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From OSCA to Bisiluro

Fulvio Ferrari

Carlo Mollino's most important feat in the world of car design was the creation of the Damolnar, a one-off racing car, which was produced in 1955 for the Le Mans 24 Hours race.
In 1953, when he was still far from the clamour of the racing world, he had been commissioned, together with Franco Campo and Carlo Graffi, to design another vehicle, the "Nube d'Argento" bus.[1] These two undertakings, very different from each other but as unique as just about all his forniture and other objects, constitute the architect's entire production in the automobile sector. Undocumented except for a letter[2] confirming their pertaining to his project work, two small-scale models of record-breaking cars, displayed on the wall of his studio, were designed by him.
It was the record - instant certification with a futurist flavour and consistency in its modernity, technology and dynamism - that attracted Mollino's attention and aroused his excitement. Cars and planes became the key focus of his interest in the mid-1950s. In April 1955 his friend engineer Aldo Celli wrote to him: "I don't know what to think about your new passion for engines and racing cars".[3] This proved it was a new interest, and yet it was one that Mollino had clearly had since his early youth - when he made the drawing of an engine. Obviously the innocent and skillful draughtsman had a full understanding of the mechanism as shown in fig. 2, where the meticulous portraitist has drawn the cooling fins, the position of the spark plugs, and the engine's exhaust piping. Young Mollino gave another example of his interest in the details of structures (which we can also see conveyed in automobiles - see figs. 33-34) with an accurate drawing of the tubular frame of an aeroplane, and it would seem reasonable to imagine that, along with his unquestionable natural tendency, he also had the support of his engineer father in his early unripe efforts.
His friendship with Aldo Celli, the Milanese engineer who in 1954 moved to the States to work at Kiekhaefer Aeromarine Motors, the company that "made Chryslers go",[4] where he was asked to design a new car engine, became an opportunity to correspond and debate on technical issues, with humour and an eye to the arts. When Mollino asked about an advanced type of sodium valve, his engineer friend replied: "they are pour épater les bourgeois". This literary bent in his friend, rarely found in a 'technician', was certainly appreciated by Mollino. In 1953 Celli wrote to him from Milan referring to his participation in speedboat races at the Idroscalo Seaplane Station as: "the last acts of romanticism in this age".[5] Celli, who loved cars and architecture and greatly admired Mollino the architect, did his best to obtain commissions for him. He convinced his cousin Luigi Cattaneo to request and obtain a design for the "House on the Agra Uplands", which was constructed in 1952-1953.
In 1955, he wrote to Mollino from Wisconsin: "I don't know if this is just a sporadic episode for you or if you really want to devote yourself to cars... but in any case I would suggest you do not forget that you are an artist at heart, and that is what I would like you to remain. Between a magnificent engineer and a magnificent artist, I believe the artist is the greater of the two".[6]
The event remained "sporadic" and, conscious of the limitations of Mollino the pilot, he wrote: "As

a true and sincere friend of yours, I would like to give you a couple of pieces of advice about your passion for engines: firstly driving a racing car is like handling your skis when racing: 80% depends on what you have learnt and knowing how to do it, and 20% depends on innate skills. The difference is that if you make a mistake on skis, you fall, whereas if you make a mistake while you are driving you kill yourself. (Use strong safety belts, with very firm clips. They are essential, together with a helmet). Secondly, this sport can easily drain your financial resources - as fast as when you pull the plug. Be reserved, as befits a true Piedmontese. Having said all this, live your life the way you want to, this is the most important thing...".[7]

We know how Mollino liked to live his life, by reaching the top in whatever discipline happened to appeal to him at a particular time, and also by delighting in achieving his goal, and this was how he was to proceed.

Another friend, Mario Damonte,[8] unwittingly provided the inspiration that enabled Mollino to see in his mind's eye and put down on paper the unique design of the Damolnar racing car. The inspiration came in the shape of an OSCA 1100, which the gentleman-driver Damonte had driven in the 24 Hours race at Le Mans in 1953. Mollino certainly perceived the exceptional characteristics of this production-line car, which in actual fact was produced by Maserati.[9]

Damonte was a great motoring enthusiast and his elegant chemist's shop was a meeting place where sports projects catalysed and took shape from the lively discussions between coach-builders and drivers. In this particular 'culture medium', Mollino met Enrico Nardi, who was later to build the "Damolnar" - an acronym for Damonte, Mollino and Nardi - and it was here that he also met Gino Valenzano, who drove Mollino's personal Alfa Romeo Zagato, with Mollino as co-pilot, to the class victory in the 6th Sestriere Rally in 1955.[10]

To complete the 'cast' involved in the creation of the Damolnar, we should recall CAMO (Carrozzeria MOtto) coachbuilders, and F.A.R.T., radiator manufacturers. "Where they all come from nobody knows", wrote a journalist in the *Hot Rod Magazine* in the 1950s, and indeed out of nowhere came Enrico Nardi, the son of a notary, Rocco Motto, an orphan, and the anonymous founder of the "Fabbrica Artigiana Radiatori Torino", a small factory for the production of radiators in Turin, about whom no information has been found.

The Damolnar project was the result of passion, coupled with the relative case with which mechanical constructions could be made in the dynamic post-war period and, of course, Mollino's vision and foresight.

Mario Damonte played a number of roles in the Le Mans adventure. First of all, he was the leading financial backer of the enterprise, which set him back a few million lire and, since he was already known to the selection committee for the Le Mans race, it was probably thanks to him that the Damolnar was able to take part in the much sought-after race, in which only 63 cars out of 200 applicants were accepted in 1955. What is more, only car manufacturers were allowed to take part in the 24 Hours, so this curious vehicle - which was certainly not designed for industrial production - was temporarily transformed into a Nardi on the application forms. Last but not least, Damonte played the vital role of pilot in the race.

Enrico Nardi[11] was a brilliant personality who, at the age of 25, constructed his first car.[12] He became a Lancia and Alfa Romeo test driver and, when promoted to racing driver, he changed to Ferrari. In 1947 he set up his own company, "ND",[13] which made special components, manifolds and cars with motorcycle engines on light tubular trelliswork frames, which he himself invented. Later, production also shifted towards larger engines, but Nardi's real skill was in 'souping up' engines to increase their power.[14] Gino Valenzano and Gino Munaron became his pilots, and in 1952 he produced a Formula 1 single-seater with bodywork by Motto. In 1954 he himself drove one of his own cars at the 24 Hours at Le Mans and the following year he returned with the Damolnar

he had made himself.
Rocco Motto founded CAMO in 1931.[15] Car bodies, which were often unique items commissioned by a client, were designed by Rocco and hand made by cutting 12/10-mm-thick sheets of aluminium, which were then shaped by endless beating with wooden mallets. Technical automobile drawings were rarely made for these cars and Motto created full-size shapes directly on the frames of production vehicles using 10 mm diameter metal rods. He developed a U shaped lapping system for the edges of aluminium sheets, which were then seamed or welded at low-temperature using borax that prevented weakening due to reheating the metal. In this way he produced very light shells that were used for all Cisitalia cars and racing Ferraris, Maseratis and Nardis. Rocco's son Franco recalled how crazy Mollino was about coachbuilding: "He could beat the devil at his own game!"
For the Damolnar Nardi used a light 750cc Giannini engine,[16] a small cylinder size for racing that he than souped up to the very limit in order to obtain the best possible weight/power ratio. So, compliant with Mollino-Damonte's design,[17] one of the famous lightweight tubular grid frames began to take shape in the Nardi workshop and, most of all the car's bodywork acquired unforeseeable aerodynamic profile in Mollino's studio. He must certainly have been piqued when, in the June 1953 issue of Auto Italiana he saw a photo of the OSCA category winner at Le Mans, with a complacent Damonte by its side. In his usual, rapid style he immediately transformed reality into his own vision by retouching the photo of the car in his copy of the magazine with a pencil. It was the car body that spurred him on to work on aerodynamics. Using an airbrush, he changed the photographs of the OSCA, absorbing the vertical radiator - clearly an aerodynamic brake - into the flowing lines of the coachwork, and smoothening the hubcaps to eliminate the eddies created by the spokes. What appealed most to Mollino, however, was the intelligent recess that the Maserati brothers had applied to the sides of their OSCA in an attempt to make it slimmer so that it would penetrate the air even better.
He poured out meticulous drawings in an incessant excavation of the body and exasperated this idea by extracting a sort of two-seater, with the seats placed lengthways, a perfect winged hull and a purely formal study with no access for the drivers and no heat exchangers for the engine cooling system.
This was followed in a rapid sketch by an asymmetrically shaped car. The right-hand side, which was clearly for the driver, was considerably higher than the rest of the machine. Lastly, in a sketch with the three standard views, we find a car depicted in its asymmetrical detail, with torpedo-style aerodynamics, even if it still didn't have a radiator. In a later drawing, the radiator issue was solved and the two-body solution was improved, with one for the driver, petrol tank, and right wheels, and the other for the engine, transmission, and left wheels. The body work was longer and lower, covering the wheels at the front. Next to the tag on which the architect signed the design, he significantly added "and Mr Damonte", underlining the fact that it had been the result of cooperation. For the newborn Bisiluro - which, incidentally, had quite separate origins from the Bisiluro Taruffi[18] - Mollino worked on the brakes issue. Reducing the speed of a vehicle traveling at high speed was a complex problem. Pilot Gino Munaron described the situation: "We had no brakes, and our tyres were 17-18 cm wide, there were no rain tyres and if it rained the races were certainly not called off. We were going at 250 kph on drum brakes - disc brakes didn't exist at that time - so we needed an elephant's weight to press on the pedal to brake".[19] Mollino solved the problem by dividing the braking process into two stages: firstly, a sharp aeronautical-style deceleration and, secondly, the use of the usual drum-brake system. He devised a 'two-stage' aircraft type brake consisting of a horizontal spoiler built into the body work in line with the central element connecting the two sections of the car. The spoiler was pedal-controlled and rose up just like an

aircraft flap. It was no coincidence that he had a young aeronautical engineer, from the office of his friend Barba Navaretti, calculate the size to be used. The spoiler provided faster braking, thus saving time, and less pressure on the drums, along with the lighter grip, meant that the brakes would not overheat too much.[20]

Another aerodynamic solution was the complete retractability of the rear-view mirror, while the unusual shape of the truncated circle steering wheel, made by Nardi,[21] gave the driver easier access to the small passenger compartment. Lastly, in his constant quest to achieve the least possible air penetration resistance, Mollino created a revolutionary radiator which had nothing in common with the normal vertical, honeycomb type used at the time. He tilted a rounded, rectangular-section brass shell-and-tube system, curving the front end to bring it perfectly into line with the bodywork in the direction of the wind. In the mean while, Gino Munaron was called into test the mechanical prototype on the road in order to fine-tune the suspension, brakes and general tendencies of the car, which still had the normal type of radiator used for the Fiat 1100.[22]

The connecting element between the two 'torpedoes' of the car now contained the brake flap and the radiator, and there was an aeronautical-style negative-lift wing that kept the very light car (450 kg) flat to the ground. The flap connection thus became an essential part of this revolutionary creation.

Referring to the pictures that Mollino sent to the Licitra-Ponti family, Luigi Licitra wrote: "The photograph of you in the Le Mans car is so breathtaking that if all the effort you have been through to build it had led to this alone, you should feel fully satisfied. Your grin, and the glint of your eye as you look out from the engine, are worthy of a lunar satellite".[23]

The final series of pictures taken by his friend Elirio Invernizzi is accompanied by the technical specifications of the vehicle, which is described as "750. Modèle Le-Mans 1955. Chassis tubulaire - répartition directe du poid sur les roues - carenage aérodinamique intégrale - double fuselage avec trait d'union a aile d'avion deportante - radiateur a plaque avec nervures radiantes".

In the free-and-easy atmosphere that Mollino enjoyed so much - as if the creation of the Damolnar had just been a pleasant game - the "750" left for Le Mans from Nardi's workshop in Turin.

On Saturday 11 June at exactly 4 pm, Count Ajmo-Maggi gave the signal for the race to start. All endurance races started with the teams lined up apposite the cars, on the other side of the track. The pilots raced to their vehicles: doors closed, engines off.

The "750" (number 61 in the race[24] was driven by Damonte and Crovetto, with Mollino as reserve pilot. He was photographed in the pit lane with the driver's band on his arm, and was awarded the participation medal that went to all the drivers. After a couple of hours racing, Damonte was forced off the track on a corner by Mike Hawthorn's powerful Jaguar.[25] Munaron explained how it was particularly difficult to drive an asymmetrical car, with its weight shifted towards the outside, tending to 'force' the vehicle to the left or to the right as it followed its course. Moreover, the driver's lateral position gave a false perception of the car's movement. Due to a sort of compass-like effect, the driver was either a central pivot or at the edge of the movement, depending on whether the corner turned left or right. It was very difficult to react with the correct minor adjustments to the steering wheel, and the risk was that the vehicle would come back into line too sharply. Some pictures still remain of the race and the fastest lap on the 13.5-km circuit was recorded as 5'40", giving an average speed of 143 kph.[26] The team also avoided being involved in the most terrible accident ever to take place in the history of motor racing which, at 6.30 pm, caused over one hundred deaths and countless injured.

An epic quarrel with Mario Damonte brought an end to the story of Mollino and the Bisiluro. After having achieved his objective of creating a car that even now, fifty years on, still amazes, and after managing to take part in a tough international competition like the 24 Hours at Le Mans, he was satisfied enough to put an end to his racing interest. Munaron recalled that "Mollino was with us

[drivers] constantly, then he quit the automobile world completely".[27]
In July 1955 Celli wrote to him: "Some time ago I received the photos of your car and of Le Mans... I had already learned about what you'd done from the English and German magazines that got here before your photos.[28] It was still a great surprise and I am very pleased for you, especially since you enjoyed producing the car, you had fun, and you won - and that is what matters, since we are all destined to die. As for the car, I like the idea but I had the impression that it is rather fat".[29]
The car is now in the Museo della Scienza e della Tecnologia in Milan.

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[1] The contractor was Agip-Gas. the national petroleum company based in Rome. The commission originally called for the construction of three advertising vehicles.

[2] Letter dated 12 December 1972 to photographer Alfa Castaldi.

[3] Letter dated 10 April 1955.

[4] Letter dated 30 July 1955.

[5] Letter dated 1 October 1953.

[6] Letter dated 10 April 1955.

[7] Ibid.

[8] Mario Damonte, a wealthy pharmacology physician, was the owner of the Boniscontro chemists shop of which Mollino redesigned the interior in 1954. Commissioned by his friend, Mollino redesigned the interior of his apartment and the furnishings of the istituto di Cooperazione Sanitaria, an office of associated doctors.

[9] OSCA (Officine Specializzate Costruzione Automobili) was set up in Modena by the Maserati brothers after they had sold their car manufacturing company and the Maserati brand.

[10] Mollino wrote to Carlo Pagani: "As for the Sestriere Rally, your congratulations arouse some bitterness, for we failed to get first place as we were penalised in advance due to a mistake in the log-book... Without this penalty we would have been the absolute winners, with ten points less than the winner. In any case, let's forget it." Letter of 16 March 1955.

[11] 1907-1966, self-taught, he graduated in engineering in l942, but never liked to be called "Ingegnere".

[12] The "Chichibio", designed with his friend Augusto Monaco, mounted a motorcycle engine. It is now in the collection of the Museo dell'Automobile in Turin.

[13] An acronym, from the names of the two partners, Nardi and Danese.

[14] His daughter Roberta remembers how her father modified the engines of police cars but also how, during the night, he worked on those of smugglers.

[15] Rocco Motto, 1904-1996, set up his coachbuilding company with his brothers Clemente and Ernesto in Via Bardonecchia 101 in Turin. The panel-beaters used simple mallets to bear out the sheets of metal on flat or shaped wooden blocks, creating an ear-splitting noise which led to widespread deafness. Even the seats could be shaped from a single sheet of aluminium which was then upholstered and finished by saddlers. The aluminium instrument panels were matt-finished with small brushes on drills to avoid dazzling reflections. Since there were no modern wind tunnels to test the aerodynamics of the cars, the prototypes were tried out on muddy roads. By examining the splash marks, improvements could be made to reduce passive resistance. Rocco invented and sold Fiat his system for locating the door hinges on the inside - an innovative feature that was applied to the 1100 model. When producing 20 special Appia models for Lancia, Motto managed to reduce their original weight of 1150 kg down to 660 kg. The founding father of streamlining, Raymond Loevy, met the coach builder during one of his visits to Lancia and had him make some cars for his personal use. Similarly, former world champion Manuel Fangio, who was introduced by Enrico Nardi, had Motto make the bodywork for his own private car.

[16] Nardi often used BMW or Crosley motorcycle engines. The Giannini was a straight-4 engine with dual overhead camshafts. It delivered about 62 HP at 7000 rpm.

[17] In a Letter dated 5 June 1955 to the French Automobile magazine, Damonte explained the co-ownership of the vehicle with Mollino and their joint authorship of the entire project:"La construction et la mise an point mécanique a été executé par les soins bien compétents de Nardi &C: à la suite des plans que nous avons lui donnés = dispositions mécaniques, dessin du chassis, profile aerodinamiques du carenage (constructeur Motto), radiateur, etc".

[18] "Bisiluro" or "twin-torpedo" cars were already being discussed in the first half of the twentieth century (the Ising and von Koenig-Fachsenfeld patent of 1941 is one example), and Pegaso of Spain produced one after Mollino's. The TARF bisiluro, designed by Ingegner Piero Taruffi just after the war as a record-breaking car, was a basic machine with limited steering. At the end of the straight on which the record-breaking tests were carried out, the TARF had to be lifted up and turned right round by a team of people who inserted four bars into special side slots. The Taruffi bisiluro is now in the collection of the Museo dell'Automobile in Turin.

[19] Tape-recording library, Museo Casa Mollino, interview on 9 March 2001.

[20] Mercedes took part in the 24 Hours that year with the 300 SLR model, which had a similar braking spoiler to the one devised by Mollino. Cino Valenzano, who raced with Musso in a Maserati 3000, remembered that complaints were made during the race because the spoiler blocked the view from behind when it was raised. The problem was later solved by using a perspex window and brake lights.

[21] Nardi was the greatest specialist in the production of extremely lightweight steering wheels, which were made of aluminium with a cork covering. In the case of an accident, the steering wheel buckled and the cork fell to bits without producing sharp splinters. For the top end of his clientele he was a supplier to Ferrari and Pininfarina - he made steering wheels in the finest woods, even going so far as to use rosewood.

[22] The front suspension and linkage for the Bisiluro came from Lancia, and the gearing lock was limited: there was only one tight corner at Le Mans, but it was certainly wide enough.

[23] Letter dated 6 September 1955.

[24] The progressive numbering was assigned to the cars according to their cylinder displacement, with the largest first. The Bisiluro was thus one of the smallest allowed into the race.

[25] An unlikely version of the accident was published, suggesting that the passing of a large and powerful car had caused it by the "suction of the air displacement".

[26] The Bisiluro reached 220 kph on the Monza circuit, reaching a top average lap speed of 196 kph.

[27] Tape recording library, Museo Casa Mollino, interview on 9 March 2001.

[28] On 7 June 1955 Mollino wrote from the Hotel de Paris in Le Mans to his secretary De Luca: "I should be most grateful if you could order enlargements of three different photographs from Berrazzini, at your very earliest opportunity, possibly showing him this letter as I gave him instructions not to consign any photograph to anyone without my authorisation ... I should be grateful if you could send these three photographs at your very earliest convenience by registered airmail to Mr Max Millar at The Autocar magazine, Dorset House, Stamford St., London Forgive my tediousness but I have to be quick".

[29] Letter dated 30 July 1955.