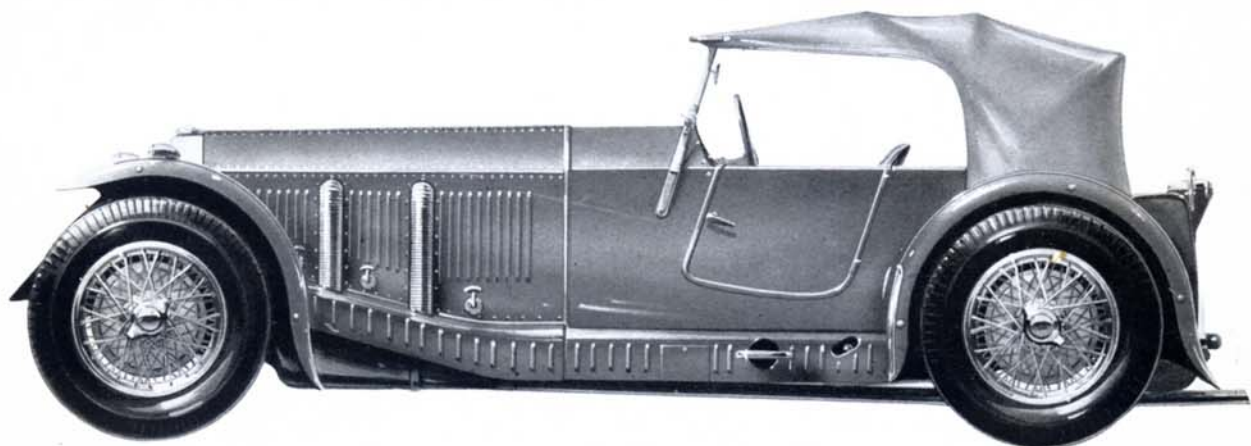


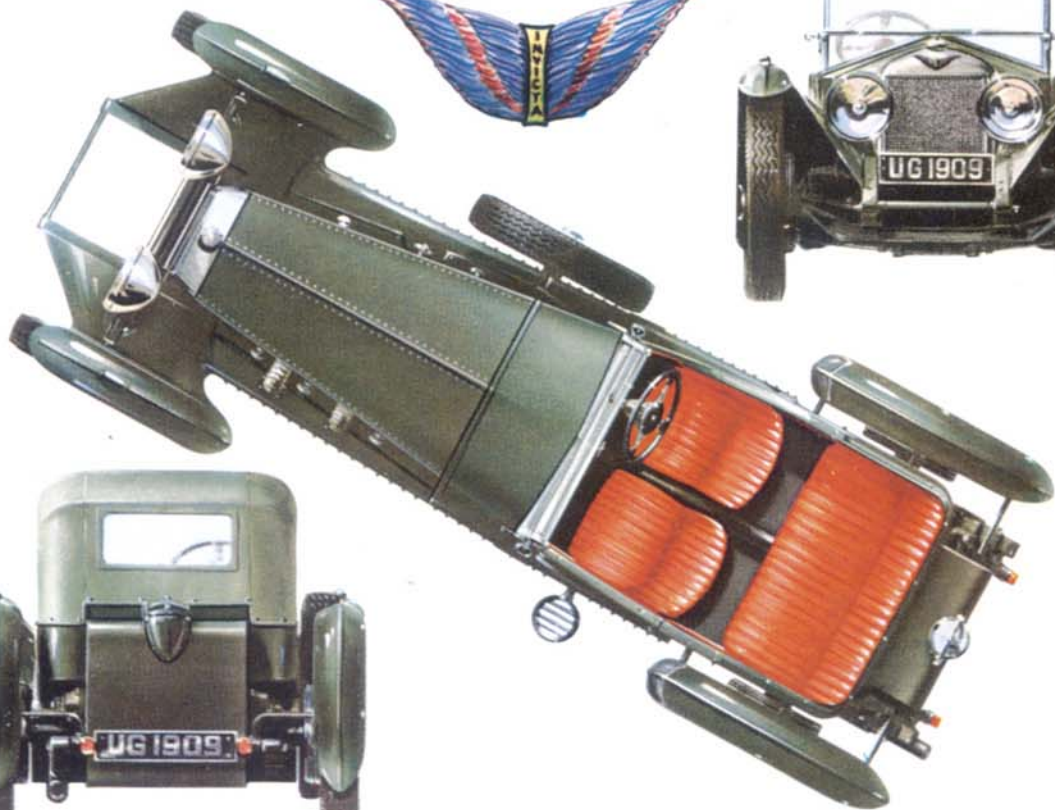
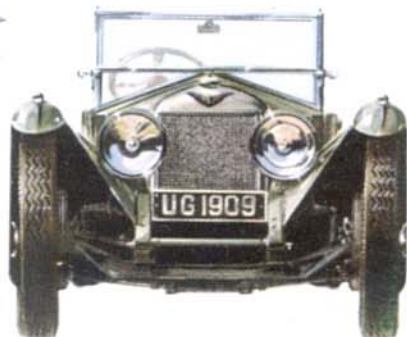
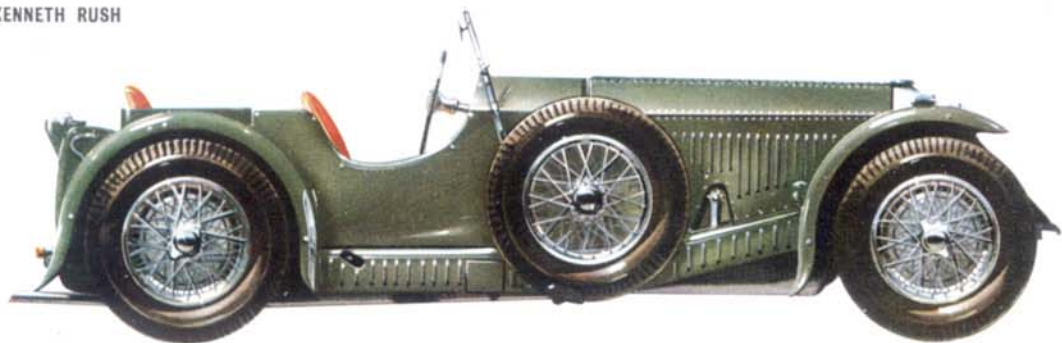
The 4.5-Litre, S-Type Invicta



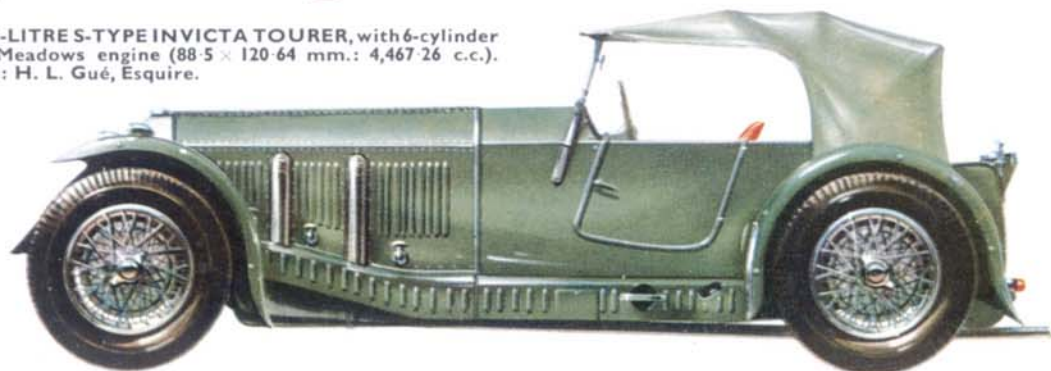
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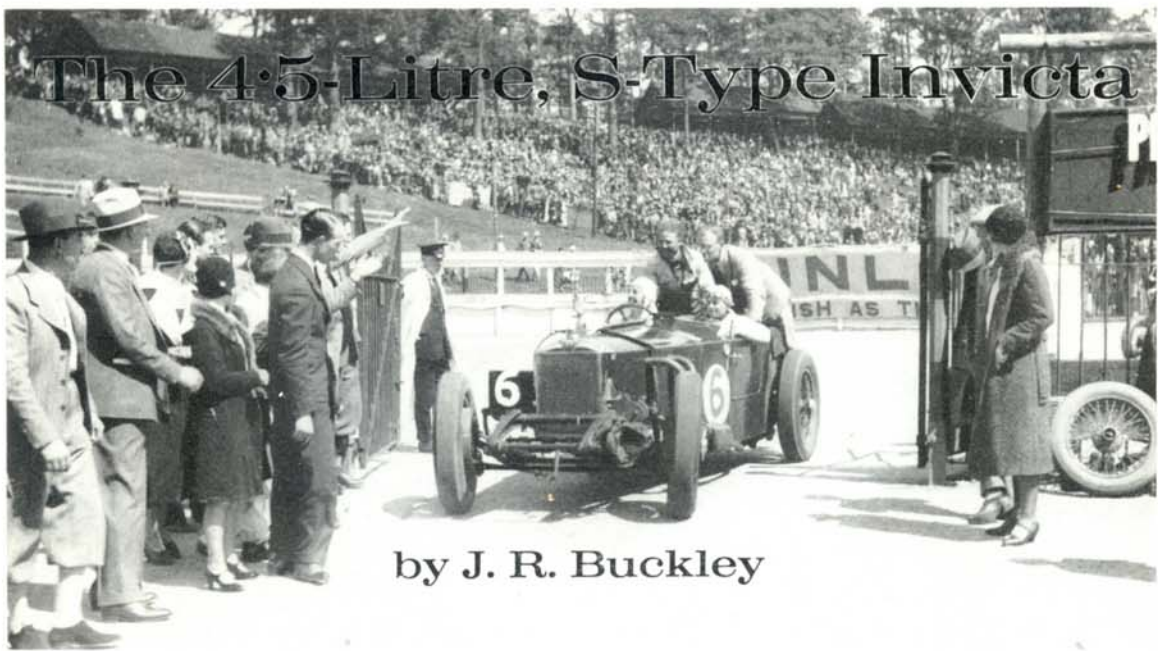
PROFILE PUBLICATIONS



1931 4 5-LITRE S-TYPE INVICTA TOURER, with 6-cylinder o.h.v. Meadows engine (88.5 x 120.64 mm.: 4,467.26 c.c.).
Owner: H. L. Gué, Esquire.



The 4.5-Litre, S-Type Invicta



by J. R. Buckley

Miss Violet Cordery and G. Fields entering the Paddock at Brooklands, 1931. (Photo: Montagu Motor Museum)

The origins of the Invicta Company go back to the year 1924. Like the Bentley Company it remained in existence for only twelve years, and again like that company actively produced motor-cars for only ten of those twelve years; some seven cars being assembled from spares by the company's service depot in Flood Street, Chelsea, between 1934 and 1936, after works production had ceased.

Both the Invicta and the Bentley were designed by men with a personal background of competition motoring and both were produced to a standard—the best—with price as only a secondary consideration. It is probable that this factor contributed largely to the failure of both firms to weather the storms of the financial depression of the early and mid-1930s.

Captain Noel Macklin, later Sir Noel Macklin, was a great admirer of the steam car, and at varying times owned both Doble and Stanley steamers. It is not surprising therefore that the extreme flexibility and very high power-to-weight ratio inherent in the good steamer were pre-eminent characteristics of every Invicta Macklin produced, with the exception only of the 1½-litre cars made late in the firm's life.

Associated with Macklin in the Invicta Company were Oliver Lyle, already well known in the world of sugar, W. G. Watson helping on the design side, and the Earl Fitzwilliam, who earlier had been responsible for the Sheffield Simplex cars, which had unsuccessfully challenged Rolls-Royce and Napier in the large luxury car market. The factory started life in a very modest way in the 3-car garage of Macklin's country home at Cobham in Surrey, and here the first three Invictas—2½-litre cars with Coventry Climax 6-cylinder engines—were produced in 1924.

The cars were reasonably successful, but failed to reach the high standard which Macklin had set. Fortunately at this time, Macklin met Henry Meadows of Fallings Park, Wolverhampton, an established manufacturer of fine I.C. engines, and the next Invicta and all Invictas thereafter—again, the 1½-litre

excepted—were powered by Meadows engines.

For 1925 the cars were still of 2½-litres capacity, but now recognisable as the forbears of later cars, but the overall design was completely reviewed for the year 1926 when the new 3-litre Invicta appeared. It was produced in both L.C. and S.C. chassis forms which stood, not as one might imagine for 'long' and 'short' chassis, but for *large* and *small* chassis versions.

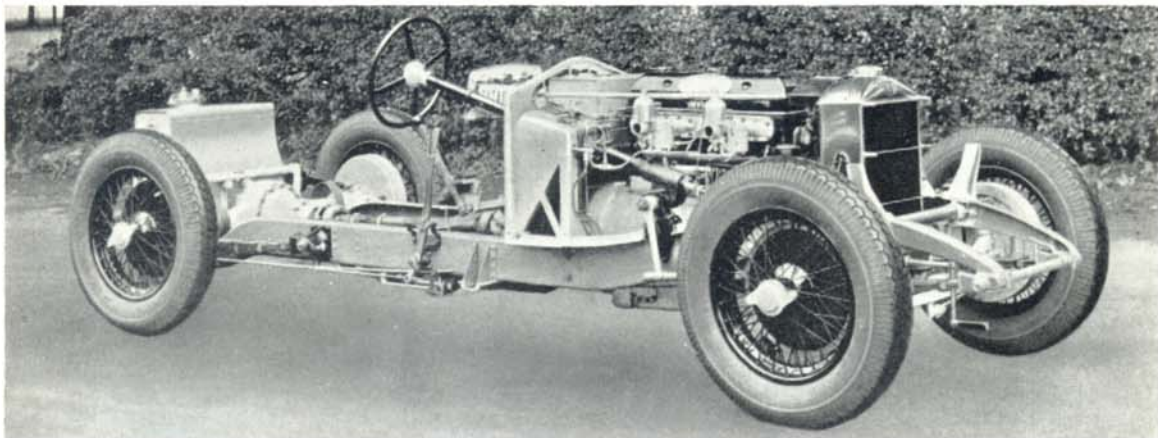
This 3-litre Invicta in two short years made the new firm's reputation and continued in production until 1929. As a result of the car's outstanding success, very largely in long-distance observed reliability trials, the Invicta Company was awarded the coveted Dewar Trophy in 1926 and again in 1929.

The first 4½-litre car was seen at the London Motor Show of 1928—then held at Olympia—to be followed in 1929 by the most expensive Invicta ever produced, the 4.5-litre type N.L.C. The instruments, finish, controls and fittings of this car were modelled on, and made to, Rolls-Royce standards. The chassis of the type N.L.C. at £1,050 (the Invicta Company never built bodies on their cars) cost only £50 less than that of the contemporary 20/25 h.p. Rolls-Royce, at a time when Rolls-Royce were considering the marketing of a lower-priced car to meet the markets of the prevailing difficult times.

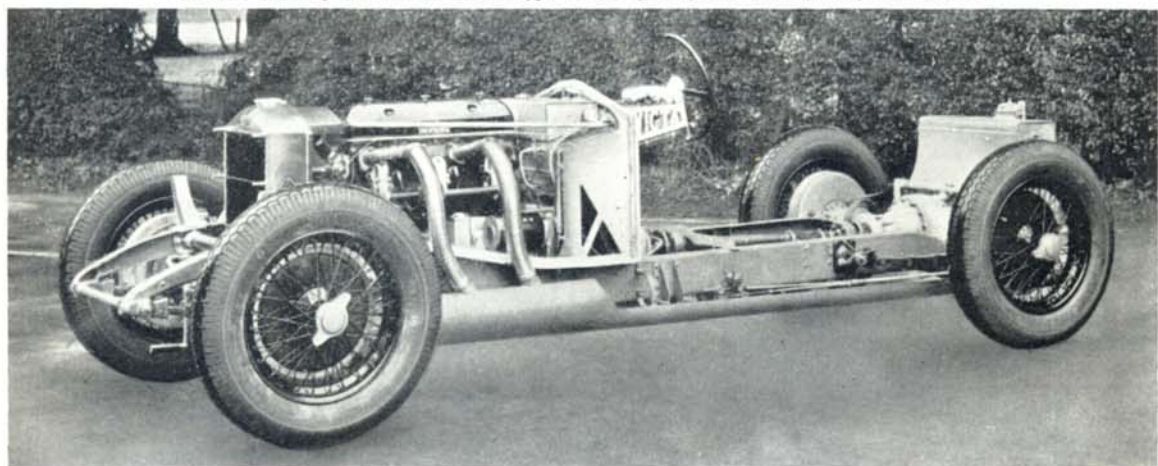
For the N.L.C. car the chassis was completely redesigned. It was much stiffer, with side members both deeper and heavier in section, and the track was increased from 4 ft. 4 in. to 4 ft. 8 in.; floor line was lower, springs lengthened, and a much heavier front axle fitted.

It was an expensive car launched at precisely the wrong moment. The same year the Stock Markets of America crumbled into ruin, and the repercussions were felt all over Europe. People thought hard before buying a new car which in saloon form cost £1,800.

Late in 1929 and complementing the N.L.C. in the firm's catalogue and its later successor, the 'High' chassis type A—which was in effect the N.L.C. shorn



The bare bones of the matter: 1931 S-type chassis (above) inlet side; (below) exhaust side.



of its luxury equipment—was the entirely new sports chassis, the type S. Its subsequent scarcity value of to-day was assured in that only 77 of these cars in all were made.

Better known at the time and since as the low chassis Invicta (though occasionally as the M.P.H. model) and frequently and incorrectly as the 100 M.P.H. Invicta, it attracted immediate attention by virtue of its unusual and very attractive appearance and fine finish. It was probably the best-looking sports car in the vintage tradition ever to be produced in England. I can think of no contemporary unsupercharged motor-car of similar capacity, made here, which could outperform it—and very few built elsewhere. It looked exactly what it was: a comfortable, very rapid and desirable fast-touring motor-car.

The name of the '100-M.P.H. Invicta' was bestowed upon the car erroneously because, in a day when cars which could do a genuine 100 m.p.h. could almost be counted on the fingers of a man's hand, the makers never claimed this maximum speed for it. As produced in 1929 and 1930 there is no doubt at all that the standard production S-type had a maximum speed not far short of this very elusive figure. It was however relatively easy to tune an Invicta to give this maximum speed, without impairing the power and flexibility in the lower and middle speed ranges, which was always the car's greatest attraction.

Raymond Mays, writing of the two Invictas he owned in the early 1930s, says that they gave him some of the most exhilarating motoring he ever had, with their ability 'to crest most main-road hills at nearly the century.'

The only thing the S-type Invicta had in common with earlier cars and those which complemented it in the firm's catalogue, was the 4.5-litre Meadows engine; that engine was used for all 4.5-litre models, the 'N.L.C.' the 'A' and the 'S-type' cars.

The chassis was an entirely new design and it is said that it was inspired by that of the fantastically successful racing 1.5-litre Grand Prix Delage of a year or so earlier.

Fabricated from nickel chrome steel, it was swept upwards in front over the axle, the radiator sitting down neatly inside the chassis side-members. From immediately above the front axle it sloped steeply downwards to a point below the engine bulkhead, and here reached its maximum sectional depth; for the next 3 ft. 6 in. of its length—the space usually devoted to the passengers—the chassis frame ran parallel to the ground, and thereafter was carried down below the back axle and up again, to support a 20-gallon fuel tank at the rear. It was braced at the front, and again immediately in front of the radiator and at the rear, by heavy section tubular steel cross-members, and elsewhere by deep, channel-steel sections. Front

Then! G. Fields and Dudley Froy and the "works" Invicta, 1931 Double-Twelve at Brooklands. (Photo: Montagu Motor Museum)

springs were carried under the frame, and those at the rear were outboard of the chassis side-members. All were housed in gunmetal trunnions. Behind the rear engine mountings was an extremely robust cast aluminium bulkhead, on which was mounted a 2-gallon reserve petrol tank, and a reserve oil tank feeding directly to the engine's sump. Cast alloy brackets from the bulkhead carried an instrument panel fabricated from sheet brass.

Headlamp brackets, front wing stays, shock-absorber mountings, engine bearers, the petrol tank brackets and 6-inch diameter filler cap were all, like the suspension mountings, gunmetal castings, though the engine, sump, gearbox casing and bell housing in the S-type were cast in aluminium; this was one way in which the cost of the S-type Invicta was kept down to a reasonable level. The other was in the use of standard Smiths instruments. In the earlier N.L.C. chassis cars, the crankcase, gearbox, bell-housing and sump castings had been in Electron, and instruments by A.T. Ltd.

The radiator—lower and more square than that of the N.L.C. and A-type cars—was of nickel with a matrix, and the oblong Invicta badge was replaced by a winged badge in blue, green and gold enamel.

Transmission was by a single plate clutch and 4-speed sliding pinion gearbox (also a product of Henry Meadows Ltd.), in unit with the engine. This box, in conjunction with a final drive ratio of 3.6 to 1, gave overall gear ratios of 3.6, 4.9, 7 and 10.4 to 1. Reverse gear ratio was 12 to 1. Rather surprisingly alternative ratios were neither available at the time the car was introduced nor were they found to be desirable at any time later throughout the production life of the car, though for one or two special events 'works' cars used a 2.9 to 1 rear axle. An open propeller shaft with oil-proof ring-type universal joints, similar to that used in the Phantom Rolls, took the drive to a massive semi-floating hypoid rear axle.

Brakes on all four wheels were rod controlled and operated through Perrot-type shafts in 14 inch steel drums fitted with cast alloy cooling fins, and mounted on heavy cast aluminium anchor plates.

The electrical system and the 10-inch lamps were by Rotax.

The power unit had a bore and stroke of 88.5 mm. × 120.64 mm., capacity being 4.467-litres (or 272.5 cubic in.) R.A.C. horse power rating was 29.124 and developed power, when the cars were introduced, was given as 115 b.h.p. There can be little doubt that this was a most conservative estimate, since the same engine, in marine form, operating with single ignition



and one carburettor only, and with a modest 6-to-1 compression ratio, was rated by the Admiralty for boat service at 100 b.h.p. *continuous* rating at 2,800 r.p.m.

Two 40 mm. S.U.-type H.V.5 horizontal carburetors having bronze barrels and float chambers supplied the mixture, and ignition was dual firing 12 plugs. A Scintilla magneto fed six plugs on the inlet side of the engine, and a Scintilla coil and distributor supplied six on the exhaust side. The whole system was synchronised, and there was an over-riding manual control by means of ratchet lever mounted on the steering wheel boss.

"Drill Order—Summer": Colonel J. R. Buckley's 1930 coupé.





Now! The Tourist Trophy car, once owned by G. Field, still winning races 34 years later with its present owner, J. Earle Marsh.

Dual swept exhaust manifolds with twin exhaust pipes covered by chromed flexible conduits led the exhaust gasses to a silencer mounted alongside and below the engine.

The clutch was fitted with an adjustable clutch stop and all three pedals could be adjusted for reach over a 5-inch sector. Cooling was by pump and fan, with cast aluminium water transfer ports fitted externally between cylinder block and head. However, since the water capacity is around five gallons and the pump is very efficient, the car may be run without the fan in operation in England apart from rare hot summer weather.

The maximum speed of the car when introduced was in excess of 90 m.p.h., and 78 m.p.h. was available—if needed—in the high ratio 3rd gear at 3,200 r.p.m. the then safe maximum engine speed.

The performance was improved upon before production ceased in 1934, by which time the engine limit had been raised to 3,600, and brake horse power output to a stated 140 b.h.p., when the S-type was able to justify the name the public had given it: the 100 M.P.H. Invicta.

In much the same way as the Speed Model 3-litre Bentley was almost invariably known as 'the Red-label' Bentley, so also the Invicta type-S came to be known as the 100 M.P.H. Invicta, though the firms neither sponsored nor approved these type names.

Engines subsequently modified to Sanction III standards, i.e. utilising improvements designed by W. O. Bentley and H. Weslake for use on the Meadows engine in the Lagonda L.G. 45-type car of

1936, have a permissible safe crankshaft speed of 4,000 r.p.m. and, with compression ratios of 7.5 to 1, give maximum speeds of over 100 m.p.h. and 80 m.p.h. in 3rd gear, with acceleration of an even more startling order than was standard in the early cars.

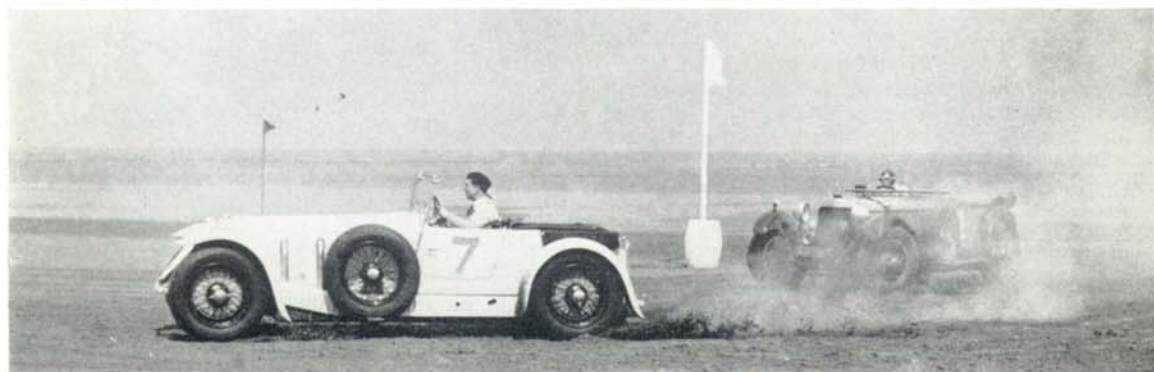
It must be stressed however that the S-type Invicta was primarily a very fast but comfortable high speed touring car, and though it met with moderate success in racing in the hands of private owners in the early 1930s, its greatest appeal lies in its ability to cover big mileages at high average speeds with no strain, either to driver or to the machinery.

In fact the charmingly effortless manner in which the car will cross Europe, up hill and down, with the speedometer needle steady at 60 m.p.h.—traffic permitting—and the revolution counter showing a modest 2,000 r.p.m., is the real secret of the car's appeal. Motoring in this way, quite high average speeds can be maintained, and there is still a large untapped reserve of power and speed available should the need arise.

Like most low-speed engines there is a very large amount of torque available in the lower and middle speed ranges. The Invicta can be throttled down to 6 to 8 m.p.h. in top gear—despite its 3.6 to 1 ratio—and will then accelerate rapidly and without fuss, still in top gear, when the accelerator is depressed. The acceleration figures given by the contemporary *Motoring Press* (see page 12) speak for themselves on this subject.

Once launched, Macklin made little effort to prove the car on racing circuits. From the beginning to the

Skegness sand races: Raymond Mays leads a 36/220 Mercedes-Benz round the pylons. (Photo: Montagu Motor Museum)



end of the firm's history it was company policy to prove all Invictas in long-distance trials of various types. A 3-litre car having been driven completely round the world only two years earlier, under R.A.C. observation, with no failure beyond a half-shaft in the axle, it was not considered necessary to prove the S-type by subjecting it to further trials of this type.

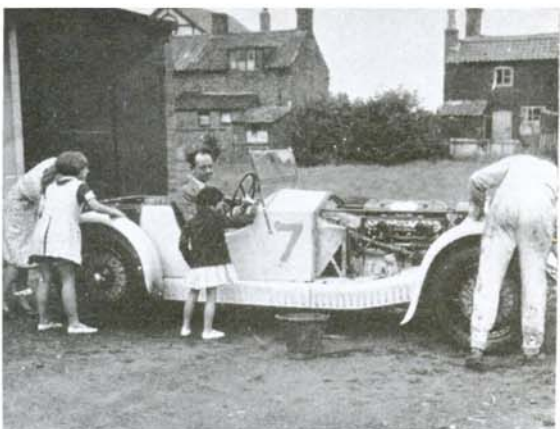
Instead the company concentrated on entering the cars in the most difficult long-distance trials in the motoring calendar, and notable successes were achieved. Shortly after its introduction the car was entered in the Austrian Alpine Trials of 1930, one of the most searching of all trials. It won the Alpine Cup, and made fastest time in the Arlberg Hill Climb. It took the Alpine Cup also in the Hungarian Alpine Trial the same year, and the Glacier Cup in the International Alpine Trials and—as a side line—again made fastest time in the Gallibier Hill Climbs.

The following year, starting from Stavanger, it won the Monte Carlo Rally outright and the Mont-des-Mules hill climb following the Rally. This, despite the fact that in Norway, early in the Rally the car slid off the road on ice, cut a telegraph pole in two and had to be driven almost the whole route with a twisted chassis and both axles out of line. In 1932 starting from Umea, in Sweden—almost on the Arctic circle—it gained 2nd place in the Monte Carlo Rally, but repeated its success in the Mont-des-Mules climb. But face was saved in the International Alpine Trials that year. Three S-types were entered, three Glacier Cups were won, each car securing maximum points and a record time for the Stelvio Pass hill climb.

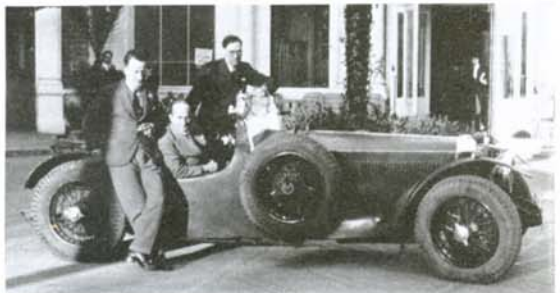
Later in 1932 the S-type took the International Sports Car Record for Shelsley Walsh hill climb and, by way of variety, the Mountain Circuit lap record at Brooklands track for unsupercharged cars and gained 2nd and 4th places in the Mountain Championship at Brooklands track.

It is an interesting speculation to compare motoring competition then and its present-day counterpart, with cars which bear not a great deal of resemblance to the ones one buys.

The Invicta which Donald Healey drove in the 1932 and 1933 Monte Carlo Rallies, and with which he won



Last-minute preparation: Raymond Mays with the white Invicta. (Photo: Montagu Motor Museum)



Winter sunshine: Donald Healey's car after winning the 1931 Monte Carlo Rally. (Photo: Autocar)

the Mont-des-Mules hill climbs, had already covered over 50,000 miles before starting in 1932. It was used as daily transport, it won its class in the Brighton Speed trials in 1933 and obtained 2nd place in the R.A.C. rally the same year.

The actual cars which raced at Brooklands, in the Tourist Trophy races and elsewhere, are still winning

Morgan's Invicta about to be overtaken by Kaye Don in a Type 51 supercharged Bugatti, Brooklands, 1933. (Photo: Radio Times Hulton Picture Library)





G. Fields in the T.T. car at Brooklands. (Photo: H. L. Gué)

club races at Silverstone, Goodwood and Oulton Park to-day, thirty five years later.

This enviable performance was not therefore obtained at the expense of durability or reliability. The Invictas are about as indestructible in normal use as a car can be. Well over thirty years after most were built, 48 of the 77 cars are known to survive (there may be more), and most are in excellent order.

The actual car which eclipsed the lap record set up by Sir Henry Birkin in the 4.5-litre supercharged Bentley in the Tourist Trophy Race in Ireland, by lapping the 13 $\frac{3}{4}$ -mile Ards circuit at 77.69 m.p.h. in 1933, is in impeccable order and could probably repeat its earlier performance. The two cars with

which Donald Healey competed in the Monte Carlo Rally in 1931 from Stavanger, in 1932 from Umea and in 1933 from Tallinn, in Esthonia, are in daily use today despite astronomical mileages.

The very admirable 4.5-litre cars were not the only cars the company produced, though today when one hears Invicta motor-cars being discussed it is invariably of the 4 $\frac{1}{2}$ -litre cars that one thinks and usually the S-type machines.

There were several models of the 1.5-litre cars made. The early ones, in contra-distinction to the 4 $\frac{1}{2}$ s, being substantially underpowered. As a wit once described them 'a good car marred by an impotent engine.'

Powered by a six-cylinder 1.5-litre engine developing 45 b.h.p. it was necessary to utilise a 6-to-1 final drive ratio to obtain any sort of performance at all, and the engine was temperamental.

To overcome the trouble the unit was supercharged with a Powerplus supercharger coupled direct to the crankshaft. This enabled the final drive ratio to be increased to 5-to-1 and thereafter bearing life was rather uncertain.

A very nice 1.5-litre car, with twin overhead camshafts and a capacity of either 1.5 or 1.66-litres supercharged, and fitted with a Wilson gearbox and lightened chassis, was evolved in 1933 but it never got beyond the prototype stage of development.



Personality: G. E. Milligen's immaculate 2/4-seater. (Photo: Jeremy Mason)



Lewes Speed Trials: Donald Monro in the S-type Invicta 'Red Gauntlet'. (Photo: Montagu Motor Museum)



Concentration: Lord Ebury, Prescott, 1954. (Photo: T. C. March)

Confidence: R. M. Blomfield's Invicta at Prescott, 1946. (Photo: Guy Griffiths)





Combat: A. Price 'round the bend' at Prescott in S.139. (Photo: Louis Klemantaski)

The final development of the type-S, the 5-litre double overhead camshaft Invicta, the type S.S., gave promise of being one of the outstanding motor-cars of its time.

The chassis was a refinement of that of the type-S fitted with light alloy Lockheed hydraulic brakes of 16 inches in diameter and with all the springs carried outboard of the chassis frame. Engine was 93 mm. bore \times 120 mm. stroke, capacity being 4890.9 c.c., with

two exhaust and one inlet valve per cylinder. Transmission refinements included a 5-speed Wilson-type pre-selector gearbox and designed speed was 130 m.p.h. Catalogued chassis price was a modest £1,875 and included a kit of tools and spare wheel.

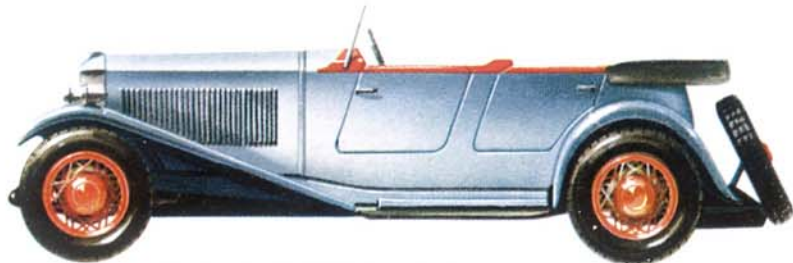
It is believed that two of these chassis were completed, but if they were ever sold to the public, the most diligent search has failed to trace them. Contemporary Press reports linked the name of Humphrey

Performance: Sir David Gamble with 'Agricola' at Prescott, 1946. (Photo: Guy Griffiths)



INVICTA

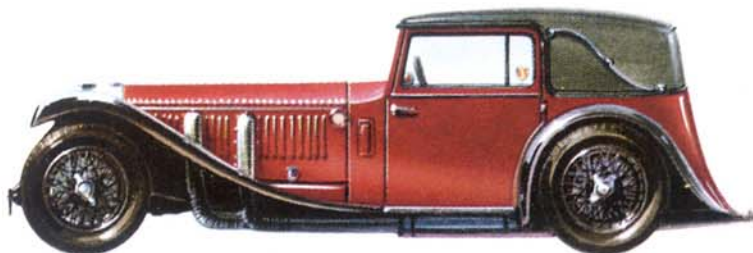
Badge worn by N.L.C. cars.



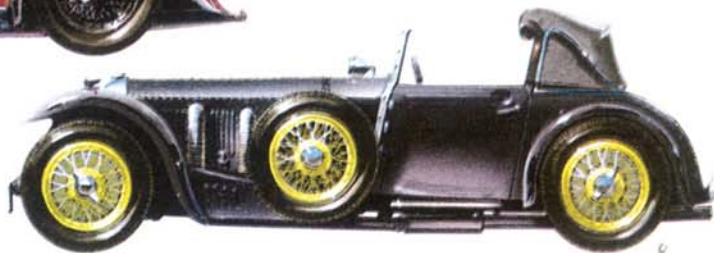
1929 Open Touring N.L.C. 4½-litre by Cadogan.



1929 4-Door 4-Light Saloon N.L.C. 4½-litre by Mulliner.



1933 S-type Fixed Head Coupé.



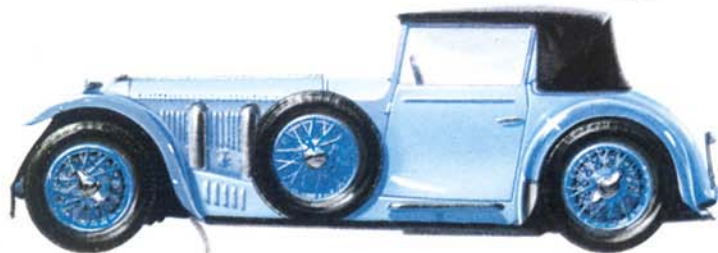
1930 S-type Drophead Coupé by Freestone & Webb.



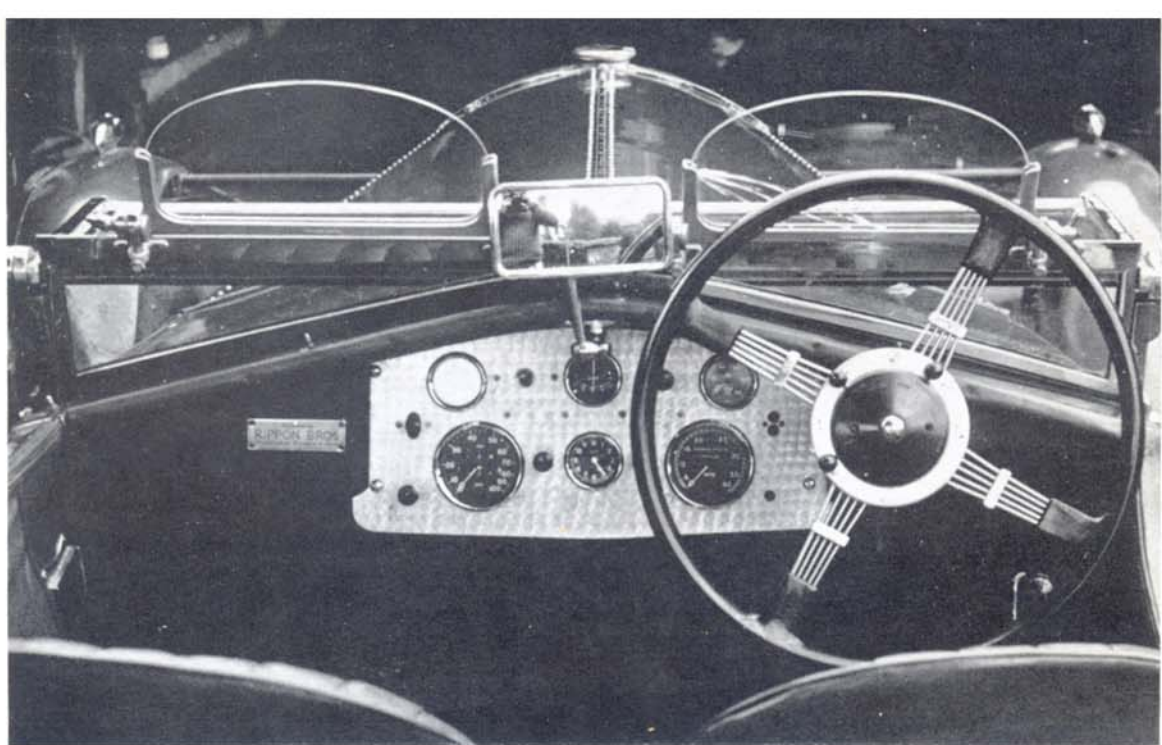
1935 S-type Drophead Coupé by Grose.



1930 S-type Drophead Coupé by Corsica.



1931 S-type Fixed Head Coupé.



Pilot's View: the cockpit of Hedley Gué's S-type. (Photo: H. L. Gué)

Cook with a team of three of these cars for use in the Le Mans Race, and Reid Railton was consultant designer with Macklin and Watson.

If only the Depression had not come along just then—but the history of the world has been changed by that small word—IF!

Years later, W. G. Watson did use a Meadows twin overhead camshaft engine in his post-war Invicta Black Prince, though of only 3-litres capacity, and Henry Meadows produced another twin overhead camshaft engine with 8-cylinders-in-line for use in the early Jensen.

© J. R. Buckley, 1966.

Power: John Shuttler breaks the Vintage record at Prescott. (Photo: Richmond Pike)



SPECIFICATION INVICTA 4.5-LITRE TYPE-S.

Engine. 6-cylinder O.H.V. push-rod operated. Two valves per cylinder in detachable cast iron head. Separate detachable block on light alloy crankcase. Bore and stroke 88.5 × 120.64 mm. Capacity 4467.26 c.c.s or 3.464 in. × 4.75 in. capacity 272.5 cu. in. 4 main bearings, aluminium pistons on H-section steel connecting rods. High pressure forced feed lubrication to mains, big ends, rocker and timing gears. **Ignition.** Dual by magneto and independent coil and distributor firing 12 plugs. (18 mm.)

Carburation. Dual by twin S.U. 40 mm. type H.V.5 instruments.

Clutch. Single dry plate.

Gearbox. 4-speed and reverse sliding pinion. overall ratios;—3.6; 4.9; 7 and 10.4 to 1. reverse gear;—12 to 1.

Suspension. $\frac{1}{2}$ -elliptic springs front and rear. Shock absorbers, hydraulic front and rear with André Hartford friction dampers in over-riding control.

Frame. Nickel chrome steel channel frame underslung in rear.

Wheelbase. 9 ft. 10 in.

Track. 4 ft. 8 in.

Wheels. Rudge Whitworth 72-spoke centre-lock wire wheels with 19 in. × 6.00 tyres.

Acceleration Figures. (Press Road Tests.)

Top gear. 10–30 m.p.h. 6.5 secs. 10–50 m.p.h. 12.5 secs. 10–60 m.p.h. 15.0 secs. 10–70 m.p.h. 19.0 secs. 10–80 m.p.h. 23.5 secs. 10–90 m.p.h. 32.5 secs.

Chassis Data.

Valve clearance: (both .004 in. (hot).

Magneto Points: .015 in.

Distributor: .012 in.

Firing order: 1. 4. 2. 6. 3. 5.

Carburetors: S.U. 40 mm. H.V.5.

Oil Pressure: 25/30 lb. hot. (Standard sump).

Optimum temperature: 75 to 80 degrees centigrade.

Plug settings: Mag. .025. Coil .030.

Timing: Valves. inlet opens 10 deg. b.t.d.c. inlet closes 50 deg. a.b.d.c. Exhaust opens 60 deg. b.b.d.c. exhaust closes 15 deg. a.t.d.c. (1 tooth on flywheel=3.103 degrees).

Timing: Ignition. 42 deg. b.t.d.c.—fully advanced.

Tracking: front wheels. $\frac{1}{2}$ -inch toe-in at wheel centre height.