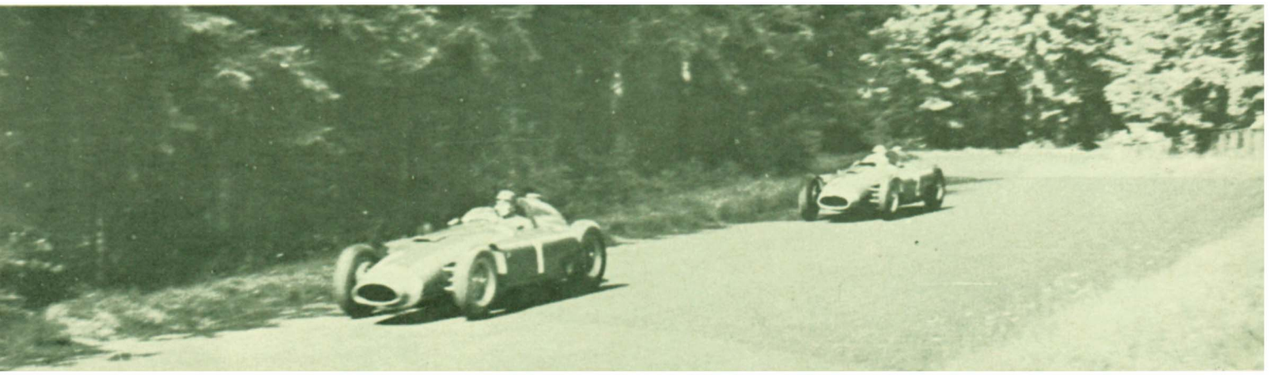
CONSISTENT CHAMPION

Continuing the story of the fabulous Lancia-Ferrari D-50



Fangio leads Collins during the 1956 German G.P.

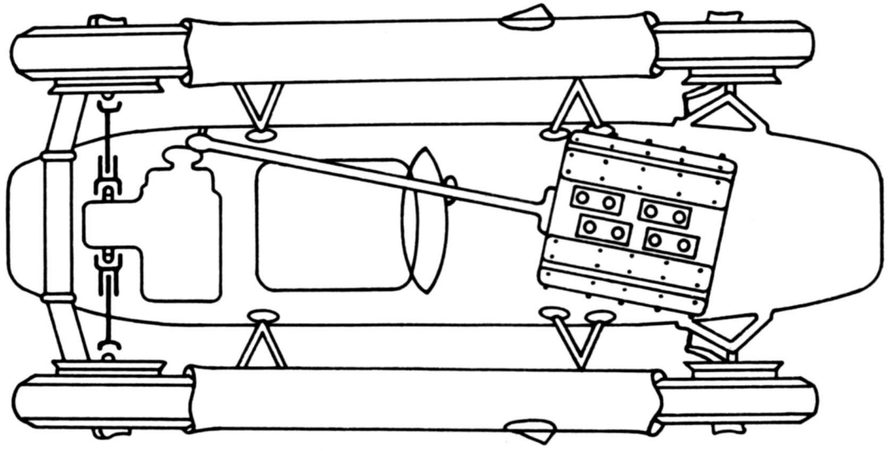
By KARL LUDVIGSEN

BEFORE the D50 Lancia made its debut, the few who had managed to get a glimpse of it were deeply impressed by the tightness of its design. Nothing was either wasted or superfluous. It looked as though the suspension was simply hung from the engine and gearbox. Actually, however, the engine and gearbox, both extremely lightweight, were used to back up the frame and suspension.

With major members of tubing about an inch and a half in diameter, the chassis frame is a simple truss-type rig with extremely high – about shoulder height – upper tubes. This is highly reminiscent of a frame that Nardi built a few years back, using Lancia Aurelia parts. To tie the cowl and firewall up to the front suspension crossmember, though, Jano didn't add tubes and weight. He just cast special lugs into the front and back of each cylinder head and bolted them right into the structure. In addition, two lugs at the "bottom" of each head mated with mounts welded to the bottom frame members, adding immeasurably to frame and beam stiffness. The cylinders and crankcase hang suspended between the cylinder heads, in this unique installation.

Two boxed towers are erected at each side just ahead of the engine, to serve as mounts for the parallel wishbone suspension. The two front towers are connected across the car by big upper and lower tubes and the back towers are braced in by smaller diagonal tubes. Behind the cockpit, the frame only went far enough to get a good hold on the massive transmission casting, which in turn supported such items as the transverse leaf spring and the locating block for the de Dion tube. Through the cockpit, stiffness is aided by smaller tubes and by perforated sheet metal webs, the firewall already being an integral part of the chassis. The stark simplicity of the original Lancia shows well the advantages of starting with a virgin sheet of paper in the design room.

When he started to make marks on this paper, Jano wanted lightness, yet he wanted roadholding of an entirely new order. Each tire was to do as much work as possible – requiring careful studies of cornering and acceleration conditions which affect selection of roll centers, weight transfer and distribution, etc. To make a tough job just a little easier the bulk of the fuel was stored in the famous pontoons slung between the wheels, with strut supports and with a third header tank behind the driver's skull. This of course kept front/rear weight distribution roughly the same whether the tanks were full or empty.



The engine is at such an angle that driveshaft engages side-mounted clutch shaft through bevel gears, enabling both a low seating position and fairly simple, transverse gearbox ahead of the differential.

The point at which a set of wheels will bust loose and head for the bean fields depends mainly on the loads on the *outside* tire in a given corner. This in turn depends on the amount of car weight that shifts over to the outside in a turn, which finally follows from such technicalities as roll center and spring stiffness, as allied to the center of gravity. In general, the more roll stiffness there is, the lower the overall weight transfer will be, and the better the car's sheer traction will be. In other words, it'll stick to the road after a car with more lateral transfer at one end or the other has broken away. Also, unsprung weight had to be shoved down since the entire car was exceptionally light.

At the front this wasn't hard, since the front tires only have to brake and steer, and seldom (or shouldn't) do both at the same time. Equal-length parallel wishbones were settled on, and welded up of tubing with forged connections. The outer ends are ball-jointed into the forged spindle and vertical support. At the outer tips of the bottom arms are enclosed rollers which are massaged by the main leaf of a single transverse spring. This has five hefty leaves but is clamped only at the center. The result is low stiffness per wheel which can be increased by screwing down a couple of outrigged stops above the small top leaf. The front bar of each wishbone extends inboard of its pivot as a drilled I-section lever. Flanges on the bottom levers rotate against rubber buffers on the lower crossmember to limit upward wheel travel, while the upper levers work the plungers

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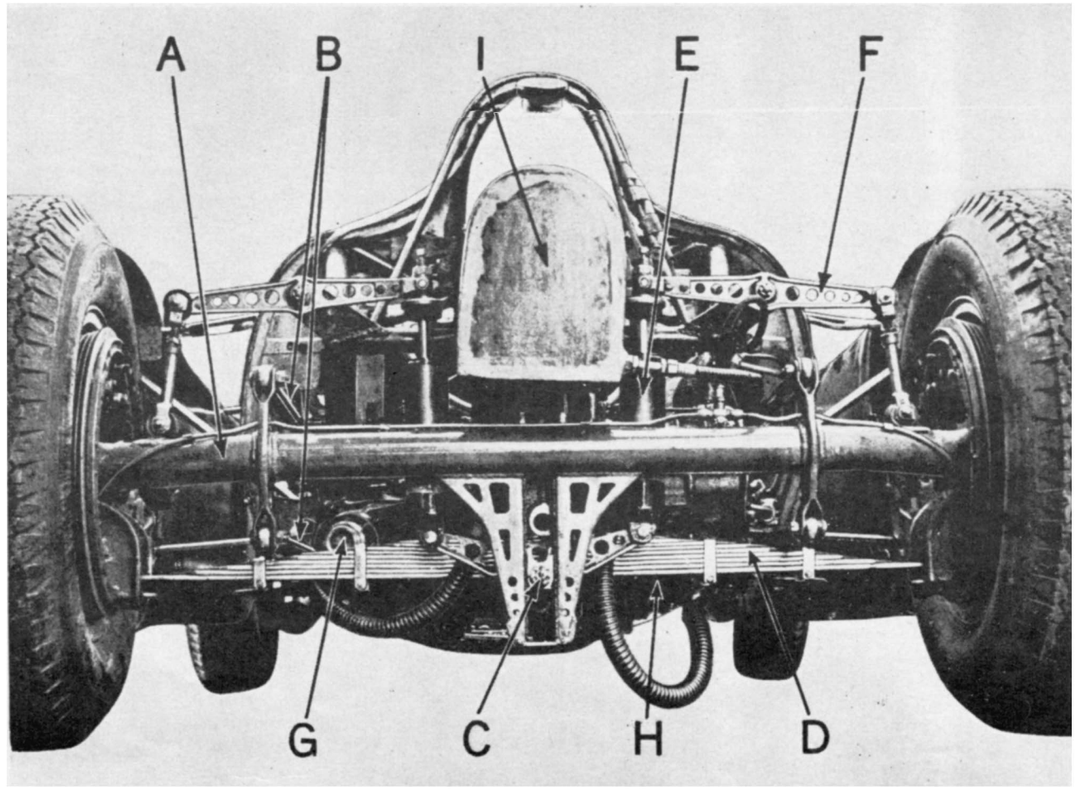
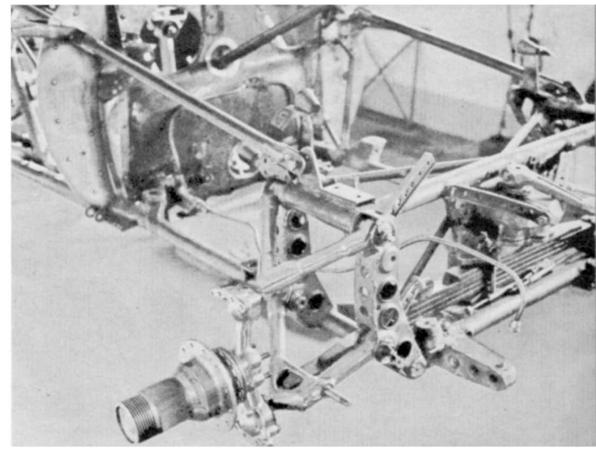


On the original Lancia D-50, the deDion tube (A) is located by two radius rods (B) on each side and a low-mounted sliding block (C). Equally low, the leaf spring (D) rides on rollers hung below the wheel hubs. Tubular dampers (E) are connected to each other and to the deDion tube through three rockers (F) to avoid roll-damping. The engine is started through an extension (G) to driveshaft at the left rear of the gearbox-differential unit (H). Inside the headrest fairing is a header tank (I) for fuel. Both Lancia and Ferrari have made extensive changes and current cars, while similar in layout, are vastly different in detail.



Front transverse spring rides on roller in outer end of lower wishbone. Drilled extension to upper one compresses an inboard-mounted shock absorber.

Rex Hays

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1906 Renault, winner of that year's French G.P. at Le Mans; Nazarro's 1907 F.I.A.T.; Lautenschlager's 1908 Mercedes; the same homeric German's 1914 Mercedes; Murphy's 1921 Dusenberg; Segrave's 1923 Sunbeam; Segrave's 1924 2 litre Sunbeam (San Sebastian G.P. winner); 1924/25 P2 Alfa; 1926 1.5 litre Delage; 1935 P3 monoposto Alfa (Nuvolari's winning car in the German G.P.); 1934/35 750 kg. Merc; C-type Auto Union; 1939 3 litre Mercedes; 2 litre Ferrari and Gordini (old Formula 2); 4.5 litre Ferrari; 158 Alfa; 250F Maserati; W196 Mercedes, 1955. Presently under construction are the 1912 Peugeot (Georges Boillot's car, French G.P. victor at Dieppe) and the 1934 3.3 litre Bugatti. When these two are completed, Rex aims to go back over the years and start filling in the gaps. Bids for the entire collection from both British and U. S. sources are under consideration at this writing. And, in addition, Hays has plans for making a kindred series of historic sports cars.

Obviously, making a replica of a *particular* antique racing car, as distinct from one that merely typifies a greater or lesser batch, contronts an historically-exacting modeler with special difficulties. The actual characters in which the original race numbers were painted and their precise location on the body and hood, for example, have to be faithfully counterfeited.

Hays' devotion to his craft is rooted in a deep and dedicated love of cars. After serving his apprenticeship in a truck and bus factory, he joined the late Cecil Kimber's staff at the birth of MG. As an MG employe he raced a few times at Brooklands, although without any memorable success, and also handled early Kimberware in English trials and other competitions. His forte as a driver apparently lay in demonstrating cars to prospective buyers, a fact which, when it became bruited abroad, led to his being borrowed from MG by such famous figures as Segrave and Campbell. The only trouble with so persuasive a demonstrator and talker, as Campbell once remarked, was that if you let him chauffeur you a mile or two in the car you planned to sell, you probably wound up deciding you wanted to keep it after all.

Hays' personal taste in lifesize automobiles, in contrast with his professional predilection for the miniature, has a strong lean towards the rumbleguts Bentleys of the vintage era. He has owned five at various times, including the original of the majestic Le Mans 4.5 litre. Equipped by nature with about as much commercial instinct as a snowman, he doesn't presently make the sort of income, he says, that is compatible with a 4.5 Bentley's thirst for gas, or its insurers' thirst for premiums. But someday soon, Steyning's bald-pated Gulliver may find himself back with the big-banger classics that have inspired some of his gouges' noblest sculpture.

Dennis May.

Lancia D-50

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on vertically placed tubular shocks. These units are here — instead of outboard — only because this is the best place to feed stress into the chassis without adding more weighty bracing.

The back wheels are overworked to begin with, so needed special attention from Jano. A de Dion tube, small and light, of course, curves behind the differential and is located in one plane by parallel trailing arms mounted well inboard on each side. We've seen sliding blocks for lateral guiding before, but seldom with the block bolted to the frame and the guide hung below the de Dion tube as is done here. This was done to get a low roll center without excess downward curvature of the axle tube. Springing is again by transverse leaf, clamped in the center and working on rollers below the hubs, with nine thin leaves this time. Though it looks stiff, this is more flexible in operation than the roller-mounted leaves used in the rear by Ferrari and Maserati.

To make sure the tubular shocks had no effect on roll stiffness at all, Jano mounted them vertically about a foot apart in the center of the car. Links and rocker arms actuated them from the top and a third rocker joined them at the bottom so that when the car rolled the whole shock absorber assembly rolled with it. The shocks only worked when both wheels jolted up and down in unison.

When all this was worked out, there just wasn't any room left in the chassis for inboard brakes, as had been used in the sports cars. Outboard brakes, conventional except for the use of four shoes per wheel, filled the insides of the 16-inch wire wheels. Drums were exceptionally wide, with several types of finning, and the backing plates had no scoops and were only moderately drilled.

The cockpit was stark, even for a race car, with a big 10,000 rpm tach hung from the cowl and a small cover over the even-smaller two-piece prop shaft. A handsome drilled-spoke wheel had a short shaft to a steering box just behind the dash. The pitman arm pushed a long drag link down the center of the engine vee which rotated a bell crank vertically pivoted to the upper front crossmember. Bottom arm of the bell crank turns the wheels through a split track rod and drilled I-section steering arms. The rear brakes could be hand-applied through cables and a small lever at the left of the seat.

You can see that the general layout of Jano's brainchild was conventional, in terms of modern racing design, but the de tails were extremely imaginative. With a prototype constructed in early '54 Gianni Lancia and his team had a lot of gremlins to evict from the premises. In the meantime they went on with sports car racing to keep up with the times and try out equipment for the GP car — not to mention keeping their star-driver team in shape. After a poor weekend in Florida they snapped back to win the Tour of Sicily, the Mille Miglia, the Portugese GP and the Targa Florio. Nothing but 4.9 Ferraris could get even close to the 3.3 liter B24 Lancias.

The high point of the sports car's career was Ascari's single-handed Mille Miglia victory, for in September the Grand Prix preparations were soaking up most of the team energy. Only highlights of their four-car Tourist Trophy entry were two new 3750 cc engined cars with outboard front brakes — undoubtedly the same units as were about to appear on the GP car.

In the meantime Ascari and Villoresi spent their work week flogging the D50 prototypes around Monza and San Remo, as well as the private Turin course. They bent up at least one car apiece while trying to get below the Mercedes time of 1:59 at Monza, but even in early October they could only touch 2:04. Most of the work so far had been on chassis, though, and when the latest items were transferred from the engine dynos to the cars it was announced that Ascari was down to 1:56, which was really fast. Then followed a solid entry for the Barcelona Grand Prix.

Dramatically late three cherry-red cars appeared: two for go and one for practice. The two went in a big way, setting fastest laps before and during the race and pulling out before ten laps were run. Villoresi had brake and bearing trouble while a defect in the gearbox casting had doused Ascari's clutch with oil, but when they were in they outcornered and outaccelerated Ferrari, Maserati and Mercedes. There was a twitch to the handling and they were hard to hold out of corners, but the prospects looked good.

A KLM plane flew the cars, in practically identical trim, down to Buenos Aires in January. On this twisty course Castellotti was nowhere in his first GP start, but the two aces travelled very fast. While watching them the public realized what the drivers had known for some time: that Jano's concept had given the cars better sheer road adhesion than any competing machine, but when the limit was passed there was no turning back. Front and rear cornering powers were so well matched that they couldn't predict which end would break away first — sometimes both at once — and when they broke it was like lightning.

The theory employed was excellent, and is still being recommended today by many blue-sky designers. Trouble was that the cars couldn't be tossed around with a little margin to play with at the breakaway verge; Italy's best drivers weren't equal to it. This layout could still be good for courses with tight corners and long straights, like Barcelona and Sebring or the second Watkins Glen course, or even for straight drag racing where the excellent rear wheel bite would pay off in lowered elapsed times. Keep this in mind!

Jano and staff worked hard on these matters in early '55, altering many details. Removal of the oil cooler from the left hand pontoon allowed an increase of nine gallons in fuel capacity, and the new tanks were riveted instead of welded. Both single and multiple oil cooling pipes were tried, running between the right hand tank and

the body. A more conventional two-shoe brake was developed, as was a drum with a finned aluminum face riveted to a cast iron braking surface with deep, delicate finning. There was a rounder nose shape, and two instead of one gearbox control rods. To improve rear wheel behavior, the de Dion tube mounts for the trailing arms were moved out toward the hubs on some cars.

These things done, Ascari carried the team to wins at Turin and Naples and led most of the way at Pau. At Monaco, though, he couldn't catch Fangio and Moss in the short-chassis Mercedes and went flying off course into the bay in the attempt! On the following Wednesday Ascari was up and practicing for the Monza 1000 kilometer race. As he hurtled over a back straight in a Monza Ferrari borrowed from his friend Castellotti, a workman ambled out into the road. In trying to avoid him Ascari overturned the car and was killed.

This was what Gianni Lancia's opponents needed. The Lancia family had 49 percent of the company stock, and Gianni only a part of that. Lancia was not prospering so the racing activities were ruled out by a majority of the directors. While feelers were extended to seek out possible purchasers for the equipment, Castellotti took one car to Belgium as a private entry; he also took Vittorio Jano, a squad of mechanics and a spare car. After setting fastest lap in practice the D50 ran a controlled third spot until it spun and stalled on a patch of oil.

About a month later, after checking with British and American firms, Lancia turned every shred of the racing department (except the sports cars) over to Enzo Ferrari. Jano went along with the deal, so development of the snarling V8's could continue as planned. The cars turned up at Monza in September, but had to be scratched. Tire temperatures were running half again as high as on the Super Squalo Ferraris, which was too much for the Englebert casings to which Ferrari was bound by contract. They later tried Dunlops in practice at Oulton Park in England, returning to Monza for winter testing.

The 1956 season and Fangio's World Championship are recent history, telling of the success of the Lancia D50 as modified by Ferrari's crew. The refurbishments advanced in two stages: for Argentina and for Syracuse, and similar stages apply for 1957 too. Let's look at the refinement of that furry V8 first, and then see how the cars were made driveable by ordinary mortals.

Early power figures quoted for the V8 ranged between 230 and 260 bhp, a reasonable figure being 250 horses. Lancia had experimented a lot with direct fuel injection but were discouraged by a tendency for fuel droplets to find their way down the walls into the oil supply. Solexes were the answer. They also tried two bore/stroke combinations: 76 by 68.5 mm and 73.6 by 73.1 mm, finally settling on the latter. First set at 8100, the rev limit crept up to 8400 and Hawthorn took it to 8900 at the end of '55.

Prior to 1956 the original Weber carbs were given another try. They produced ten

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more horsepower at the top than the Solexes could, but were weak in the middle ranges. Reinstatement of the Solexes allied with the use of a separate tuned pipe for each exhaust port brought the power in at 5000 rpm instead of 6500 and raised peak power from the 1955 level. The cars were geared for 82-8600 on the fastest straight of a given course, and drivers were still asked to stay under 8100 in the gears.

Before the middle of 1956 the structure of the engine had been heavily reworked. Ferrari elected to use the oversquare dimensions previously rejected, now that induction and exhaust were taking care of low-end power. To raise compression new pistons were made and gaskets between heads and cylinders were eliminated. A heavier oil pan was also cast to contribute more stiffness to the bottom end. These touches resulted in an engine that was reliable but just a hair rough at 9000 revs, but would blow sky-high at 9100! Fangio proved the point in Belgium, where he left a broken car with 9200 showing on the tell-tale. There were also some clutch troubles, probably aggravated by the hot, unventilated working conditions back there by the gearbox, but a switch to metal-to-metal discs cured them.

For this year new Solexes have been bolted on and reangled to give a straighter air path to the valves. This, with more detail attention, smoothed out the torque curve and tacked on 18 bhp from 4500 to 7000 rpm. Before going to Buenos Aires they tried out some new fuel brews at Modena, and did put six percent nitro to it in Aregntina, but the cool race day threw off their still-experimental carburetion. Clutch faults cropped up again but were blamed on faulty materials. To upset the situation further, the latest open-wheeled Ferrari-Lancia has the 1956 vertical Solex layout, though it appears that this was a trial engine for the revised chassis.

Speaking of chassis, Ferrari worked fast and hard to endow the Lancia with normal handling. He made two changes right away in 1955: added an upper frame tube at each side to take loads off the cylinder heads, and fitted an anti-roll bar above the front suspension with links connecting the bar ends to the bottom wishbones. The objective was to make the machine understeer mildly up to breakaway and then gradually slide away at the rear. Adding the anti-roll bar increased lateral weight transfer at the front end, which promotes understeer.

Then, to give more control and "feel" at the back end, a new rear-mounted fuel tank was riveted up and only the very front portions of the pontoons used for fuel. Several like this were built for Argentina, but for Syracuse, 1956 another version was prepared with small saddle tanks next to the cockpit, the pontoons being faired into the body for aerodynamics only. The Syracuse cars also had the revised rear suspension that was tried on Fangio's Buenos Aires car, using the Lancia de Dion tube with new springing. A Ferrari transverse leaf was roller-mounted on new frame members above the axle tube and connected to it by links as were the original shock absorber rockers. Those rockers were tossd out and good old Houdailles attached just behind each hub. In the course of this work the wheelbase was also lengthened about four inches.

Result of all this was that the break-away line was reached a lot sooner than before, and almost always at the rear, but the Lancia could now be driven on either side of that line consistently by most of the Ferrari team handlers. As a double-check one car was tried at Rheims with the front anti-roll bar (now attached *between* the wishbones) removed. This improved tight-corner handling, which was always good with the D50, but the car was a brute on swerves of the 100 mph and up variety. With the bar replaced the characteristics were exactly the reverse — still not right, but better.

Also at Rheims Ferrari produced one machine with a brand-new Modena-built frame, like Jano's but with a stiffer front section and other refinements. For the bumpy Nürburgring the shock mounts and the fuel tank were given added bracing. They didn't anticipate the structural failures that turned up at Monza, though, where the bumpy banked track surface broke nearly all the nice drilled steering arms. This led to some hairy moments for the drivers: sliding off the course, into pit counters, and so forth.

Now for 1957 the wheelbase was shortened four inches again, to bring it back to D50 size. This was in search of neutral steer on slow corners, as was a longer rear wheel travel and slightly larger saddle fuel tanks with smaller rear oil and fuel tanks. All these indicate a return to the compactness and low polar moment of the original D50. Several cars of this type were erected with 1956-type bodies and altered front suspension geometry, but the big change came at this year's Syracuse event. Fuel tankage had again been reworked and the hollow pontoons sheared off entirely, revealing the bunched megaphone exhausts. Also an adaptor was clamped to the reshaped bottom wishbones to allow the use of coil springs instead of the transverse leaf, which can still be replaced if necessary. The torsion anti-roll bar took up a third position below the suspension entirely. If the '56 pattern is followed, this edition will have been seen most often this year.

For Jano, the Lancia sports-racing cars were only a guide, not a foundation for the Grand Prix machines, which took shape without restriction of any kind in the mind of a great designer. As a result the D50 ranks as one of the best integrated and most consistent race car designs ever. Had there been enough drivers with the patience to feel out its unusual handling it might still exist in original form, but racing drivers are not patient men by nature. Knowing this Ferrari's staff made drastic changes, but now they're edging stealthily back to Jano's concept.

At today's pace, it's indeed commendable that a racing car conceived in 1953 is still THE car to beat.

Karl Ludvigsen