the nose cone to add understeer; and oil tank and fire extinguisher were moved to the rear to give better traction out of corners.

The March was on Firestone's standard intermediate pattern, but Trimmer's Brabham was trying the very dry 13 pattern used on the Lotus 63; few changes appeared to be necessary for the Brabham to accommodate the lower tyres as the softer suspension is designed to operate at greater movements. Both the Palliser and Lotus 59 were on the faithful YB11s.

Firestone's tyre marking has changed between the YB11 and the ZB11; the former uses the same system as Dunlop, the latter, with sizes like 7.6/22.0 x 13 and 10.00/23.00 x 13, give the width of rubber on the road (as opposed to the maximum width of the casing) and overall diameter, so you can't work out the profile ratio in the usual way. Firestone didn't want to use the ZB11 until everyone could obtain them so their appearance was delayed. The wet equivalent is the hand-cut ZB16.

In Formula One, drivers have been running on reduced front rim sizes to cut down the drag, but this reversal hasn't penetrated throughout F3 yet—the Lotus, Chevron and March were using 10 inch front rim widths and 12 inch rears. The Palliser used 9 inch fronts and 12 inch at the rear while Tony Trimmer used a 9/11 inch combination.

At the end of its seven year life Formula 3 has become pretty sophisticated with highly efficient engines and very effective suspension. By the end of the year the Silverstone F3 lap record stood at 1m 35.8s to Mike Beuttler. An output of 120 bhp at 9500 rpm from 1000 cc on a single choke carburetter meant that the engines were fairly highly stressed and the new F3 is designed to reduce this considerably, making maintenance less expensive.

From January, 1971 the new specification is four-cylinder engines of 1600 cc of which 5000 units must have been produced in 12 months. On this formula the throttling washer which can be inboard or outboard of any induction system (fuel injection if you like) is a mere 20 mm, just over $\frac{1}{4}$ inch, or about the same choke size as an Austin 7. The idea is that output is limited to around 120 bhp by the air passing through the washer

at sonic speeds; this will limit the revs required to around 7500 rpm so engines should last longer.

So far there appear to be two failings of what should be a cheap formula; one is that the Ford twin-cam engine, which qualifies, is not a cheap unit; the second is that fuel injection can be used and may well provide more torque than you can get on carburetters, so the cost escalates again. Torques may not be quite so vital now that five-speed boxes are allowed but for those out to win it may well prove necessary to use injection. The current idea is to put the 20mm restrictor on the way into an air box from which four intakes suck, so if you don't have injection you still use two twin-choke carburetters—twice as many as the current F3.

Gearbox casings have to come from a 5000-unit car and limited slip differentials are now allowed—so yet more expense. The weight is up some 22 lb excluding the mandatory safety increases as the cars now need safety fuel tanks; a conversion on last years F3 apparently would cost around £300.

Between 1964 and 1970 Formula 3 developed a good reputation for the best racing and we certainly enjoyed our driving; here's good luck to the next F3.

First lesson

Roger Bell tries the March and the Palliser

To start with it didn't quite fit. There was insufficient room for my size ten to depress the clutch without catching on the adjacent foot rest; the glass-fibre tray you sat in was an inch narrower than my hips; and my knees caught the scuttle crossmember which made heel and toeing awkward. But once inside the March, wedged like a cigar in an undersized case, I felt snug, slightly claustrophobic but very comfortable.

Cockpit drill is quick and easy. Swivel ignition switch on (there's no key), fuel switch down and press starter—making sure you don't confuse it with the automatic fire extinguisher button which would have you sitting in a tub of billowing powder. If there is any engine vibration you're totally unaware of it. Your senses are dominated by the engine's smooth, hysterical buzz, monitored in slightly delayed action by a jerky rev counter needle.

The clutch was dragging a bit so first wouldn't engage without some nasty grating noises from the Hewland box in the tail. Eventually an extra heavy shove on the tiny right-hand lever got it home. Despite my delicate clutchwork, the engine promptly stalled so abrupt is engagement, so minimal the torque below about 5000 rpm. I got it rolling (untidily) at the second attempt, cured some kangaroo leaps down the pit road with a couple of de-clutched blips on the

throttle, and gingerly edged towards Cope trying to remember whether Mike Hailwood had just gone by in the rapid Lola 210—or was just coming.

I needn't have worried. Despite the groundhog driving position you get a good view out fore and aft. I recall my attention being temporarily diverted by watching the wheels and suspension working, live as it were. Not that there was much to watch for the ride on Silverstone's asphalt was very smooth—except out of Abbey where some furrows tweaked the wheel in your hand. You have to grip the tiny thick-rimmed wheel very tightly, too, because the self-centring tug is very strong and the leverage to hold it pretty small. My fingers and wrists were soon aching.

At first the cornering forces didn't seem all that high, partly because the tub holds you so well, partly because one tends to ease off at the sort of g loadings that road car experience suggests is the limit. You acclimatize quite quickly, though. Soon your concentration can be diverted from the purely mechanical reflex job of driving a basically easy car to the more testing task of technique and line. My times, like those of Michael Bowler, fell by about a second a lap for the seven or eight I did in the March. I suspect they would have stabilized soon after in the low 'forties for this session. I would have needed a lot more than seven laps to summon the courage to take Woodcote flat out. Even after lifting off momentarily—the best I could do at the time—the side loading was so colossal that I felt something just had to give. At 110 mph it did—my nerve.

For a car with barely 1000 cc the acceleration is staggering—though hardly memorable by absolute standards. There must be plenty of road-going machinery around that could comfortably out-drag an F3 car. It is the cornering and braking powers that belong to another world. They're so good that a novice accustomed to ordinary cars, even a respectable racing saloon, cannot adjust to them easily. Forcing the pace is like trying to keep your eyes shut when walking across a vast open space. You know that there's nothing to hit but you still have to look to make sure. Similarly, I knew that Woodcote could be taken without lifting off, that the men's braking point for Cope was 50 yards beyond where I hit the pedal. But an inbuilt safety device somewhere in the grey matter over-ruled this knowledge and reflexed the muscles into premature action. Fear is essential for self-preservation.

To be perfectly at ease and comfortable is fundamental to fast driving. I was neither in the Palliser which had been tailored for a much taller driver. When the throttle stuck wide open going into Club—a moment I don't care to relive—I was quite glad to have a good reason to abort. Apart from being at full stretch all the time, the EMC engine's totally unprogressive throttle response was to me frightening. The choice was simple: full power or nothing, aggravated by a slight delayed action between the two. Quite how you master this miserable arrangement at 100 mph in a tight formation while jostling for a position at a lateral 1g I shall never know. It would seem to me a rather masochistic exercise. ■