Small car, ergo small truck

O.S.C.A. spells Maserati

The Fratelli Maserati sold their name but kept their talent.

by Karl Ludvigsen

IF THE AUTOMOTIVE WORLD can be said to have a fleeting, elusive Flying Dutchman, it must surely be the desmodromic Osca engine. Ever since late 1956, when the Maserati brothers declared that they had dispensed with springs, manifestations of the new engine have been reported from Sebring to Rouen, the most insistent stories usually being filed by those who've just been trounced by the suspect car. The documented appearances are relatively few in number. First was in September of 1957 at a Silverstone meeting, fitted to a Formula II chassis which was end-over-ended in its heat. Not damaged, the desmo engine was transplanted to a sports framework and raced at Spa shortly thereafter.

Since these events the pressure of sports car production and the development of a Gran Turismo engine for Fiat had moved the brothers' mechanically-closed valves to the back of the bench, but the recent enthusiasm (and finance) of Alejandro and Isabelle de Tomaso has caused 'em to be dusted off and bolted to an engine of new dimensions mounted in an automobile rife with features new to the Osca organization. The resulting car is an intriguing *potpourri* of the classical and scientific approaches to sports car design.

It's logical that the Maserati brothers should have been the first to follow Mercedes' lead and produce a practical modern mechanical system to replace the valve springs. As is well known, some very close clearances and precise adjustments are called for. These can either be designed in by a concentrated engineering effort or individually built in by expert, painstaking hand fitting. Daimler-Benz naturally chose the former route, while the Officine Specializzate per la Costruzioni di Automobili, with its intimate, feudal assemblage of artisans, elected an emphasis on execution rather than design. It works, and well, but frankly hasn't been so successfully exploited as was the case at Stuttgart. In view of the relative size of the coffers at Bologna it's most remarkable that the Italian interpretation was built at all.

For maximum utility, the desmodromic gear was first designed into the head for the 1491 cc engine with its traditionally square 78 mm dimensions. With a probable eye on Porsche developments and on the current preoccupation of Lotus and Cooper with Grand Prix equipment, it was decided to fit this new car into Class G. The 1350 cc block, a steppingstone from the original 1100 cc Osca to the Class F size, was pressed back into service to provide a diminished bore diameter which, in connection with a much shorter stroke, reduced capacity to about 1090 cc. The exact dimensions haven't been released. Topping it off is the full 1500 cc cylinder head, with appropriate valve, port and carburetor sizes. It should provide altogether exceptional breathing at the expense of a complete engine on the heavy side for an 1100. You'll recall that Osca's most successful Class G contender to date was a 950 cc expansion of their very light 750 cc engine. The new car thus represents a full-circle turn in policy.

All the products of the Maserati brothers have been characterized by simple, reliable design and construction methods well-suited to the needs of the private owner—a tradition that began with their 1929 car, the first in European racing to have a detachable cylinder head. The light alloy block casting of their Osca of thirty years later is competently simple, its smooth flanks broken only by screw-in core plugs on the right and by water and breather connections on the left. A flanged wet steel liner cylinder construction is used.

Ending conventionally at the crankshaft center line, the bottom of the block comprises the upper half of the crankcase and carries webbing to support the five plain main bearings. Main caps are amply dimensioned and retained by two studs each. All Oscas for sale have plain bearings throughout the bottom end, but a further refinement has been carried out in this semi-factory machine. The rods have one-piece bottom ends for use with roller big-end bearings, fitting of the rods and bearings being allowed by an assembled five-piece crankshaft. No complex Hirth system for the Bologna boys. They just carve octagonal extensions on the rod journals which mate very tightly indeed with similar holes in the corresponding cheeks. The union is consummated by freezing the journals and heating the cheeks, then assembling with the rods and rollers in place. Such an arrangement depends entirely on skilled hand work both to machine the mating surfaces and to align the assembled crank properly. Understandably, such cranks won't soon be turned over to private owners.

A combination of plain main bearings with roller rod bearings is sensible from several standpoints. For one, it allows the use of the low-friction crank/rods assembly in an unchanged conventional block. Since the supply of lubricating oil is invariably to the rods by way of the mains, this arrangement also facilitates an internal flow of oil to the rod rollers without the (admittedly effective) expedient of slinger rings. Roller mains and plain rod shells would of course be impractical from the lubrication standpoint.

Extraordinary in these days of oil/water heat exchangers, big oil reservoirs and multiple-scavenge-pump dry sump systems, this petite Osca has a plain old non-cooled wet sump lubrication layout. A wide, deep cast alloy oil pan flares out away from the crankcase bottom face to give as much finned cooling area on the bottom as possible and also to hold as much oil as the proximity of the frame members will allow. A wire dipstick is inserted at the forward right-hand side, just aft of the single pressure oil pump. Bolted to the front of the timing chest right next to the oil pump, a small housing contains pressure-release and bypass valving and provides a mounting cap and stud for the angled replaceable-element oil filter.

Small pressure oil fittings are supplied on the sides of the block adjacent to the main bearing between cylinders three and four. A small tube from each carries oil to the center outside of each cambox, from whence a gallery bathes the cam bearings and valve gear. Pressure is led to the dashboard gauge from a tee in the right-hand line. These very small pipes are the only external ducts in a very simple and hence reliable oil system. The use of a wet sump, with its limited capacity, also reflects Osca's confidence in the oil-retaining ability of the design and assembly of their engine. Since their units have an absolute minimum of external joints and usually finish races as spotlessly as they start, it seems justified.

Now to the heart of this matter: the valve gear. Twin overhead camshafts are turned by a short set of three gears in the head which are powered by a roller chain from the crankshaft nose. Each cam is carried directly in the cylinder head casting by three plain bearings, their caps being retained by four studs each. Plenty of room is left in the widened camboxes for a desmodromic gear that closely resembles the Mercedes system (SCI, May, 1957) in general layout.

Each valve is controlled by two cam lobes — one opening and one closing. Let's take the opening arrangement first. A conventional cam lobe is placed right over the end of the valve stem end, and pushes the valve open by contacting a very small mushroom-type "tappet" which is *screwed* onto the end of the short-stemmed valve. To be precise the stem screws into a tapped hole in the shank of the tappet, and is locked in place by a tiny pin which is pressed through a hole in the side of the tappet shank to engage a keyway-like slot along the valve stem. The threads being very fine, they assist in obtaining proper opening valve clearance.

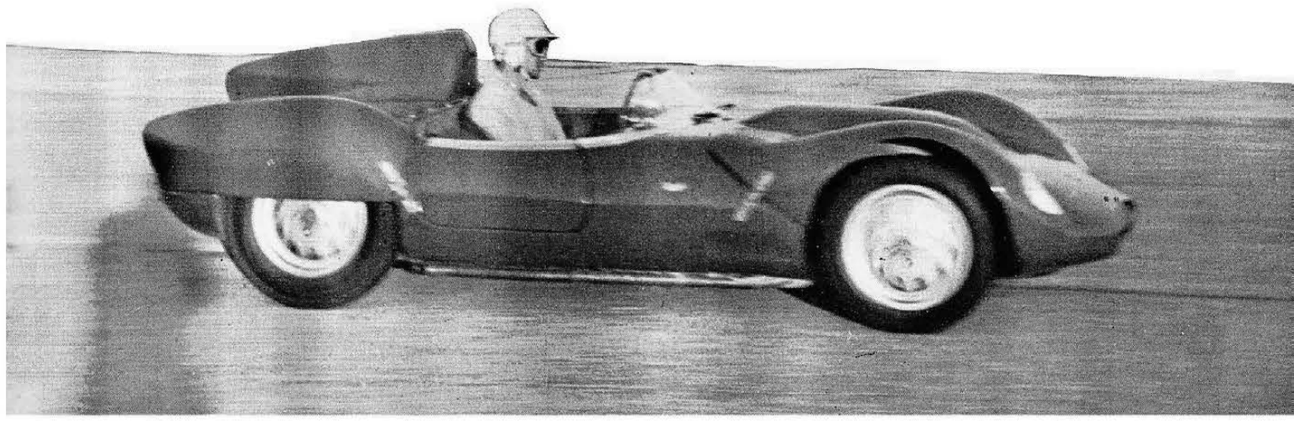
Free to slide up and down along the tappet shank is a short tube with a flange at its upper end, and between this flange and the underside of the mushroom top a very short, stiff coil spring is compressed. Backtracking a bit, a small-diameter shaft runs the length of each cambox along the inner or spark plug side. From this shaft is pivoted a closing bell crank for each valve. One end of the crank reaches out and encircles, with an oval aperture, the sliding collar and flange on the tappet shank. Offset to left or right, depending on the valve, the other bell crank end is forked to accept a needle-mounted roller which rides against a large-diameter Mercedes-style closing cam lobe. Going the other direction, the closing cam presses against the bell crank roller, causing the other end of the crank to lift up against the sliding flange and thus, through the short spring, against the underside of the tappet screwed to the valve stem. The adjacent opening and closing cam lobes are naturally contoured so that each complements the motion of the other, one backing off while the other rises, and vice-versa.

As mentioned, all the valve closing cranks are pivoted from a common shaft for each cam, there being no neat independent adjustment for the pivot location of each crank as was the case in the Mercedes interpretation. This lack of a precise setting for total running clearance made the small springs along the stem necessary to ensure full seating of the valve. Keep in mind that these tiny springs do not actually themselves close the valves; they only keep the bell crank roller in constant and firm contact with the closing cam. Mercedes tried such springs in their valve gear at first but found them superfluous, thanks to the refinement of their adjusting system.

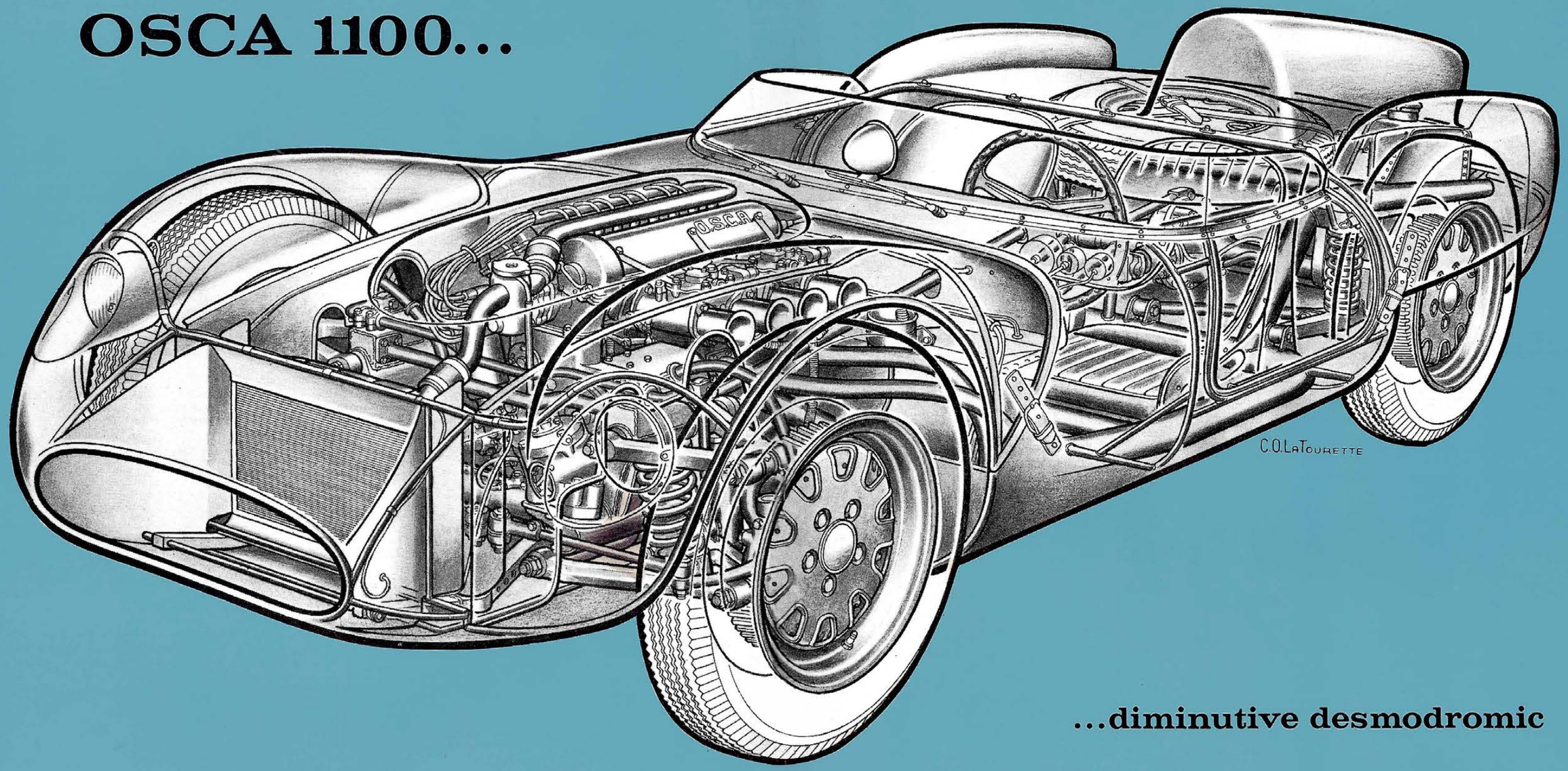
A detail worth mentioning is the application of pressure oil to the bell crank pivot shaft and finally to the opening cam and tappet by way of a spray hole in the bell crank. Although development is now at a relative standstill on this desmo gear, several details indicate the highly experimental nature of this head. The right-hand cam cover, for example, has a flange cast at its back end to accommodate a magneto or distributor if necessary (The left-hand cam turns the tach cable). Just above the ports along the sides of the head are

Alejandro de Tomaso puts the petite 1100 through its paces at the Modena Autodromo.

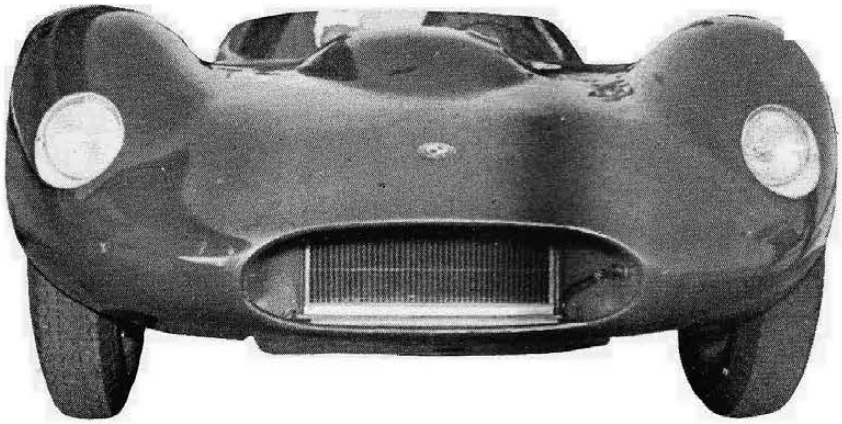
Photos by the author



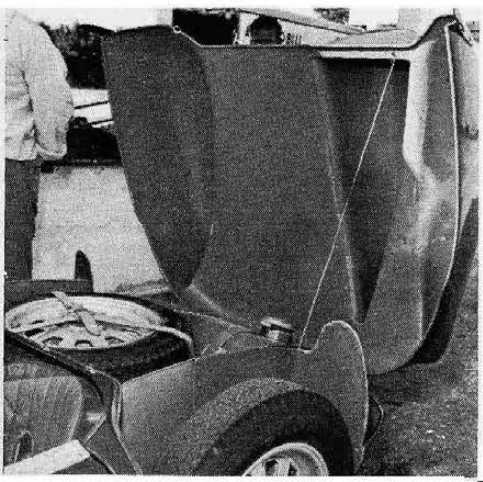
OSCA 1100...



...diminutive desmodromic

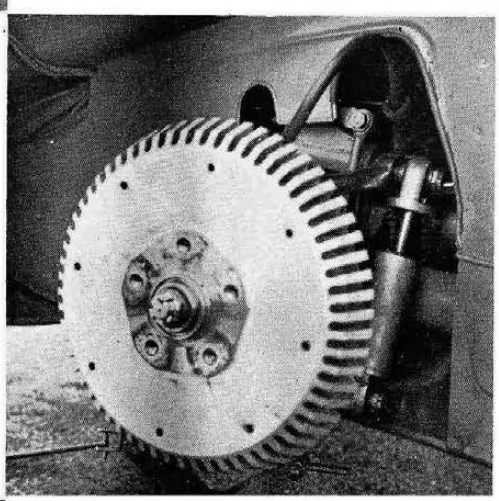


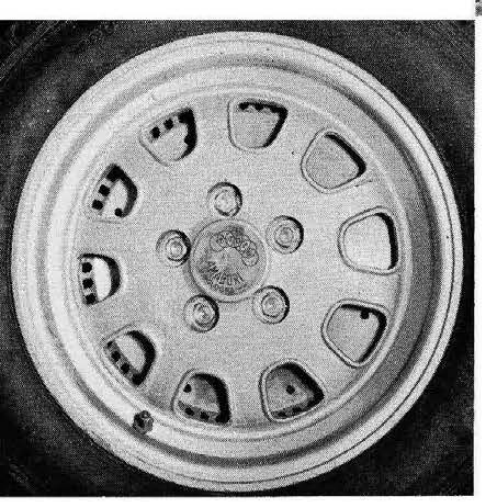
Radiator opening is efficiently small, fully ducted.



Upper tail section pivots for access to spare and gas tank. Wire strand limits its movement. Roll bars, like disc brakes, haven't caught on yet.

Big, solid-looking drums are vented only for lining dust, water. Fully machined fins care for cooling. Wheels attach with bolts, not studs.





Copper-aluminum alloy wheels made by Amadori have deep T-section spokes for rigidity. Valve stem is metal, retained by nut to avoid shearing off.

two-bolt access plates of the type usually employed by Osca to support pivots for finger-type valve followers — possible remnants of an earlier desmodromic try, or a pessimistic means of utilizing the casting if the mechanical closure failed to function. Eight core plugs down the center of the head are an index to the complexity of the casting job, which included the provision of bosses for sixteen potential water offtake (or inlet) pipes, and wells for eight vertically-placed plugs for four cylinders.

Within the framework of the Osca engine, experience at Bologna has been that the desmo gear greatly extends the maximum rev figure but has little effect on maximum power or the point at which it is reached. Were it to be applied in connection with direct injection and exceptionally high compression, as at Stuttgart, the results would have been different. As it stands it is certainly comforting to know that you are unlikely to bend a valve no matter how oblivious you are to the pleadings of the rev counter.

A Marelli twin-coil distributor juts forward from the front of the cylinder head, where it is driven by the central cam train gear. Wires to the plugs are liberal in length and bound together at several points, while the coils are placed far away on the left side of the firewall. None of these latter features are known to favor troublefree ignition, and it may not be coincidence that in trials the usable revs of this 1100 cc engine have been limited to about 7500 by erratic firing. Lodge plugs are used.

Conventional in most respects, the water cooling system is centered around a low-placed FIM radiator, made in Bologna. For the first time a sports Osca has a small separate canister in the hot water return line as a location for the pressurized filler cap. The eight offtake pipes on the intake side of the head are utilized, as is the back one on the exhaust side. Two small vee-belts from a crank pulley drive a generator slung along the left side of the engine, a shaft from the back of the generator being coupled to a water pump at the center of the block. Its output is fed directly into the block at two points, adjacent to four crankcase breather outlets which are manifolded into two big plastic vent pipes.

Contrasting with most competition layouts, this water pump location delivers cool water to the already cool intake side of the block and head. It wasn't always so, however. Until the 1957 season Oscas customarily had carburetors on the right and exhaust systems along the left-hand side, a configuration still used on the 750 cc cars. Before 1958 the works 1500 cc cars, perhaps for driver comfort, had the situation reversed, simplifying carb linkages as well. Since only the porting and valving were changed, all the auxiliary connections were in effect reversed.

In its final developments stage the desmodromic 1500 Osca moved up from 40 mm Weber carbs to the more sophisticated 42 mm size, one of the largest ever to be applied to a 1500. When the head was bolted onto this 1100 the same carbs were retained, certainly setting a record for Class G fours. Of course they're choked well down — to 34 mm — but the potential is there. An electric fuel pump back by

the riveted tank supplies a small frame-mounted fuel filter up front and then the two Webers through flexible hose and a tee fitting. The joints between carbs and head have limited flexibility, the carb weight being borne by three straps from the cam cover retaining capscrews. A modern scavenging layout is used for the exhaust piping, the last two pipes meeting in the customary pseudo-muffler and then reappearing to end just ahead of the rear tire. Below the exhaust ports, cradled between the flared oil pan and a tubular side engine mount, is found the lightweight starter motor with its pull-wire actuation.

Non-webbed and fully enclosed, a two-piece bell housing shrouds the mechanically-actuated single-plate clutch and unites power production with torque multiplication. Newly for Osca the long, but slim, gearbox contains five forward gear choices and has what was described to us as "motorcycle-type" gear engagement. Presumably they have abandoned the synchro previously used on third and fourth cogs and have reinstated a simple, rugged dog-clutch system for the top four ratios at least. In conjunction with small, light gears this can produce extremely rapid shifts, often faster than are possible with a baulking type of synchromesh. Gear changes, to the ear anyway, are indeed completed instantly.

At the gearbox tailshaft, just below the handy shift lever extension, nestles an external-contracting band handbrake controlled by a non-locking lever on the right. Strictly for downhill starting grids like Spa. Hooke-type joints and a large-diameter tubular prop shaft link up to the rear axle, which like late Ferrari productions betrays a garish practicality: live! Oscas have used both spiral and straight bevel gearing in their split alloy center sections, but since, as indicated by a neatly stamped tag, this one carries a tooth combination of 9 x 38 we can assume that they're the straight teeth giving a 4.22 ratio as used in the 1500's. Employment of the big axle also ties in with the generally heavy-duty bottom end and drive line of this muscular 1100. A ZF cam-type differential is also aboard.

Live-axle conservatism is reflected in a simple twin-tube frame which says, "So I don't look like an engineering textbook. I won't break!" And it won't. Incessant Osca successes in the chassis-breakers like the Mille Miglia and Targa Florio have signed and sealed that. In this case the two main members are round steel tubes about three inches in diameter, formed primarily by cutting and welding straight sections together. They begin at the front with two complex fabricated curved pillars for the suspension members, joined by a large tube low down and a smaller one at the top. They spread apart through the firewall and reach maximum separation at the seats, there being a two-inch crossmember under the driver's thighs which supports the back of the gearbox and unites a pattern of angled and longitudinal central-bracing two-inch tubes. A main three-inch crossmember behind the seats ends the primary frame and forms a jumping-off place for rear suspension links and for the big tubes that arch up over the axle

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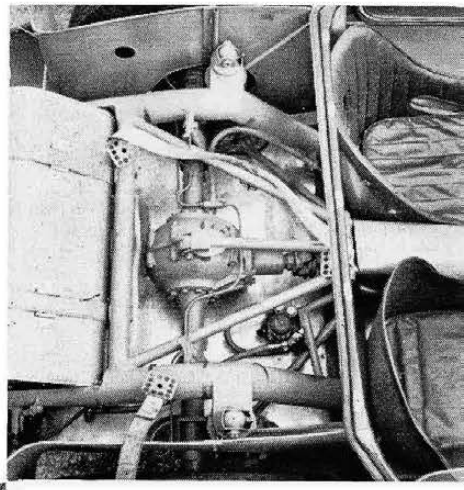
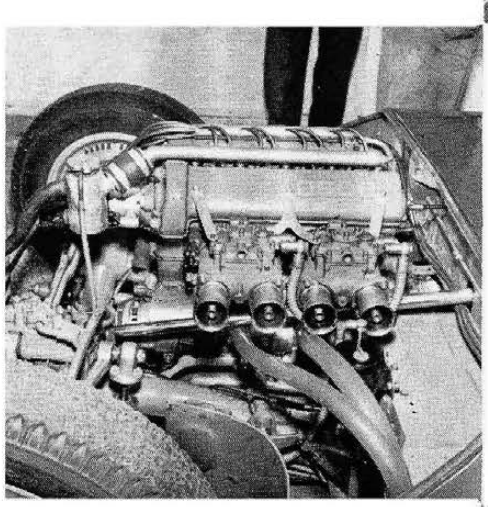
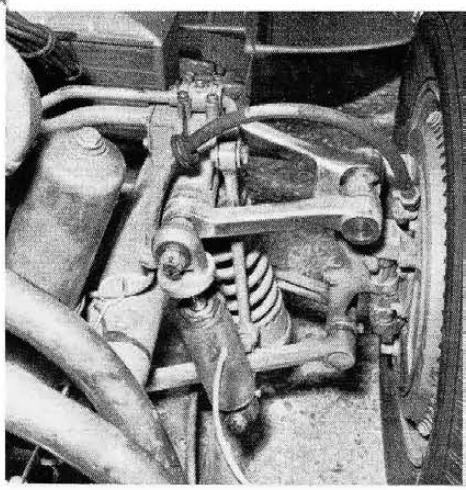
Rigid rear axle rides on concentric coil-shock units, carefully located by two diagonal arms below, central arm above. Canvas straps limit rebound.



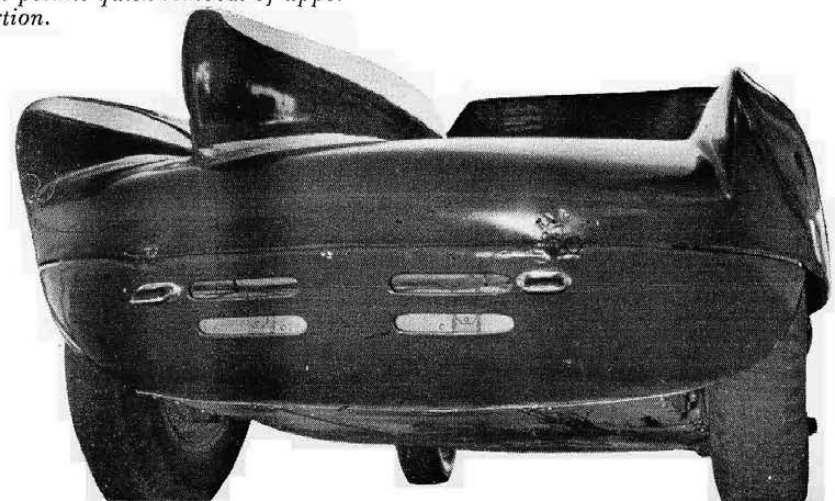


Large Webers dwarf the twin-cam four-cylinder engine. Braced by straps to cam cover, under which hides the desmodromic valves, they carry ram tubes and extensions to auxiliary venturi. Plastic hoses serve as breather pipes.

Upper wishbone is highly polished aluminum. Fully machined, it weighs but 10.6 ounces! Location of spring, shock seems dictated more by expediency than engineering principles.



Lower tail section is vented to release heated air. Grenade-like hinge pins permit quick removal of upper portion.



Osca

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and are split into D-section members to support the riveted fuel tank and the battery.

As classic as the frame is the unequal-length wishbone front suspension. Accepting all the reactions of bucketed coil springs, shocks and anti-roll bar, the bottom arms are wide-based U-section forgings riding in metallic bushes for rigid location. In contrast the short top arms are profoundly daring by any standards, being machined out of aluminum blanks. They weigh a willowy 10.6 ounces apiece! The Maserati brothers also make their own tubular dampers, these very workmanlike units having two needle valve adjustments for internal fluid flow. They are not exceptionally well mounted, though, the shock travel being only about half that of the wheel for a given deflection — a

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GT cars

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"Gran Turismo" 3-litre which now, more than ever, is becoming a flexible and docile motor car—yet with all the power anybody would want under the hood. The new 3-litre Farina coupes are very quiet at high speed—due largely to liberal use of fiberglass sound-deadening material throughout the body panels, and around transmission and firewall. Like Facel-Vega, Ferrari has been pushed into a corner on this brake business, particularly by overseas customers, many of whom won't even look at a high-performance car unless it's got disc brakes, so it won't be long before discs will be offered on most all Ferraris. The latest Facel-Vega two door coupe, the "HK500" is using the 360 bhp Chrysler Typhoon engine in conjunction with a stick shift, and Dunloy discs are now optional equipment for the Facel.

The biggest GT news from England is the Aston-Martin DB-4. It is a 3.8-litre car, whose light alloy engine is directly derived from the DBR-2 racing mill. We had a trial run, and were most impressed with its flexibility, roominess (there's room in the back for two adults), and most of all its terrific performance. A panoramic windshield has very little distortion and the driving position is excellent due in large part to a fully adjustable steering wheel. The car is tractible and quiet—yet has a tremendous blast of power available when needed. The DB-4 is a completely new Aston and is bound to be a huge success internationally.

At long last, we were able to drive a Lotus Elite, and it lived up to our every expectation. The Elite is small — tiny — when you get into it and park along side a Porsche for instance. It's a two seater and nothing more. On the road, the car is agile with a feathery-light feel, possessing that Ferrari-like quality of being aimed like a gun through gaps in traffic, rather than being consciously steered. Performance is incredible, even with one carb. What the Elite will do once it gets a dual intake

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Carlo Abarth

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the coil reaction points, distributing stress evenly into the rest of the frame. To allow plenty of ground clearance for rugged events like the Alpine Rally, exhaust manifolding leads forward to a muffler placed transversely ahead of the radiator and finally to an oval-section underbody pipe. As this is written the two-seater coupe body for the prototype is being prepared, probably for announcement at the Turin Show. No production equipment for the tube frames was in evidence at the Abarth works, but it's likely that the big expansion now being carried out at the new plant won't be devoted entirely to muffler making.

As usual, the record activities so important to both publicity and development aren't being neglected. The Farina-bodied, box-framed car run in 1957 with the original Abarth 750 engine is now being fitted with a Bi-albero unit for a go at medium-distance figures. Of more technical interest is a delightful new streamliner designed around the Fiat 500 engine and suspension. The engine remains behind the rear hub centers, receiving cooling air through a long tube from a tiny grille in the snout and exhausting it through unusual dual outlets. Chassis is multitubular, strengthened by a mildly stressed Pinin Farina body. Abarth record cars have always featured unusually large cockpit canopies, both for driver comfort and as a housing for the customary rear engine, but in this case it may have been carried to the point of caricature. The car is so very small it can't be helped, however—a real vest-pocket Bonnevillemobile. It's sure to have made a profound impression on its initial runs in the Fall of '58.

When we went looking for the new Abarth plant we had an address but no street to match and questions but no answers. When we found it, unobtrusive in its good taste, it was marked only by a bronze plaque: ABARTH & C. When the '59 season is by, and certainly by 1960, it will be as obscure as the Ferrari works in Maranello and as much in need of a bigger shingle. For Carlo Abarth has a line of equipment that's as raceable at it is marketable and which will soon be known as "Abarth" rather than "Fiat-Abarth" or "Alfa-Abarth" as the amount of effort expended per car at Via Trecate increases. Even today there's no more successful single speed shop in the world.

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disproportion which decreases the damper's effectiveness. Related criticism applies to the operating conditions of the coils and of the high-mounted anti-roll bar, which like the upper frame crossmember is dipped at its center to circumvent the distributor.

Conventional steering knuckles embrace short king pins, below which are bolted the forward-facing steering arms. Simply, though not necessarily geometrically, these are joined by a two-piece track rod, the break occurring adjacent to the left-hand

O.S.C.A.

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steering gearbox. Bolted into a fabricated niche in the frame and a considerable piece of machinery in its own right, this worm-based box actuates a forward-facing pitman arm and takes commands from a chrome-plated steering column.

Good results with a distinctive layout are obtained by the Osca location system for the light rear axle. Basic guidance is supplied by two fabricated box-section trailing arms which pivot at downward extensions from the steel axle housings. To provide lateral rigidity these arms are each braced to the frame crossmember by a small tubular stut with an angled rubber-bushed pivot at each end. An examination of this whole system will show that for one wheel to lift or for the car to roll the various rubber bushings in the members will be heavily stressed, imparting a degree of roll resistance but more importantly ensuring even firmer wheel control under such conditions. Putting it another way, if slop-free metal bushings replaced the rubber goods – the back end of this car could not roll at all.

A parallelogram to resist drive and braking torques is completed by a single trailing arm from the top of the driveshaft tunnel to a pivot atop the differential casing. Based on a one-inch tube, the arm has deeply gusseted end fittings. Perfectly vertical coil springs surrounding Osca tubular shocks are hung outboard of the frame kickups and apply their forces to the boxed trailing arms just forward of the axle. Each bottom spring cup is lightness-drilled and pivoted to its trailing arm. Axle travel is limited by canvas loops and rubber bump stops.

Brake mechanisms front and rear follow Maserati brothers' tradition in being of the conventional leading-trailing shoe type The sturdy cast backing plates have but a small screened air scoop and no air outlet, and are recessed well into the wheels to boot. Heat dissipation should however be well handled by massive new cross-finned brake drums which boast a large volume of aluminum bonded around their ferrous liners. Drum internal diameters are ten inches in front and nine in the rear. A pushrod and bell crank linkage from the pedal actuates the single master cylinder, placed in a decided hot spot between the left-hand frame member and the engine oil pan. An indicating-plunger fluid reservoir is mounted on the firewall.

Frequently seen on new Oscas of all sizes is a neat ten-spoke disc wheel, designed by Ernesto Maserati and made by the up-and-coming Amadori firm right next door to Osca on the Via Emilia. A coat of aluminum paint on each wheel conceals a color which indicates a high percentage of copper in the light alloy. Each spoke is backed up by a radial stiffening rib, giving them a T-section. The wheels are concentrically located by close-fitting raised spigots on the brake drums, and clamped on by five cap screws with relieved heads. This attachment system is adequate for medium-length events with the excellent tire life now available, but a wheel change would be a double bother as these cap screws appear to require additional tightening to ensure solid mounting after the brake drums have been warmed up. Perhaps this would not be so critical if the cap screws were relieved of braking and drive torques. Wheels and tires are 15 inch, the front rim and tire sizes being 3.5 and 5.00 respectively, with 4 and 5.25 in use at the rear.

Still built by Morelli in Ferrara, the body is a considerable departure from past Osca patterns in both shape and construction. In the former respect it blends a Lister-like nose and lumpy hood with a high, full windshield and a squared, sharply-carved tail that partially encloses the rear wheels. Regarding the latter it features a nose and tail that hinge up and away from the center of the car to expose chassis and drive components beautifully. Leather straps retain these covers, which have more of an impression of flimsiness than is usual with the tube-framed Morelli body construction.

Seen overall this is truly an Osca "special", assembled from a variety of new and old ideas around the shop for the particular benefit of de Tomaso. It envelops their classic Italian chassis with an admittedly Britannic body shell and powers it with a potentially devastating 1100 cc engine. It's new to Osca and will take some sorting out, but if that can be accomplished within reasonable time it'll be very, very hard to catch. Even better it may point a new line of endeavor for the patient brothers Maserati.

—Karl Ludvigsen