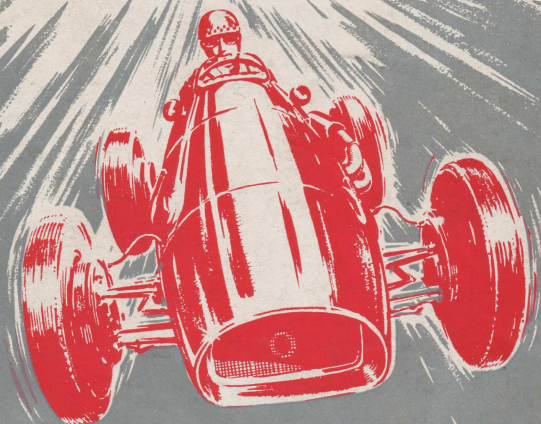


THIS THING MOTOR RAVING

*Including details of the 1955 racing programme at Snetterton,
compiled and produced by Riches and Sear Ltd., sponsors of
the Motor Racing at East Anglia's Motor Racing Circuit.*

PRICE 1/-

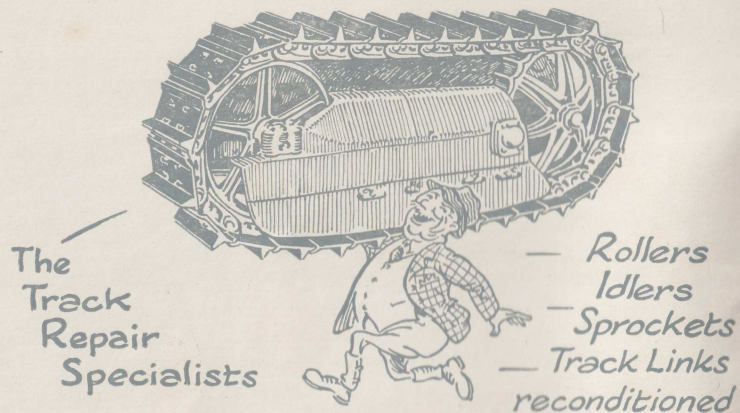


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THIS THING MOTOR RAVING



Snetterton . . .

A little more than three years ago the thrilling note of a racing car exhaust resounded across Snetterton Heath, it was a wonderful day, and was the prelude to the era of intense interest in Motor Racing that holds East Anglia in its grasp, few predicted that in this relatively thinly-populated area, such a venture could be successful, but a success it has undoubtedly been. Interest in Snetterton is I think we may say "National." So it is with confidence we peer through the winter mists and raise our glasses to spring, summer and autumn, 1955, and the most ambitious programme of Motor Racing ever seen at Snetterton.

Although based on our activities here, this booklet, will, I hope, go beyond this, and if I may put it in this way, say it is intended, to be but a brief glance into the crystal ball, wherein lies that vast panorama, this pageant of 20th-century progress, Motor Racing.

Compiled and published by Riches & Sear Ltd., sponsors of the Motor Racing at Snetterton.

SEVEN DATES TO REMEMBER

1955 Racing Dates at Snetterton . .

March 26th

National Restricted Meeting organised by the Snetterton Motor Racing Club, there will be events for Formula Libre Racing Cars, Formula III Racing Cars and Sports Cars in varying classes. First event is at 2 p.m. Practice is in the morning.

April 10th

Motor Cycle Racing organised by the Snetterton Combine with events for Solo Road Racing Machines in every class and side events. First event 12.30 p.m. Practice in morning.

May 28th

National Meeting organised by the West Essex Car Club with events for Formula I and Formula III Racing Cars and Sports Cars in varying classes. The Curtis Trophy and Lyons Trophy are awarded at this Meeting. First event will be at 1.30 p.m. Practice in morning.

June 25th

Mid-Summer Sports-Racing Car Meeting organised by the Eastern Counties Motor Club. A long-distance Sports-Racing Car event is planned, together with other events. First events 1.30 p.m. Practice in the morning.

July 31st

National Motor Cycle Race Meeting organised by the Snetterton Combine, a very full day's racing with events in every class and Sidecar events. "International" class entry expected. First event 12.30 p.m. Practice in morning.

AUGUST 13th

INTERNATIONAL MOTOR RACING organised by the West Essex Car Club, the largest meeting of the year and a "must" for all racegoers. First event probably at 11.30 a.m. Practice on Friday. Programme not finally settled on going to press.

September 10th

Motor Cycle Racing organised by the Snetterton Combine events for Solo Road Racing Machines and Sidecar Events. First event at 12.30 p.m.

Where to go when you visit SNETTERTON

These Hotels are especially recommended because of their good service and interest in Snetterton.

The Annesley Hotel

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Tel. 266311

Norwich 18 miles, on Norwich-Thetford road. 40 Bedrooms to let. Hot and Cold in all rooms; Gas or Electric Fires in all rooms; Wireless and 'Phones in some rooms. All meals served. Unlicensed, readily obtainable. Tariff: Bed and Breakfast £1 1s.; Luncheon 3s. 6d.; Teas 2s.; Dinner 6s.; Suppers 3s. 6d.; Garage 1s. 6d.

The Griffin Hotel

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Tel. 3265.

Prop.: Eric G. W. Murphy, M.B.E., M.H.C.I., A.M.I.C.A.

Approx. 3 miles from Snetterton on A11 in the Town of Attleborough in the direction of Norwich. Bedrooms to let (at present): 1 Single, 1 with Twin Beds and 3 with Double Beds, but there is a possibility of an increase of another 6 Singles and Doubles. Bathroom, etc., with H. and C. Hot and Cold will be incorporated in new rooms. Luncheons to non-residents Monday-Saturday (incl.). All meals including Dinner for residents. Dinner Parties catered for upon booking in advance. Menu à la Carte. Terms for Parties.

The Castle Hotel

Norwich, Norfolk.

Tel. Norwich 24283.

Directors: H. F. Taylor & S. M. Taylor

Norwich 19 miles from Snetterton on A11 road. Number of Bedrooms 50 (Hot and Cold all rooms). Breakfast 4s. 6d.; Luncheon 6s.; Afternoon Tea 2s. 6d.; Dinner 8s. Fully Licensed. Grillroom with extensive à la Carte Menu.

The King's Head Hotel

Diss, Norfolk.

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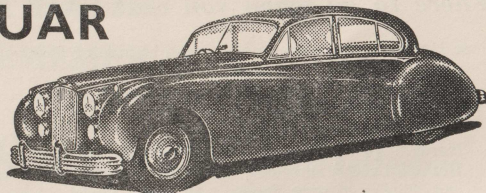
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FORMULA III RACING

"It's a lot of fun" says Jim Russell

It was largely due to Mr. Oliver Sear that Motor Racing was brought to Norfolk and I do feel that he, and all of the other organisers of the Circuit, are in a way responsible for my many successes in the field of sport. For it was at Snetterton Circuit Whit. Saturday, 1952, that I first became interested in Motor Racing.

The meeting was organised by the Half Litre Car Club, and gave me my first view of 500 c.c. cars in action. They impressed me so much with their speed, road holding and the wheel to wheel tactics adopted by most of the drivers, that I decided there and then to take up Formula III racing. The very next week I visited Coopers works and purchased a new Mk.6 complete with Jap Engine. I tried the car out on a local aerodrome and decided to enter the 500 c.c. race at the next Snetterton Meeting four weeks later. This was a 10-lap race, and although I was lapped by the first three cars home, I at least had the satisfaction of being one of the eight finishers.

Later I found that Brands Hatch, the Kent Circuit and the home of the 500 c.c. racing, was to give me the opportunity to race against other newcomers like myself. The very first season I gained so many places in junior races that I was confident that with a more powerful Norton unit I would stand some chance of success against the top-line drivers.

So in July, 1953, just 12 months later, I purchased a Steve Lancefield tuned Norton Engine. My first race with the new engine was at Snetterton and by now I was getting to know and like the Snetterton Circuit. I gained my first place in a Senior event that day crossing the line only 7 seconds behind the class champion Don Parker. Two weeks later at Snetterton I registered my first win in a 10-lap race organised by the West Essex Car Club. At the close of the 1953 season I decided to purchase a new Cooper for the next year's racing.

This new Mk.8 (which was later to become one of the most successful Formula III cars of the season) was ready for me by Spring, 1954, and again it was at Snetterton for the first try out. In this race Les Leston driving a works Cooper crossed the line one-fifth second ahead of me with Don Parker third. This was a fine start to the season. After I had gained a place in both the Silverstone and Aintree Internationals in May, Steve Lancefield decided to prepare me a new engine. This proved very fast and reliable because later in the year I won the "Daily Telegraph International Trophy," "The Redex Trophy" at Snetterton's first successful International meeting, and the 100 mile "Yorke Trophy" at

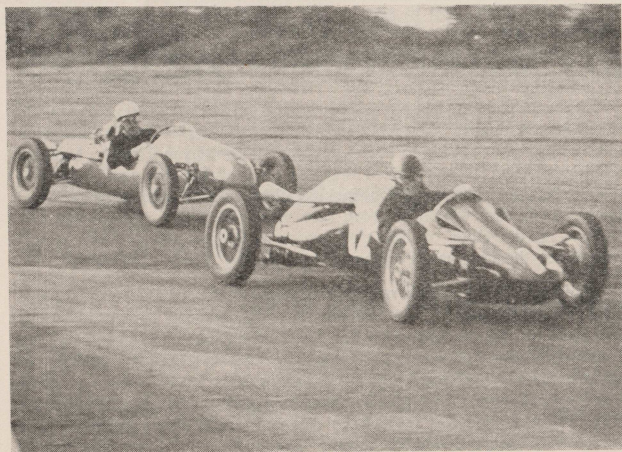
page five

Silverstone all in the month of August. By the end of the season I was third in the National Championships and had four lap records to my credit, including Snetterton, Brands Hatch, Castle Coombe and Aintree.

With experience and success at most Circuits in the country, I chose Snetterton as my favourite. As you may know I broke the lap record 3 times and won the "Eastern Daily Press Trophy" for gaining the most points in the 500 c.c. class.

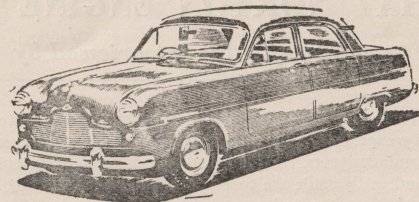
The preparations for one's car in between meetings is most important. Sometimes I have worked long through the night in order to have everything in race worthy condition, and above all to acquire the service of a first-class engine tuner. I was fortunate in persuading Steve Lancefield to take me under his wing, and it was his skill and attention this season that helped me so often to take the chequered flag. I believe this famous tuner of Norton engines has a few words to say on Engine Design and Tuning in this booklet.

Now to 1955. I need hardly say that I am looking forward to the new season, and can only hope that I have as much good fortune as I did in 1954.



Don Parker and Jim Russell in one of their "classic" F.111 struggles at Snetterton.

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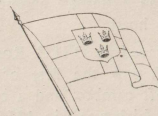
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"THAT NORTON ENGINE"

Steve Lancefield is interviewed by Oliver Sear

Steve Lancefield, ace tuner and scientist of Motor Racing, is acknowledged by experts, to be in the forefront of the world's most brilliant engine tuners and designers. Quiet and unassuming in manner, his corduroy jacket and ready smile are to be seen in the motor racing Paddocks at any Circuit where motor cycles are ridden and Formula III cars raced.

We are fortunate to be able to publish an interview with this famous motor racing personality, so without much ado, let us start firing questions at you Steve and see if we can extract some of your secrets as to why your engines seem to give a little more steam than anyone else's.

Steve—Well Oliver, I don't suppose you will extract many secrets from me. I will, however, try to answer your questions fairly.

Q—Can you start by giving me a brief history of the famous Norton engine. When was it first designed and by whom? When was the twin cam head and short stroke first introduced?

A—The first 500 c.c. overhead camshaft/rocker engine raced by Nortons in 1927 was designed by Walter Moore. He left Nortons to go to N.S.U.'s and in 1930 the Bracebridge Street concern brought out a new design of overhead camshaft engine which was basically the fore-runner of probably the most outstanding and successful single-cylinder engine series of all time. This was designed by Arthur Carrol, a young and brilliant designer, whom I knew well and greatly admired—sad to relate he met an untimely death as a result of a road accident. The famous "International" and "Manx" engines were off-springs of this design up to 1949, using a bore and stroke of 79 mm. x 100 mm., later altered to 79.62 mm. x 100 mm. on the "Manx" engines with the introduction of the "square" type cylinder head.

In 1935/36 the Works raced an O.H.C. Rockerbox using short tappets to operate the valves—1938 saw the first of the "narrow" crankcase engines with double camshaft cambox and a bore and stroke of 82 mm. x 94.3 mm., the latest of which used in 1954 an over-square bore and stroke of 90 mm. x 78.4 mm. Similar "Featherbed" engines now in "Manx" machines having a slightly over-square bore and stroke, i.e., 86 mm. x 85.62 mm.

Incidentally and for the record Joe Craig, who had a garage business in Ballymena, Northern Ireland, joined Nortons as development engineer in 1929.

Q—You are, I believe, brother-in-law to the famous T.T. rider, Harold Daniell. Have you yourself ever been associated with the Norton Works Team?

A—Yes, H. L. D. is my brother-in-law and naturally I know him very well—he rode my 500 Norton both before and after the war with conspicuous success. I consider that as a rider he was in a class of his own and his 91 m.p.h. lap in the Island in the 1938 T.T. on the Works' Norton was an achievement few could have equalled. Clare, his sister, and I were married during the "Bomb and Blitz" days and are now in our 15th year.

After the 1948 racing season I was invited by Gilbert Smith, Managing Director of Norton Motors, to take over the Works Team during 1949 with Johnny Lockett, Harold Daniell and Artie Bell as riders. Successes were not easy to come by, but we did kick-off by winning both classes in the N.W. 200, also the Senior T.T., and were generally "about the place" in the rest of the Classic road races.

Q—In your view, do the Continental multies present a better tuning "base" than the short stroke Norton engine?

A—As things are the multi has the edge on the single, but comparison between multies and singles always needs qualifying because their potentialities alter somewhat with the fuel permitted. Using hydrocarbons such as 80 octane petrol or petrol/Benzole the multi cylinder engine has a distinct advantage over a single cylinder of the same capacity, but if higher octane or alcohol fuels were permitted, I think the single would respond more favourably, particularly if the stroke/bore ratio is not overdone—a case of M.E.P.* versus R.P.M.

Q—Can you get as good a "Torque curve" from a single as a multi?

A—Whilst present short stroke engines are now very good at the lower as well as the top of the torque curve there is no doubt that the curve of a good multi cylinder engine is more constant and useful longer.

Q—Are the automatic "rev restrictions" on a large single a drawback in obtaining maximum power? or do you think a short stroke and large cylinder head compensate by offering "better breathing" and gas flow thus obtaining, in a "usable" engine speed range, of say between 4000 and 8000 r.p.m. better B.M.E.P.?

A—I would not say that the R.P.M. limitation of the larger masses of the single are "automatic" in restricting a potential increase in performance. It is as well to bear in mind the considerable increase in R.P.M. and power of present engines as compared with those used pre-war and it would be fair to assume that with continued single-cylinder

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research and development this increase will continue, but whether it will approach, equal or better the performance of the multi is open to question. The use of a shortened stroke in conjunction with an appropriate cylinder head design, porting and valve lay-out does undoubtedly help to improve the power output but how far this will yield to still higher power also remains to be seen. There are of course many racing singles of today that give a useful torque curve ranging from 4-8000 r.p.m. plus.

Q—In balancing the “top” and “bottom” end of the engine, would you say that the extra centrifugal forces placed on the bottom end, calling for stronger and heavier design with more friction and weight, outweighs the advantages of more r.p.m. at over say, 8000 r.p.m.

A—This is one of the major difficulties that designers have to face in both singles and multis, more particularly however in the case of a single in so much that with higher r.p.m. and power output often an increase in strength is required—this may be by change of material, design or increase in section—the latter expedient bringing in its train once again the problem of inertias and loadings, factors inseparable from ever-increasing r.p.m.

Q—I would like to take this imaginary engine which we have designed from your previous remarks and have a more detailed chat.

Valve gear. Do you hold the view that desmodromic valve operation is a “must” in future engine design, and the spring operation finished? It would seem to me that this is a logical development.

A—While in the academic sense the spring is looked upon as a most unmechanical device, much credit is due to valve spring manufacturers and engine designers that they have been able to achieve almost trouble free operation at the high R.P.M.'s used in some engines today. In view of the degree of reliability the Germans have obtained with desmodromic valve operation on the Mercedes it would appear that they have succeeded in achieving a satisfactory application and I believe that positive valve operation will be the “*modus operandi*” of future high output poppet valve engines.

Q—Would you have more than two valves per cylinder? What are your views on the “rotary valve”?

A—I would prefer two valves per cylinder where the bore size does not exceed 90 mm.—above this multi valves would be considered.

There is no design of rotary or sleeve valve that I would entertain were I designing a new engine—as crude as the poppet valve operation is, it is still a very efficient and formidable competitor to any other form of valve in existence today.

Q—Do you on your engines alter the normal “cam-profile”? I imagine you have carried out innumerable experiments with valve timings.

A—Over many years of experimenting I have naturally modified the cams on my engines and of course tried every conceivable position of cam settings, all with the main object of improving “breathing” and volumetric efficiency, and all-in-all have found it necessary to compromise operationally and mechanically to obtain the best trouble free performance.

Q—Do you alter your degree of overlap for different fuels according to the “mass” of the mixture in the inlet pipe?

A—I have found no worth while gain in performance when varying the valve overlap one way or another whilst using different fuels.

Q—Do you use a “Sodium filled” exhaust valve in your Norton engines? If so, why?

A—Yes, most of the Norton engines I prepare are fitted with “Sodium” exhaust valves—it is open to question whether these are really necessary on such a well-cooled engine using alcohol, particularly as very good results have been obtained with engines using non-sodium valves. However, for what it is worth, the sodium valve is a shade lighter in weight than its solid counterpart and the use of this type of valve is on this score alone worthy of consideration.

When using hydrocarbon fuels, unhesitatingly—sodium-filled exhaust valves please!

Q—Do you favour the two-plug head? Do you think it gives more instantaneous burning?

A—The gain from using two plugs is very doubtful in a well ordered and designed cylinder head. It seems a queer thing to me to produce a cylinder head having reduced turbulence and swirl—two most important factors governing the rate of burning of the gas—and then try to off-set this deficiency by using more than one plug.

Some engines converted to two-plug operation are in direct contradiction to established internal combustion engine practice as evidenced by their “roughness” and tendency to detonate, conditions inherent with an incorrect and uncontrollable rate of pressure rise.

I am fully aware that the Italians and Germans have raced with success certain two-spark engines, but these engines were designed and developed with this type of ignition in view and not as a conversion or palliative.

Research has established that a single sparking plug in the centre of the cylinder head sphere is the most efficient position, and by necessary compromise the plug should be as near to this ideal as possible.

Can we dwell for a moment or two on carburettors? You are the acknowledged master of the “Gas works.”

Q—Do you think the carburettor racing days are numbered? I see Mercedes Benz use direct injection, on the surface this would appear ideal. How do you feel?

A—In spite of the fact that—at least on single cylinders—we are getting extremely good results with atmospheric carburettors I have been of the opinion for some considerable time that fuel injection will be the method of the future. It may take time to better the efficiency of present day carburettors; it is, however, encouraging that already a Norton D/C engine has been converted to fuel injection and tested with promising results.

Whether direct injection into the combustion chamber is adopted future development will determine—bearing in mind that Mercedes Benz are not yet completely “out of the wood” using this method.

Q—I suppose Bosch are years ahead of everyone else in the technique of direct injection. They were the pioneers after all. Apart from Diesel engines they pioneered its use in aircraft piston engines as well?

A—Yes, the Bosch concern unquestionably have a great deal of knowledge in the field of fuel injection and I doubt very much whether it can be matched by any other country or concern at present.

Q—Do you think the “injection piston” type carburettor; e.g., Solex or Weber, has any great advantage over the Amal type?

A—I have always looked upon a design of carburettor using a piston to inject fuel at some phase or other as an admission that either the engine or the carburettor is not as good as it might be, and this method is used as a palliative—it certainly has no place in carburettors used in motor cycle racing.

Q—Do you reckon to get a similar natural action by the harmonic between choke and pipe length, setting up a pulsation action?

A—Depending upon a number of design factors irrespective of the type or make of carburettor there is a length/area of induction system that will give the best result—once again depending upon the R.P.M. at which one requires the pressure wave to be of most benefit.

I have found some difficulty in matching up the theoretical requirement with those found most suitable by test on the road.

Q—Do you alter the shape of the inlet choke to give you a better “venturie” action on the jet?

A—Carburettor modifications I have made have always the same object in view; i.e., to reduce losses to a minimum and ensure a stable fuel/air control. It is by no means necessary to have the smallest cross-sectional area over the main jet to obtain these.

Q—It was you, I think, on Don Parker's Keift, who first sloped the engine backwards. Was this to assist the carburation, or another reason? If so, why and how? I see this is standard now on the new Coopers.

A—The Keift of Don Parker was the first car to use the rearward inclined engine—three objects were in view—better carburation, improved cooling and oil scavenging from the sump. This system is the subject of a Patent and was fully printed up in “Motor Racing” and “The Motor Cycle.” Briefly :—

1. Carburation :

When using a track-type carburettor it is possible to raise the fuel level substantially, thereby reducing the time lag and amount of work required to induce the fuel to flow from the jet.

2. Cooling :

An increased “scrub” action takes place on fins lying at an angle to the air flow, which materially assist the cooling.

3. Oil Scavenging :

On the Norton engine oil is collected and drawn from the sump in a small pocket at the rear of the crankcase. Leaning the engine backwards effectively lowers the sump pocket and suction pipe to the oil pump, thereby improving the dry sump design of the engine.

Q—Let us jump from one port to the other now and come back to fuels later.

A brief word on the “megaphone.” What advantages do you derive?

A—A megaphone assists the action of the outgoing exhaust gases to create a useful pressure drop across the combustion chamber during valve overlap, thereby assisting the early part of the induction cycle—the R.P.M. range depending upon the length and area of the exhaust pipe/megaphone.

Q—I suppose you cannot use a “trumpet” on a multi-cylinder “in line” motor where more than one exhaust leads into the same pipe?

A—Owing to the reverse pressure and sound waves in an exhaust pipe it is extremely doubtful whether a single megaphone fitted to a multi-pipe system would be of any practical value. Obviously all exhaust pipes should lead away from each cylinder independently and have the same volume and length whether fitted with a megaphone or not.

Q—Can you tell me briefly why the “harmonics” of pipe length and diameter are so important for extraction effect?

A—Briefly, the exhaust pipe length and diameter should be such that the reverse pressure/sound waves arrive at the exhaust valve after it has closed, hence the co-relation of R.P.M. introducing a time element.

CYLINDER HEAD DESIGN

Q—Do you think the hemispherical head is the only one worth development? I liked the porting on Claude Hill's pre-war 2-litre Aston

Martin single O.H.C. engine very much. It gave you a big inlet valve over the piston, pushed the mixture into a pocket round the exhaust valve and exploded it there ?

A—For high specific power output the hemispherical form of cylinder head is accepted as being the most efficient, a fact that has been well known and established in motor cycle racing engines for many, many years.

The cylinder head design and operation of the pre-war 2-litre Aston Martin engine you refer to would not be accepted today as good practice—the surface/volume ratio is excessive, the squish action of pushing the mixture into a pocket around the exhaust valve would be very conducive to detonation—it is a far better practice to keep the volume of gas at a minimum in the exhaust port/valve area and arrange for ignition to take place from as near the exhaust valve as possible so that the flame burns towards the cooler areas of the combustion chamber.

Q—You remarked to me a few days ago that you would have to write several pages on piston design to give us any real gen. However, can you tell me briefly what kind of piston you recommend for a “dope” or “petrol” motor, number of rings, clearances, etc. ?

A—It is, of course, not possible to disclose all the details on these piston modifications for obvious reasons. Briefly the ring lay out follows standard practice of two compression and one oil control ring, a reduction in weight where possible with safety including a slight shortening of the piston skirt and relieving the sides of the thrust faces.

Apart from ensuring that the valve cut-aways avoid contact with the valves at maximum R.P.M. the shape of the piston crown has, in addition to other factors, also a big bearing on two very important desirables :

1. Breathing
2. Turbulence.

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It is by compromising of these two requirements in conjunction with the compression ratio required that the ultimate shape of the piston crown is determined.

Although surface volume-ratio does enter into the shape of the piston flame area I feel that the emphasis usually laid on this aspect is very much overdone.

Q—Do you prefer steel or alloy rods ?

A—Unhesitatingly steel rods—they are not so prone to premature fatigue and when well designed, have a low weight and can be used in a smaller compass.

It is of interest that I know of 250 c.c. racing engines using alloy rods which are heavier than the steel ones fitted in the Norton 500 Manx engine!

Q—Now for the bearings. Roller or plain. I know there is a lot to be said for both, depending on the general design. On a racing “in line” multi would you like to see a main between each Cylinder?

A—On an in-line multi, consideration would be given to a roller set up for the crankpin bearings, although I realise that such must necessarily be somewhat difficult to design but it has been done successfully and with very good results.

I think a main bearing between each cylinder would be considered essential.

Q—We come now to what I believe is one of your pet hobby horses, Oil. I believe you stick to vegetable base oils, you feel strongly about this I know, can you tell me why?

A—Yes, I consider essential a vegetable oil of the castor base type for single cylinder racing engines with their very high surface rubbing speeds and unit loadings—also its ability to resist sustained high temperature, and conduct unwanted heat away from the engine internals is an important asset. It is an established fact that such oils have a higher film strength and resist rupture of the boundary layer to a degree greater than the best mineral oils, particularly under adverse operating conditions. I consider the slight loss of power due to its viscous nature more than offset by the increased safety factor that this type of oil will sustain. In such engines in which I am concerned the new and rather expensive castor base compounded oils are undoubtedly the last word in modern racing engine lubrication.

For the record—Mercedes use a castor base oil in their F.1. engines.

Q—What about Coloidal Graphite? I have always fancied its use and I cannot understand why it is never used. It has such excellent lubricating properties under heat and pressure.

A—In the past when the science of oil refining and lubrication was not so well understood as it is today undoubtedly Coloidal Graphite did

a good job, but with modern methods of oil manufacture the benefit of Coloidal Graphite has been offset somewhat, although I believe it is still entitled to a place in some spheres of lubrication—such as in a new engine.

Q—Now another question and probably the most important from your angle. I have heard it said that you are the “Chemist of Motor Racing.” Can you give me a word or two on fuels? I see oxygen-bearing fuels are banned in F.111. Do you agree with this policy (for major meetings anyway). I appreciate the expense but for sheer power output I suppose it is essential. What sort of proportion of other fuels do you recommend?

A—In view of the very real fire danger and high cost of Nitro Methane I am in complete agreement with it being outlawed in F.111 racing, furthermore it contributed nothing whatsoever to improving the design of engines other than making it necessary to take steps to strengthen some components to cope with the increase of power which really came from the use of this unique oxygen-generating substance. I would like to add that I found it extremely interesting during the short period it was being used in my engine.

Regarding other types of fuels I prefer to prepare engines to use the best allowed by the regulations rather than modify a fuel to suit the engine.

Fuels used in Formula III—other than Nitro Methane—are in main of the 94/6 Methanol-Acetone blend. It is of course possible to use other compounded fuels—some rather complex and expensive—but I have purposely avoided these, as in some instances, a different technique of engine build and tuning is required, also some are inclined to be unstable in use and need expert attention. All-in-all, for the little extra that can be obtained from such fuels I do not think their use in Formula III justified.

My choice has been for fuels having a fairly wide latitude of operational vagaries—simplicity and freedom from trouble is very high on my list of MUSTS.

A WORD OF WARNING—It is not generally known that Methanols are toxic and classed as an Industrial Hazard—both by handling as a liquid or inhaling as vapour.

Q—Last Question. I do not suppose you can answer this one. Why is it that the vast experience acquired in designing and tuning unsupercharged “motor cycle-type” engines has not been utilised in the design of a Grand Prix engine (so it would seem). Presuming you are getting around 60 B.H.P. from your 500, not an unreasonable figure, yet over 250 from a 2½ litre G.P. engine is considered almost incredible, in this country anyway?

A—This question has often cropped up during the many talks I give from time to time. I feel that I would be very disappointed if I could

not obtain something approaching 60 B.H.P. per half-litre irrespective of the engine size with an unrestricted fuel, although one must realise that fuel consumption is a very important factor in Grand Prix Racing and a compromise may have to be made. From current engines one would deduce that the approach of the G.P. engine designers to their problems is somewhat different from those of Motor Cycle technicians who can claim a higher specific output per litre unblown than any other sphere in the world of internal combustion engines.

Thank you very much Steve for answering all my questions, I would just like to remind readers that Jim Russell's engine is prepared by you, and that Jim attributes a great deal of his success to you, and your meticulous preparation, you both richly deserve the success you have had, best of luck for the future.

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Left: The start of the 1914 Isle of Man T.T.

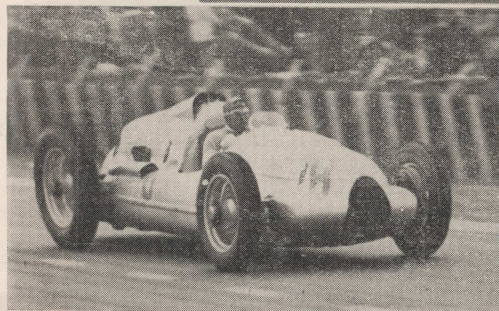
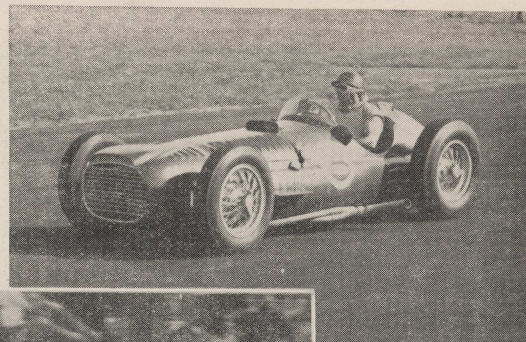
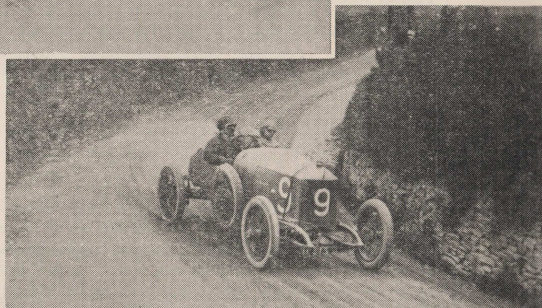
Right: Juan Fangio driving the B.R.M.

Below:
Tazio Nuvolari driving an Auto-Union in the 1939 French Grand Prix, breaks the lap record at 113 m.p.h.

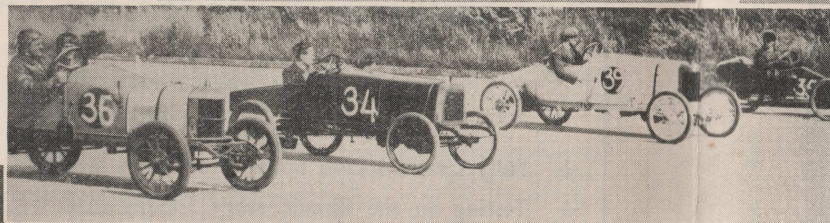


Right: Taken during the 1914 Isle of Man T.T. Race

Below: Start of the 10 mile Cycle-car Race, at Brooklands, July, 1914

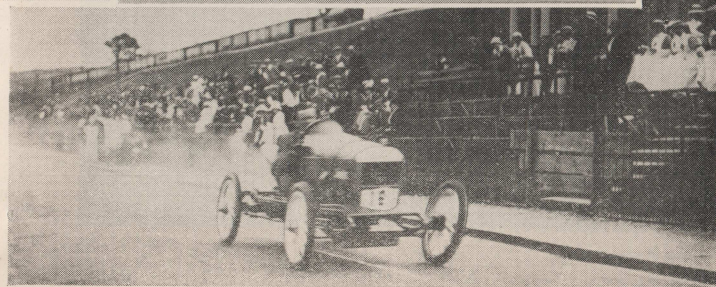
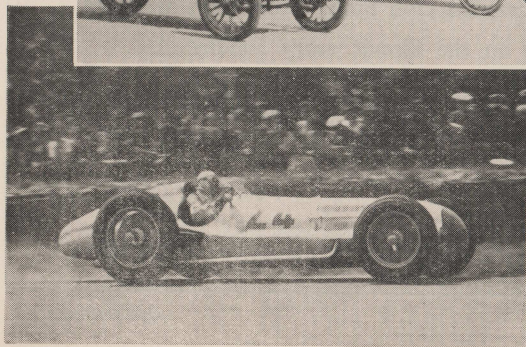


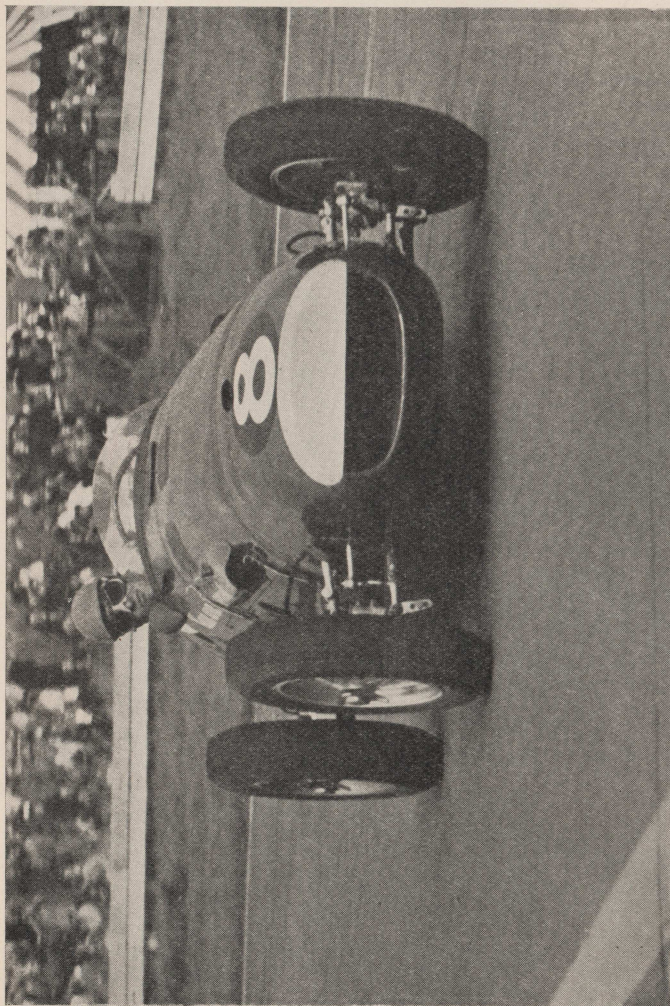
Below: W. A. Scott-Brown in a Lister-Bristol winner in the Combined 10 lap Scratch Race at Snetterton, on October 9th, 1954



Left: Carraciola in a Mercedes during the 1938 French Grand Prix

Right: G. N. Browne, driving a 10 h.p. Singer at the Colwyn Bay Speed Trials, July, 1914





Peter Collins "drifting" the "Vanwall Special" in classic fashion.
—With kind permission of "Auto Sport."

G. A. VANDERVELL

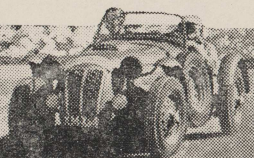
Mr. G. A. Vandervell, Industrialist, Sportsman and Racing Motorist, holds within his grasp and wide vision the only likely British contender for Grand Prix Honours in the foreseeable future. The "Vanwall Special" is a racing car conceived with imagination, albeit without departing from sound and functional engineering principles.

Of the car itself, we are able to say that it has a four cylinder engine with hemispherical combustion chambers. The aerodynamically developed ports have been so designed in conjunction with valve form to produce an exceptionally high volumetric efficiency. This result has been obtained by a careful study of airflow characteristics, some advantage having been taken of motor cycle racing engine principles.

The chassis is fairly conventional with double wishbone independents at the front and de Dion rear axle.

In its first "try out" season, the car has proved without any doubt that it has the makings of a first-class Grand Prix car. Good luck to the "Vanwall" and let us hope we see you receive the chequered flag many times during 1955 from Snetterton to Monza!

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THE LISTER CHASSIS

by *Brian Lister*

When my Company agreed in July, 1953, that I should go ahead with building a prototype (on the M.G. engined version) car I was faced with a compromise, for the two critical factors of time and money were involved: factors that limit most constructors of racing machines.

If the value of the new product was to be proved in time for the forthcoming season, it would need to be built in chassis form and tested by Christmas, 1953, thus leaving three months (the minimum period required) to design and build the body. So far as cost was concerned, I was limited to an expenditure on this car of £1000 or less.

It will, therefore, be readily appreciated that the choice of suspension, brakes, steering and other such parts, had to be carefully made. Moreover, it was necessary that the car should have road-holding qualities equal to or better than any other sports car in its class. So far as this point was concerned, no compromise was possible.

Yet another consideration arose from the fact that if the chassis was proved successful, we might expect to build another, this time with a Bristol engine, and the design had to be suitable for both units. And for this reason the 1½ litre and 2 litre cars were of similar basic construction.

In such a case, from the point of view of the small manufacturer, a tubular frame is the only possible solution. At the same time I am convinced that a monocoque chassis/body is the ultimate solution, although it is not surprising that it is the most expensive by far to make, and correspondingly difficult to design correctly.

Having decided that tube was the best form of construction from our point of view, the next point to decide was whether to have a space frame or the platform type.

If a space frame had been incorporated in our design, I am sure that the total cost of the car would have been increased by £100 and the weight saved would probably have been around 25 lbs. A space frame was, therefore, ruled out as too costly. Although possessing other advantages such as extra rigidity. No one who has raced our cars this season have criticised their road holding. This confirms a torsion test we made on the chassis in its tack-welded state when checking its rigidity.

The chassis tubes are swept outwards towards the rear and converge again at the driver's seating position. The reason for this is to procure a low seating position for the driver and, consequently, if the engine



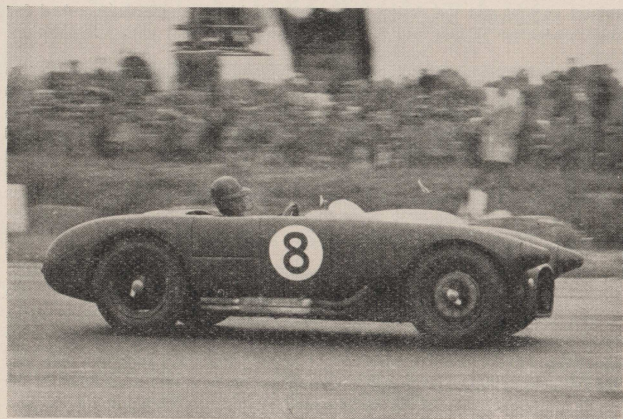
permits, a low overall frontal area. It also serves as a convenient point to mount the radius rod bracket, an outrigger being unnecessary.

Front suspension in by-equal length parallel wishbones, giving complete freedom from gyroscopic effects (a major factor on a fast, light car). It was also found possible to build the upper and lower wishbones on the same jig, thus, incidentally, helping to keep the price of the chassis down.

At the rear I at first considered swing axles, but the de Dion system was eventually chosen. I am glad now I made this choice, for although the swing axle is a lighter system (all other things being equal) it usually brings oversteering tendencies unless developed over a long period at some cost. The car that made me think seriously about using swing axles was the Type 158 Grand Prix Alfa Romeo. Photographs of Fangio drifting this perfectly-balanced car are most interesting.

The de Dion type of rear suspension has been proved successful time and time again; unsprung weight is low, and tyre wear is as light as with any type.

In any article of this length it is obviously impossible to cover the reasons for every point of design on our chassis, but it may have served to give a condensed idea of the general trend of thought behind the design of the Lister.



IN WINNING MOOD—A. Scott-Brown takes the Lister on to another victory. This time the "Daily Express" International Trophy meeting at Silverstone.

A Ramble through the Archives of Motor Racing History

This brief article is intended only as a sketch of the vast panorama that is Motor Racing. The writer asks to be excused for the many exciting and intriguing stories from racing history which have, owing to the pressure of space, had to be excluded.

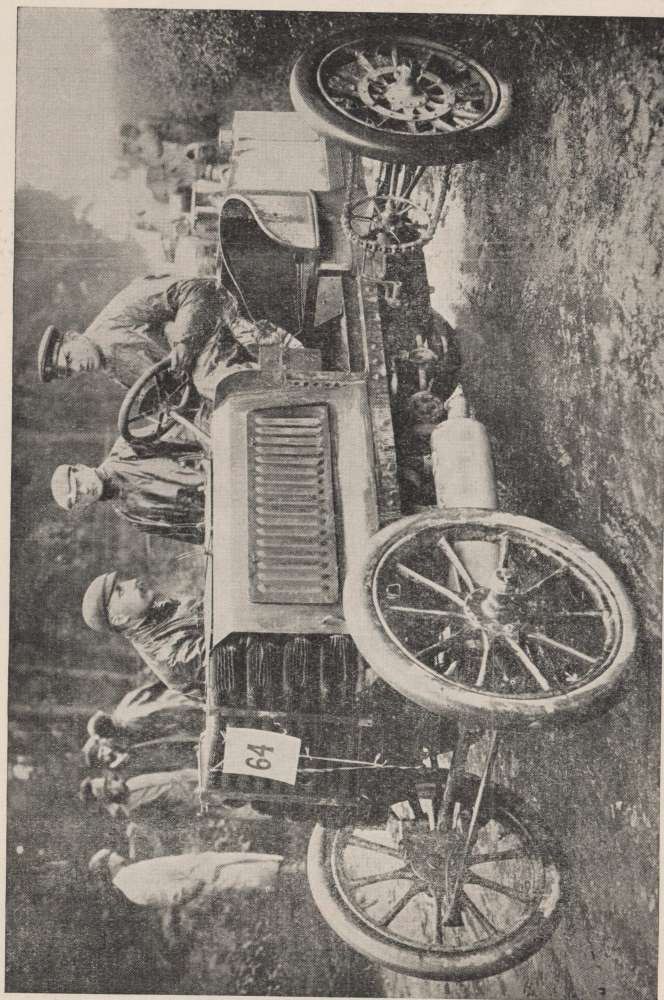
As the reign of Queen Victoria was drawing to a close, and the spacious days of pomp and circumstance, which marked the turn of the century, held Europe in the velvet glove of wealth and extravagance, a number of progressive young men found in the horseless carriage, the nucleus of the age, of the Internal Combustion Engine, which was to flood across the world, revolutionise our lives and do more in 60 years to change the social and economic structure of the world, than anything one might say, in the history of mankind.

Steam cars, electric cars and motor cars, all battled in the early days for supremacy and as in the case of all development, competition was the most thorough and exacting way of finding out those that would be strong enough to weather the storms of the 20th century.

Record breaking featured strongly as these strange machines became faster and faster. April, 29th, 1899, a red-bearded gentleman, M. Jenatzy, in an electrically-propelled cigar-shaped machine named "Jamais Contente," took the road near Acheres in France and averaged 65.82 m.p.h. over the flying kilometer, the first man to exceed a speed of 60 m.p.h.

The dawn of racing, in 1895, saw stupendous struggles over appalling roads, open to the public and of course, un-policed, the major events being run from Capital to Capital. So it was in 1898 that M. Charran driving a Panhard—a make whose name endures to this very day—won the Paris - Amsterdam race of 900 miles at an average of 26.9 m.p.h. This car was fitted with wheel steering, the first of its kind (a tiller being used before this). Panhard et Levosor dominated the early races, but in 1901, Faurier on a Mors won the Paris - Berlin at 44 m.p.h., a staggering achievement when we realise the road conditions, the flimsy tyres, and the fact that the driver and his mechanic had to carry out all necessary repairs en rout.

1902 saw the introduction of the first Circuit-type race and, incidentally, the first big win for a British driver, Charles Jarrott on a Panhard on the Circuit des Ardennes, Belgium, averaged 54 m.p.h. for the 318 miles.



CHARLES JARROT—1902 PANHARD.—With kind permission of the Autocar, and taken from the book "The Vintage Car."

The era of the "Monster Racers" was getting into its stride, enormous cars, ever increasing in size and power, requiring great skill to handle them at racing speeds, dominated the scene. Thundering from town to town, across miles of rolling country, over mountains, and through villages, they were cheered on by the enthusiastic crowds who gathered along the route, calling for more and more speed. The greatest of these cross-country marathons were the Gordon Bennett races. Each country sent a team of cars to compete, every detail of the car having been made in that country. These epic struggles soon developed into almost National battles for supremacy. However, racing on unguarded roads (other than Italy and Sicily where it still exists) was soon to end.

Inevitably as speeds increased and competition became keener, overtaking on dusty roads at speeds approaching 100 m.p.h. became a hazardous affair, and it was during the Paris-Madrid that the French Government stopped the race. It has never been disclosed how many people lost their lives in that last of the capital to capital races, but the toll was heavy.

With the end of town to town racing the circuit-type race came into its own and the French Grand Prix soon replaced the Gordon Bennett, and became the premier International Race meeting. This also brought about the development of the specialist racing car as opposed to the modified touring car, but the French marques still dominated the scene, soon, however, to be challenged by Italy and Germany and later by England. F.I.A.T. scored a win in 1906, and in 1908 Mercedes won, the first of a line of successes right down to 1954. The "Monsters" (some with engines of 14 litres capacity and bonnets so high that the driver had to look round, not over) were coming to the end of their run. They were too large and too heavy on tyres and the smaller, lighter cars were winning, the Delage, Peugeot, Bugatti, Mercedes and British Sunbeam now dominated the scene. A new era in motor racing was dawning.

In England, in 1907, Mr. Lock King, built Brooklands Track and this quickly became the mecca of British enthusiasts for racing, testing and record breaking. S. F. Edge on a Napier averaged 65 m.p.h. for 24 hours, and in 1913 Percy Lambert covered over 103 miles in the hour on a Talbot.

The horseless carriage in the brief space of under 20 years had come a long way, and as the clouds of war spread across Europe, the French Grand Prix was run. Before a tense and silent crowd, Lautenschlager on a Mercedes gained a narrow victory over Boillot's Peugeot for France. Those who watched the race felt the tension, the deluge was soon to descend, and the world plunged into titanic and mortal struggle for existence.

As the war clouds cleared and a shattered Europe returned to normal life, it was soon apparent that the economic changes enforced by war, would alter the course of motor racing, in fact many a scribe predicted the end of racing. It was not long, however, before they were proved

wrong and it was the Henrie-designed Ballot, Peugeot and Sunbeams which won the immediate post-war races. In 1921 the French Grand Prix was won by an American. A Dusenburger, driven by Murphy, who, incidentally, scored the only win for an American marque in a grand épreuve.

Le Mans was born. Lorraine-Dietrich, Bentley, Bugatti, Darracq, Alfa-Romeo, Mercedes, Sunbeam, F.I.A.T. and Delage dominated the races of this period. Racing was getting into its stride. The Bentley wins at Le Mans were a tonic for the British followers of motor racing, but as is so often the case, when things looked brightest—trouble was ahead.

Economic strife engulfed the whole world, and the great slumps of the late twenties and early thirties took their toll. Bentley faded from the competition stage, as did Sunbeam, Lorraine-Dietrich and Delage. Nevertheless the black days could not last for ever. The thirties got into their stride, new names and new cars came along, a decade of brilliant racing was upon us.

As Germany recovered from defeat in the field, followed by economic collapse, her rulers appreciated the enormous prestige value that wins in the motor racing world brought and gave some assistance to Mercedes, and another combination of motor manufacturers called "Auto Union," in order that they should build racing cars. New revolutionary cars appeared, built to the 750 Kilogram Formula, immensely powerful and capable of speeds in excess of 180 m.p.h. Varzi, Wimille and Nuvolari on Bugatti and Alfa Romeo were their only serious rivals.

The struggle for the lead continued. Fight after fight saw a brilliance in racing rarely equalled. Alfa Romeo and their number one driver, Nuvolari, scoring occasional victories over their rivals, but Bugatti could not hold the flying silver cars and before very long the three pointed star and Auto Union swept all opposition before them. Maseratti, Alfa Romeo and Bugatti still struggled but it was a losing battle, nevertheless, do not think that racing became a procession. The two German marques fought for supremacy on every famous circuit in Europe and even crossed the Atlantic to win the Vanderbilt Cup. This, indeed, was racing on a grand scale.

In England, however, the International voiturette class for cars of 1500 c.c. supercharged and 2 litre unsupercharged, was going from strength to strength. Humphrey Cook, Raymond Mays and Peter Berthon produced the wonderful E.R.A., and it was in one of these cars that

Raymond Mays won the Eifelrennen, at Nurburgring, in Germany, in 1935, a win forgotten in this country, but not at Nurburgring. Freddie Dixon, Prince Bira and many more were the stars of Brooklands, Donnington Park and the Ards circuit in N. Ireland.

It is almost impossible in such a short space to write a history of this wonderful sport. It enhances such a varied and vast field, from record breaking in every class, to individual Grand Prix. Suffice to say that motor racing had swept like a torrent across Europe, firing the imagination of the public and carrying great national prestige for the country whose cars won.

Just before Western civilisation was to be plunged into the horror of war, it was the shining, fabulous silver racers from the Third Reich that went from victory to victory and dominated every circuit.

As the shattered world turned its face away from fighter aircraft, tanks, bombs, and guns to more peaceful things, it was once again in France, the birthplace of motor racing, that the sport started again. In Paris, in 1945, pre-war racers reappeared after their long hibernation, war was over and a new noise was in the air. The shrill of exhausts, the brilliant colours, the pageantry of motor racing was back. Maserati scored the first wins. Famous names reappeared—Nuvolari, Count Trossi, Wimille, Villoresi, Varzi and Farina, alas some have since given their lives for the sport they loved dearer than life. New names came forward Ascari, son of a great racing driver of the twenties, Parnell, a British driver with a forceful style, "Jock" Hornefall, winner at Spa and Chimay, who so tragically lost his life at Silverstone. An East Anglian, a great sportsman and a sad loss to motor racing.

Old cars, new cars, old masters, new talent, the stage was set for the surge of enthusiasm for motor racing that was to capture the hearts and imagination of the British public. Where one had stood before, ten or twenty did now, motor racing had indeed come to stay.

The post-war years saw the superiority of Alfa Romeo, challenged by Maserati, the voiturettes of post-war years were soon reaching speeds and breaking lap records created by Mercedes before the war. Speeds reached 190 to 200 m.p.h. Wimille, Varzi and Farina won race after race, French Talbot and British pre-war E.R.A. could not hold the scarlet cars from Milan.

1947 saw road racing in Jersey, and a win for Reg Parnell in his Maserati. Silverstone started a win for Villoresi, followed by Ascari, both on 4/CLT Maseratis. Goodwood started, unprecedented crowds went to watch motor racing. Interest ran high in the country. The B.R.M. project was developing but the brilliant and revolutionary design was not to overcome its many troubles before the International Formula changed, calling for a different type of racing car.

It was not until 1950 that Alfa Romeo received their first setback at Silverstone in the European Grand Prix. Juan Fangio, No. 1 driver for Alfa Romeo and Froilan Gonzalez, No. 1 driver for a relatively new



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make (if an old racing stable) that was soon to make its name, Ferrari, a household word, duelled for the entire race for the honours. What a race it was, never more than a few seconds between them, the crowd was on its toes. The B.R.M.'s, driven by Reg Parnell and Peter Walker, put up a brave show but the new Ferrari with Gonzalez won a magnificent race.

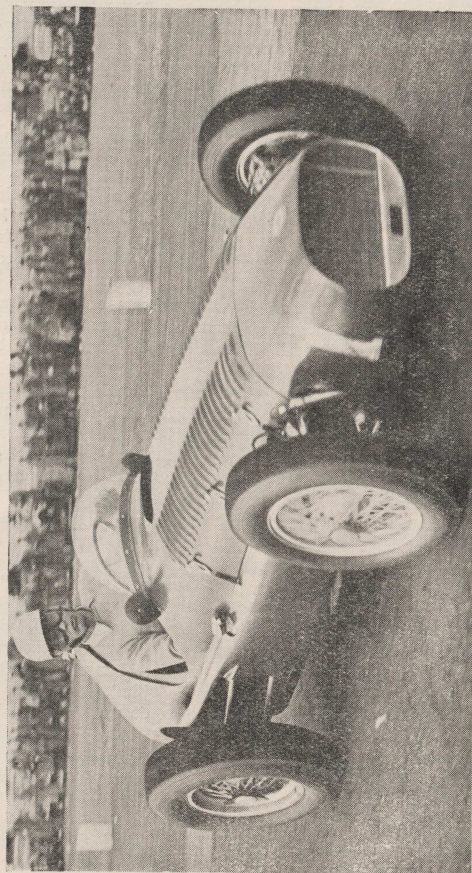
New names were coming into the motor racing world. Stirling Moss, Roy Salvadori and Ken Wharton; new cars, H.W.M., Connaught, Cooper. Formula III racing was a triumph for British cars, every worth while race saw victories for the cars from these small enthusiastic manufacturers. This type of racing became immensely popular, large fields, real competition and speeds going up and up. Tussle after tussle on every circuit, these little cars offered a new style of competition, no processions here, but real "dog fight" split-second racing a healthy sign for the future.

Sports car racing was gaining strength, and it was in this field that Britain excelled. Jaguar wins at Le Mans, 1951 and 1953, Aston Martin victories at Spa and Dunrod. The Sports-Racers put up speeds that staggered the critics and brought International prestige to this country with orders for the car manufacturers.

The years 1952 and 1953 saw Formula II cars of 2-litre capacity racing for the premier honours. Alberto Ascari in a Ferrari was unbeatable, but the young English driver Hawthorn was not far behind the world champion.

Last year, 1954, saw the dawn of a new Formula I, this time for unsupercharged cars of 2½ litres or supercharged cars of 750 c.c.; to date no one has adopted the latter although it is rumoured that Alfa Romeo have considered it seriously, as we imagine have O.R.M.A. However, the larger capacity cars have a very big lead on any new ideas coming along. Mercedes with their first G.P. appearance since the Hitler war have shown that they still know most of the answers when it comes to racing motor cars, however, they have not had things all their own way by any means. Ferrari scored more than one victory, and in fact won the last round at Barcelona in October when Mike Hawthorn drove "the shark," (as it was nicknamed because of its squat body and low, steeply-raked radiator), to victory, earning the distinction with Sir Henry Seagrave of being the only Englishman to win two Grand Epreuves. 1954 was an exciting year full of promise for things to come with Lancia, Maserati, and Britain's "Vanwall" (with Mike Hawthorn and Peter Collins), determined to see that the cars from Unterturkheim and Modena do not have it all their own way.

Now it is 1955 and a big future for motor racing is assured. As a stimulant to manufacturers to produce better cars, there is no finer testing ground, but for us, it is the sport that matters. Healthy and invigorating, the future is bright, but do not let us lose sight of a most important point. Motor racing is expensive, and its survival stems from the support it receives from the public. There is a growing interest and enthusiasm, so have no fear; it has found a secure place in the hearts of the great sport loving people of Britain.



RON FLOCKHART—Mk. II B.R.M. going through the Esses at Snetterton.
—With kind permission of "The Motor."

THE B.R.M. RACING CAR

It is certain that no other racing car in England has ever achieved the notoriety of the B.R.M. Even among people who know little or nothing of motor racing, and who could not name half a dozen makes of racing car? the name of B.R.M. is perfectly familiar. It is generally recognised that larger crowds have been drawn to race meetings at which the B.R.M. cars have appeared than have ever assembled in this country before.

Exactly why the car has captured public fancy it is difficult to say. Probably above everything else it is the fantastic engine note, and the striking appearance of the car that has made it popular. There is no doubt that, also that the attempt to challenge the supremacy of the Continental manufacturers in the field of motor racing has appealed to the sporting spirit of the British public.

The story of the B.R.M. cars has been marked from the beginning by bad luck of all kinds. Races have been lost by the narrowest of margins, by completely unforeseen circumstances, by failures wholly unexpected and impossible to guard against. There is no doubt that, had the resources of the B.R.M. Research Trust been more extensive, so that development and testing work could have been more quickly carried out, the car was a potential world beater in the old Formula I class. This is a fact vouched for by foreign competitors as well as English supporters. With the change of Formula at the end of 1953 the present 16-cylinder B.R.M. cars became obsolete, but simply because of their great popularity, and their crowd appeal, Mr. A. G. B. Owen, their present owner, decided to let them appear in Formula Libre races for another year.

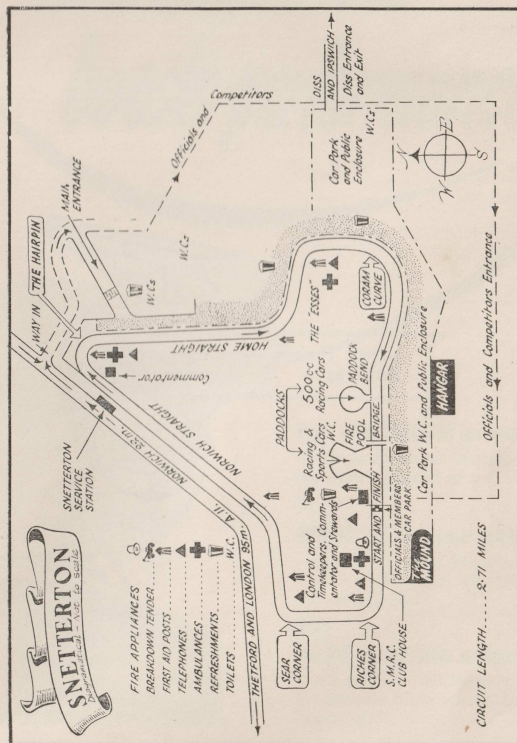
Looking back over the history of the 16-cylinder, 1½-litre cars, several incidents stand out. During 1952 the present World Champion Driver, Juan Manuel Fangio, and his fellow-countryman Froilan Gonzalez, drove the B.R.M. cars, in addition to Reg Parnell and Ken Wharton, and one of the best performances was the 1-2-3 victory in the Goodwood Trophy in September of that year, with Gonzalez, Parnell and Wharton. In 1953 both the Argentine drivers were with the cars again for the Grand Prix, at Albi, where Fangio won the first heat, after a terrific duel with Ascari on the works 4½-litre Ferrari, a contest which those who witnessed it will never forget, nor the happiness of seeing a British car leading an Italian at last in a Grand Prix. In addition, Fangio's fantastic lap record, and Ken Wharton's dramatic crash and most lucky escape, were incidents to stand out in racing history.

In 1954 the drivers for B.R.M. have been Ken Wharton and Ron Flockhart, and although the season has not been marked by any great

It is Mr. Owen's intention to go on with the building of a new B.R.M. to the present Grand Prix Formula. Progress cannot be rapid, because neither in resources nor manpower does the organisation come anywhere within sight of what is needed for progress on the scale of, for instance, Mercedes Benz, but from the beginning enthusiasm and determination have been behind the B.R.M. organisation, and these at least are still unlimited.



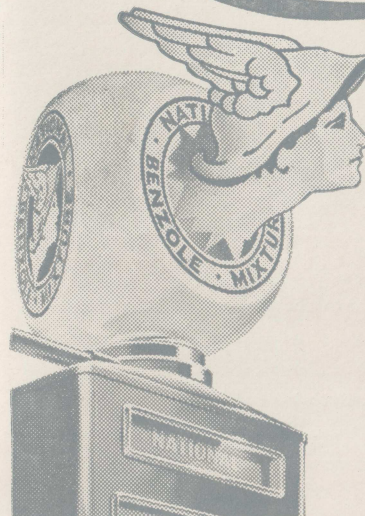
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