

► How do you improve an already top-notch competition car? Maserati has had several sports-racing automobiles in the top rungs of their classes in recent years. Two that ranked with the best were the 300S and 200SI, machines which are now outdated internationally but which continue to win races in this country. Since financial hurdles tripped up Maserati's racing ambitions at the end of the '57 season, the Modenese firm has devoted a lot of attention to its Grand Touring 3½-liter car and relatively little time, publicly, to racing cars. Sports-racers like the 300S and 200SI continued to get service but no successors, excepting sporadic work during 1958 on a three-liter version of Maserati's G.P. V12 mounted in the 300S chassis. Other sports cars—Ferraris, Coopers and Porsches—passed the '56-'57 high water mark of Maserati. A new car was needed. Once he had been able to establish some financial stability, Omer Orsi gave his chief engineer Ing. Alfieri the go-ahead—late in 1958—to build one.

Of necessity Alfieri had to design a complete automobile this time. In the past he's been mainly responsible for engines, leaving chassis and transmission to young Valerio Colotti, who has left Maserati and struck out on his own to form the Tec-Mec Studio in Modena. Alfieri's fresh point of view is obviously responsible for the complete novelty of the new car's frame. He has succeeded in making improvements in all the areas that can affect a racing car's ability: light weight, power, handling and braking. The new creation was intended to supplant the 200SI, but it was found to have sufficient safety margins all around to allow it to fill the three-liter slot as well, which accounts for its twin type designations. "Type 60" refers to the two-liter car, while the three-liter version is Type 61. (The 450S V8 was Type 54, by the way.) There have been rumors, also, that the basic car may even be evolved into a Grand Prize contender, which would bear much the same relationship to the sports version as the W196 Mercedes did to the 300SLR.

SHRINKAGE IN SIZE

Basic dimensions of tread and wheelbase reflect real progress in design, as well as Alfieri's sound reliance on principles that have proved successful in the past. With the exception of the front tread, which was widened by two inches to 51 to exaggerate the already-established crab track, the Type 60's dimensions are identical to those of the 200SI and, indeed, of the short-lived 150S. (See full description of 200SI in SCI, May 1957.) Alfieri relied, in this case, on proportions which had already been proven to equate to good handling. Design progress is shown by the complete success of the Type 61 edition, which has five inches less wheelbase and two inches less rear tread than the 300S which it effectively replaces—

reductions which contributed a lot to the 450-pound margin of lightness between the 300S and the Type 61, which has a remarkably low dry weight of 1260 pounds.

FANTASTICALLY FRAMED

It's been said that a proper space frame should be built up around a parakeet; if the bird can fly away when the job's completed, it hasn't been done properly. This seems to have been the dictum followed by Ing. Alfieri in the design of the aptly-nicknamed "Birdcage" Maserati's frame, a construction that's a real *tour de force* by the car's stress-conscious designer. Obviously complicated, this frame is actually based on a highly logical premise. What might be the two extremes of frame design? For the purposes of our discussion, one might be the old reliable twin-tube or twin-channel layout, while the other might be a unitized stressed-skin structure which combines frame and body in one shell, like an airplane fuselage. This Maserati is much more closely related to the stressed-skin extreme than it is to the twin-tube school. It is, in fact, about as far as you can go with tubes toward fuselage-type construction.

Put it this way: If you use two tubes, they must be darned big ones. If you use four, they can be smaller—and actually, if you place them properly (far apart) they can weigh less for the same stiffness than the two they replace. The more tubes you use, the smaller they can be and, if they're properly placed, the lighter the structure will be for the same stiffness—or the stiffer it will be for the same weight, if that's what you're trying to accomplish. The ultimate would be a near-infinite number of tubes of near-infinite thinness: a smooth, complete skin—the other extreme we discussed above. If you had the facilities (which Maserati doesn't) you could duplicate the Type 60/61's structure by starting with properly-placed stressed sheets and punching triangular-shaped holes through them!

LIGHT AND RIGID

Only a few racing car builders have had the resources or the know-how to start at the stressed-skin extreme. Jaguar did it with the center-section of the D-Type, as did B.R.M. with the midsection of its first four-cylinder car, and Lotus tried it but abandoned it as too expensive to repair on its first aerodynamic cars. Lacking experience in this realm, but having on hand craftsmen superhumanly skilled in the use of torch and tin-snips, Alfieri decided to get the same effect with a myriad of chrome-moly tubes. ¼-inch ones form the main framework and are diagonally braced by smaller tubes nearer ½-inch in diameter. The skin is actually stressed in areas where it is critical and/or convenient. It's convenient along the front wheel wells and under the front end, where

frame tubes are already plentiful, and critical along the floor pan and over the door sills and prop shaft tunnel, where there are fewer tubes spaced closer together.

One result seems to have been impressive stiffness. Gus Andrey, who drove one of the cars at Nassau, reported that it had a feeling of rock-like rigidity that he'd never experienced before. Gus's car also emerged in remarkably good shape from some off-course maneuvers that he indulged in, through no fault of his own. Since most of the suspension and power components of this car are as heavy or heavier than the equivalents in the 200SI, the frame seems to have done a good job of "adding lightness." Since the tubes go just about everywhere there's little need for extra body supports, and in addition Maserati has shown great courage in simply leaving off body skin where it seems to serve no useful purpose. Typical is the gap between the flat dash panel and the base of the windshield.

LEANED FOR LOWNESS

To lower both the hood line and the center of gravity, the four-cylinder in-line engine was canted over 45 degrees to the right. At the same time the crank centerline was offset to the left side of the chassis, to keep the engine's weight centered, requiring a prop shaft that angles slightly back to the right again as it runs rearward—only slightly, because the gearbox input shaft (at the rear) is also offset to the left. This combination leaves the driver proportionally more room on the right side of the drive shaft.

It can be said that the Type 60/61 engine is descended from the 200SI unit, but it's a very long way around. The element most closely related is the light alloy block, which houses the wet nitrided iron cylinder liners and which carries the crank in five main bearings. Massive main caps with four studs apiece restore the lateral strength that's lost by ending the bottom of the block at the crank centerline. In the design of the crank, rods, pistons—the whole bottom end—it's clear that use has been made of the experience garnered with the similarly-proportioned 450S V8.

A new, deep oil pan was cast, liberally finned on its left side and shaped to conform to the engine's 45-degree slope. As on the 200SI and 150S, the pressure and scavenge pumps for the dry-sump lubrication system are exposed at the front of the pan, below the nose of the crank. Nearest to the engine, the single pressure pump draws oil from the reservoir, slung on the left side of the engine room, and pumps it to the engine by way of a large filter, frame-mounted next to the reservoir. Hot, tired oil is plucked from the pan by two pickups and two scavenge pumps, and returned to the tank via an oil cooler at the left of the water radiator.

TOP END DESIGN

As is well known, the cylinder head design of the 200SI formed the basis for the layout of the 450S V8. In transition it remained much the same except for the layout of the water passages. The four-cylinder engine simply let hot water out through a cast-in pipe at the front, between the cam drive gears. For the V8 the layout of the 250F and 300S engines was adopted: Hot water exited through separate manifolding above the intake valve seats (on the "high side" in this case); cool water was pumped direct to the sorely-tried exhaust valve seats and guides by another manifold on the other side of the head vee. Spun by the-cam drive gearing, the water pump (two on the V8) fed fluid both to the head and to a manifold cast along the side of the block.

With its single head placed at the precise angle of the right-hand cylinder bank of the V8, the 60/61 engine could well afford to keep this new form of water manifolding. An additional major change from the V8, moreover, was the abandonment of the elaborate roller finger tappet that had come in with the 150S and had spread to the 200SI and 450S. For the new engine Alfieri reverted to the simple, light, space-saving finger tappet that had been proven on all the recent Maserati twin-cam sixes. In the latter engines it was combined with coil springs, though, while here it works with hairpin-type springs for the first time.

Thus far 45 mm twin-throat Weber carbs have been used on the Type 60 engines, protruding high up from the hood to get the straightest possible ram path into the ports. Ram is less critical on the Type 61, allowing the carbs (48 or 50 mm) to be angled downward under a more modest hood bulge. Development on the bigger engine will doubtless be directed toward enlargement and perfection of the intake valves, ports and carburetors. A tuned scavenging exhaust system of conventional shape is supplied.

YEARLY STRESS INCREASE

Just as Ferrari was able to expand his 1½-liter V6 to 3 liters, so has Alfieri been able to get nearly three liters from his 1½-liter four—a more difficult job, with a smaller number of cylinders. As the increases have been made, also, improved construction methods have allowed higher stresses and hence higher revs for more power. The way the basic cylinder has been expanded, and the way stresses (shown as piston speed divided by the square root of the stroke/bore ratio) have been able to increase year by year are best shown in the following chart. The new touring version of the Maser V8 is also shown as a matter of interest, as is the four-cylinder 2½-liter engine used in the G.P. Cooper-Maseratis.

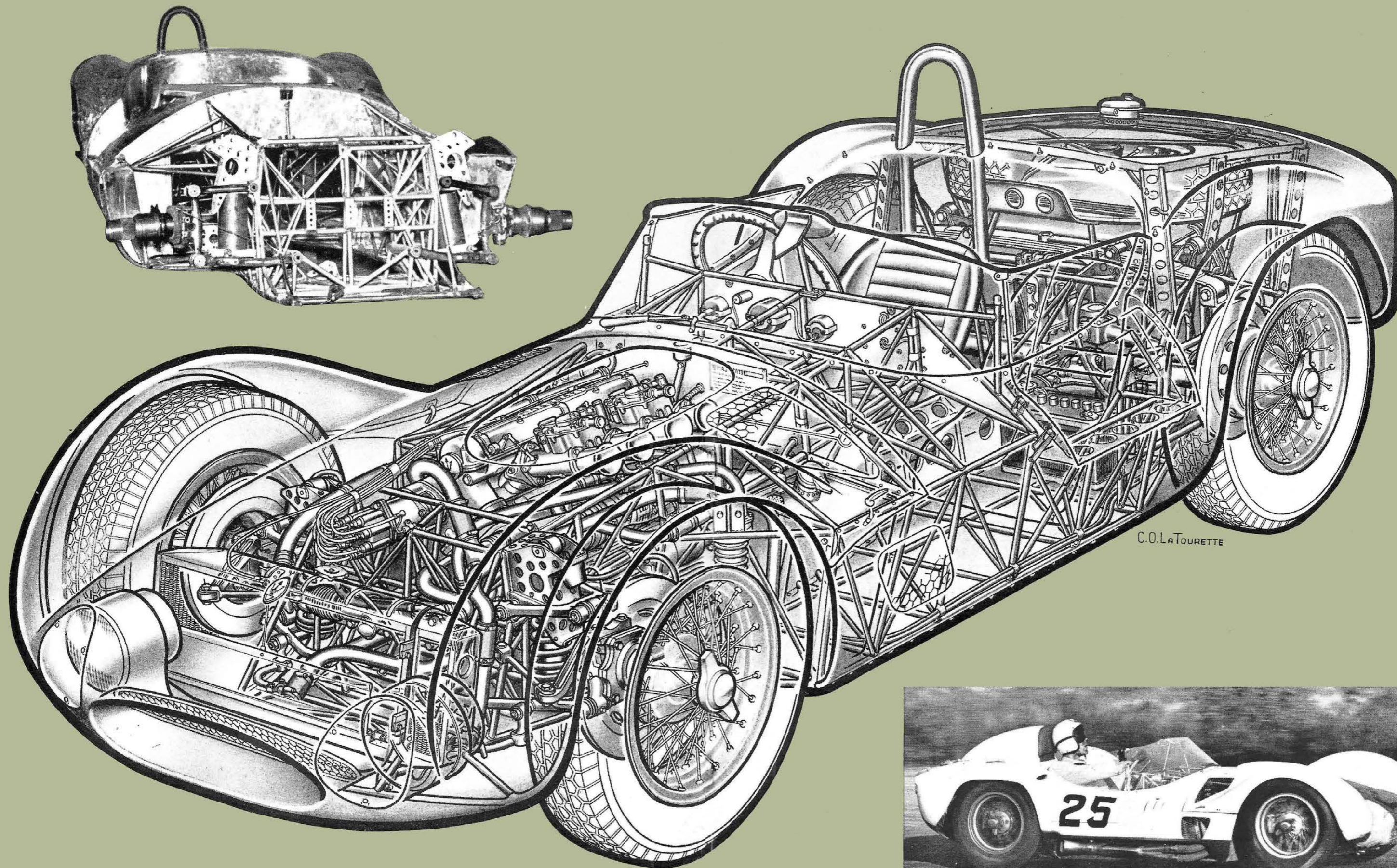
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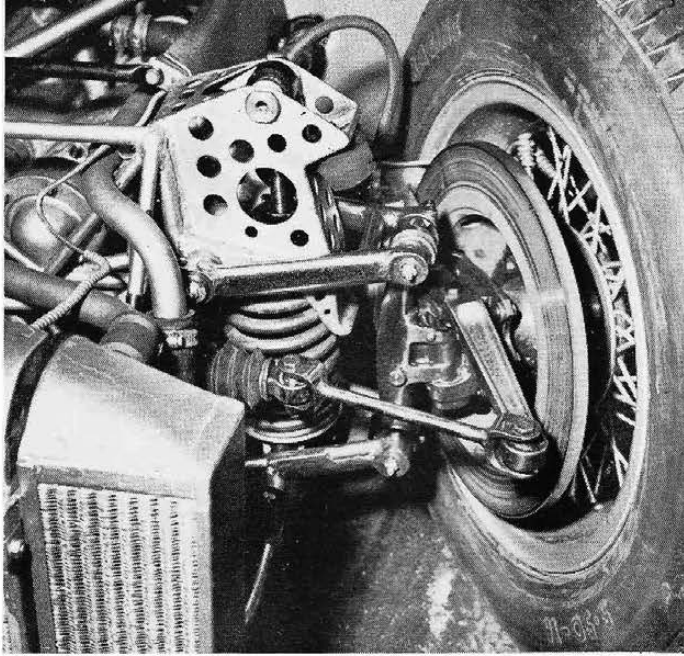
SCI TECHNICAL REPORT: THE INCREDIBLE MASERATI TYPE 60/61

by Karl Ludvigsen

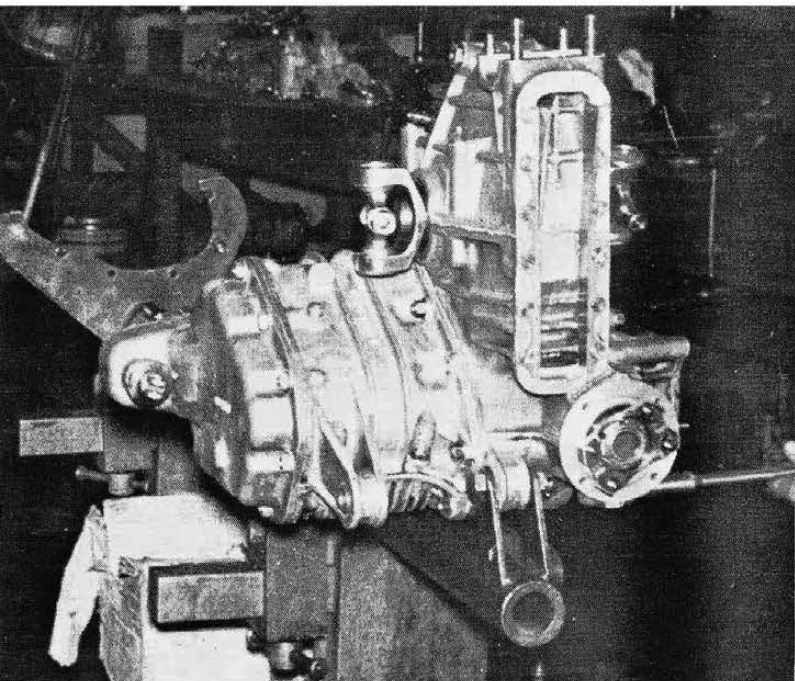
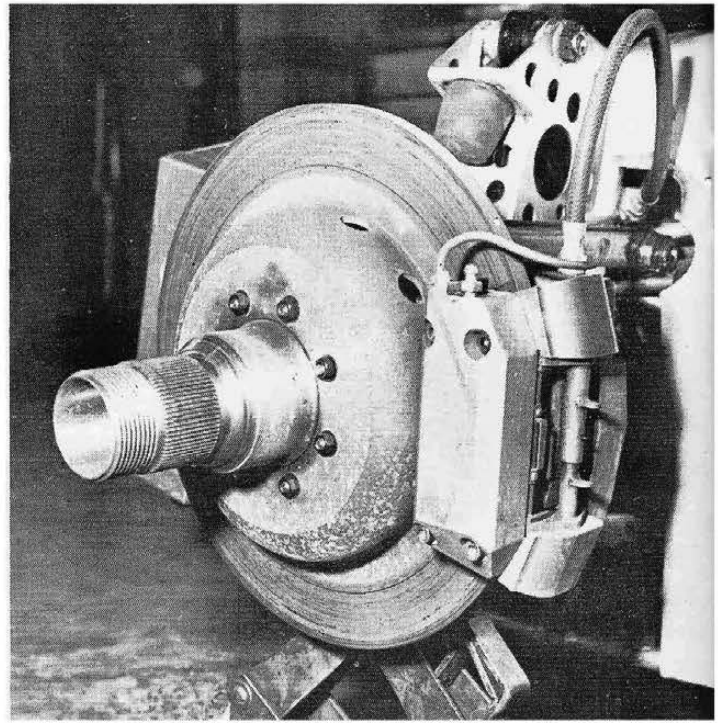


MASERATI TYPE 61 — “a near-infinite number of tubes of near-infinite thinness”



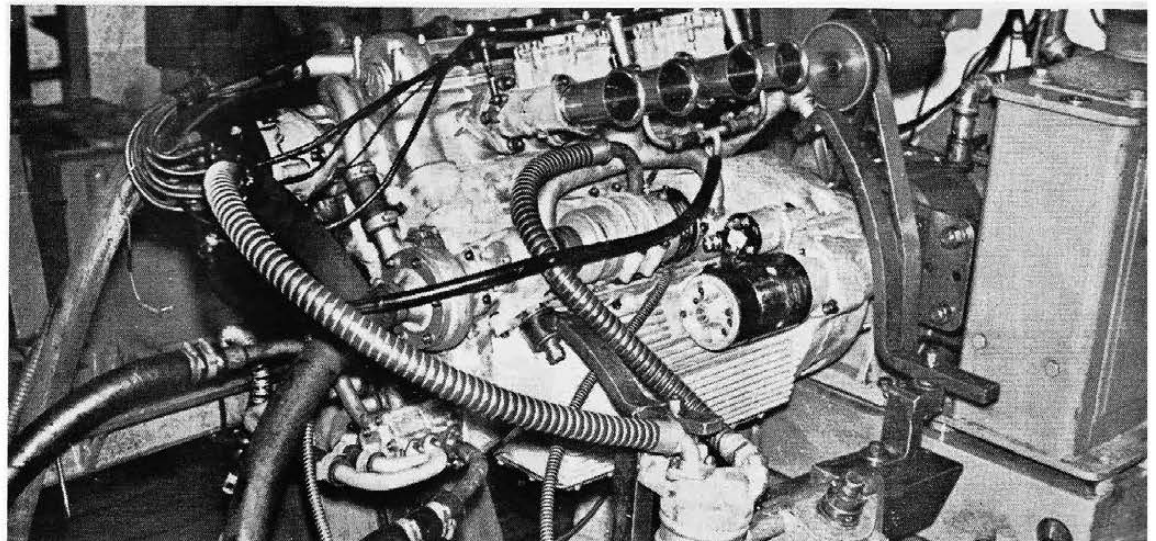


Suspension on left front wheel of this Type 61 is welded-tube type, stolen from "Piccolo" Maser of 1958. Link to I-section steering arm is knitting-needle size. Drilled spring/shock support also is borrowed from G.P. car. Disc of Girling brake, also seen at right, is placed well out in air flow. Machined caliper has one large piston on inside, and two smaller ones on outside to provide smaller overall radius from hub to clear inside of rim.



During practice for the German G.P. in 1959, Stirling Moss took out an experimental edition of the two-liter Type 60. Above, Bertocchi confers with him on the new Maser's handling and performance. At left is the modified gearbox, which is based on an early final drive housing and newest gears. Looking at it from the "front," as here, we can see the input coupling and the de Dion locating slide.

Seen on the test bed in Modena, the 2.9-liter Type 61 engine is greatly changed from the 200SI. View here is dominated by flexible hoses to remote-mounted oil filter.



Year	Type	Bore and Stroke (mm)	Cylinder Size (cc)	Maximum RPM	Corrected Piston Speed (f.p.m.)
1955	150S	81x72	371	7500	3760
1957	450S	93.8x81	560	7000	4000
1957	200SI	92x75	498	7500	4120
1958	2.51.	96x86	623	7000	4180
1959	5000	98.5x81	618	6000	3520
1960	60	92x75	498	8200	4480
1960	61	100x92	722	6800	4270

In view of the revs available, the power figures quoted for these new Maseratis are surprisingly modest: 195 bhp for the Type 60 and 240 for the Type 61. Yet the performance they produce is completely competitive, as anyone who saw the Type 61's in action at Nassau will testify.

INHERITED GEARING

Ing. Alfieri chose to transmit this power through a multi-plate clutch in unit with the engine, and to carry it back to the rear-mounted gearbox that has been a Maserati feature since it was introduced on the 1954 Grand Prize car. Its compact transverse-shaft arrangement has been described and illustrated many times before in SCI, the gear-change shafts lying to the right of the bevel input set and the spur output gearing to the ZF differential. Since the early days a very light waffle-ribbed case has been developed for this box and used on certain G.P. cars since 1957, but for these cars it has been eschewed in favor of the more rugged central housing used on the 300S. Experience with the G.P. gearing has, however, allowed the gear case to be shortened a couple of centimeters.

Extremely rugged dog clutches engage the five constant-mesh forward gear sets of the Type 61 (Low starting gear of the Type 60 isn't constant-mesh). Establishment of a usable low gear at the right end of the case booted the box's oil pressure pump from that location. It's now at the left end of the unit, driven from the end of the laterally-placed input bevel gear. With this gearbox it was possible to provide a right-hand shift location that's familiar to American operators. The short-travel gate is fitted with a latch that blocks off reverse in a positive manner.

Retention of this gearbox also allowed Alfieri to keep the de Dion rear suspension that was introduced on the same car at the same time. The axle tube runs ahead of the gearbox and is laterally located by a steel-sided slide in the front of the box casing. Parallel trailing arms guide the wheel hubs individually. High above the axle shafts the transverse leaf spring crosses, carried in pairs of rollers to augment roll resistance at the rear. Maserati has taken a leaf from Cooper's notebook in the way the spring is kept from moving laterally. It used to be done by a miniature channel mounted at the spring center, but it's now accomplished by a strut reaching over to the center of the spring from the left upper supporting roller. Separately mounted, on drilled webs, are Girling or Koni tubular shock absorbers.

BORROWED FRONT ENDS

An utter novelty for Maserati is the use of a rack and pinion steering gear, mounted ahead of the front wheel centers. It actuates the forward-facing steering arms through short tie rods of remarkable thinness, which are arranged to preserve traditional Maserati steering geometries. The front suspension itself is more than traditional. It's made up using components from Maserati Grand Prize cars of the last few years! The wishbones are parallel, with the top arm substantially shorter than the bottom one, and they and their concentric coil-shock assembly are hung from drilled pylons very much like those used on the "Piccolo" Maserati G.P. car of 1958. The first couple of Type 61's built actually used the welded-up, oval-section tubular wishbones that had been fitted to these 1958 cars, after some trial installations in 1957. Further "Birdcage" cars, under construc-

tion as this is written for the Camoradi team, will use wishbones with forged I-section arms that are obviously borrowed from earlier Grand Prize Maseratis of 1956 and 1957. It's interesting that the geometry has been so successful that it has required no change since that time. A small-diameter anti-roll bar is supplied, mounted below and ahead of the lower wishbones.

MUCH BETTER BRAKING

A major step forward are the brakes of the Type 60/61. Maserati took up the experimental Girling design which was tried by Ferrari on his coil-sprung car at Morocco at the end of '58, and dropped in favor of Dunlop discs. The Girling units, characterized by a deep-dish disc which keeps the rubbing surfaces out in the air flow and by a unique three-cylinder caliper, have been modified for production and fitted to the front wheels of a few of the 3500GT Maseratis. The quick-change, fully-machined version used on the Type 60 is practically identical to that first tried by Ferrari.

To establish a front/rear braking proportion, the front discs are 365 mm in diameter as opposed to 314 mm at the rear (13.8 and 12.3 inches respectively). There are also separate brake master cylinders for the front and rear circuits, which allow further proportioning to be done easily as required. These discs have proved to be very good at stopping this light but fast automobile. They are in no way to be blamed, incidentally, for E. D. Martin's crash at Daytona last year.

Sixteen-inch Borrani wire wheels are fitted at all four wheels. The Type 61's are coming through with an interesting combination of tires which, according to Maserati's skilled Chief Mechanic, Guerrino Bertocchi, is recommended by the factory. 5.50 x 16 R5 Dunlops are fitted at the front, while 6.00 x 16 Pirellis are used at the back. This combination would be expected to move the car in the direction of understeer, so perhaps the car turned out to be a bit more tail-happy than Alfieri expected.

HOW IT WORKS

As President of Rallye Motors (46 Sea Cliff Avenue, Glen Cove, Long Island), importer of Maserati cars, Serge Toumaniantz clearly has a personal interest in the success of the make. Yet his comments on the capabilities of the Type 61 strike us as being fair: "It has tremendous acceleration, equal to that of the big Aston Martin and the large-displacement Ferraris; it goes much, much deeper into the corners thanks to the light weight and disc brakes; it holds the road incredibly well; it is extremely solid and has a tough, reliable, simple engine". The factory's top speed estimates for the small and large versions are 161 and 180 mph, figures which have been closely approximated using high final drive ratios. Under racing conditions they deliver about six miles to the gallon, from a 31½-gallon tank.

Though the first race for the new machine was won by a two-liter version (Moss, Rouen, 1959), which appears to be very potent in its class, most of the orders so far have been for the 2.9-liter car. As this is written, Lucky Casner's Camoradi USA appears to have been given the assignment of campaigning the Type 61's on an international scale, with the full backing of the Maserati factory. Their Sebring entry of three cars, tentatively approved at this time, includes the following driver pairings: Stirling Moss/Dan Gurney, Carroll Shelby/Masten Gregory, and George Constantine/Rodger Ward. Gurney, Shelby and Gregory are the drivers Camoradi will rely on primarily in 1960 World's Constructor's Championship competition: Driving the car owned by Mike Garber, Gus Andrey will concentrate on SCCA events this year — a league in which the Type 61 should be hard to beat.

The cars are good — an almost stunning advance over past Masers and their contemporaries — and the drivers are the world's best. If the backing is there, Maserati could be out for its winningest season yet.

—kel