MICK WALKER'S ITALIAN RACING MOTORCYCLES

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REDLINE BOOKS

This book is dedicated to the memory of my son Gary Walker,
whose life and developing skills on the track were cruelly cut short
by the sport he loved so much.

Published jointly by Redline Books and Brooklands Books 2012

First published by Redline Books in 2002

British Library Cataloguing in Publication Data

A catalogue record for this book is available
from the British Library

ISBN 9781783180066

Distributed by: Brooklands Books Ltd.
Phone: (44) (0) 1932 885051

Ref: IRMRBE

**BROOKLANDS BOOKS LTD.
P.O. BOX 146, COBHAM,
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Introduction

Programme cover for the last ever Giro d' Italia (Tour of Italy), 6th-14th April 1957.

Above all else, Italy has a reputation for style, having gained fame for its beautiful architecture, up-to-the-minute fashion design, exotic cars, and motorcycles which display a rare combination of sheer style and exciting performance.

In the field of powered two-wheelers, the very first to be available in Italy were those manufactured by Hildebrand and Wolfmuller of Germany, which were sold by the Max Turkeiner organisation of Milan around 1895. Other sources in those early days were the great American marques, such as ACE, Harley-Davidson, Henderson and Indian.

The first pure-bred Italian motorcycles made their appearance at the beginning of the 20th century and included Bianchi, Borgo, Prinetti & Stucchi and Ferrera.

By the 1920s these companies had been joined, or replaced, by a number of newer concerns. Then came a period when the pentarchia (the famous 'big five' Italian bike builders), comprising Benelli, Bianchi, Garelli, Gilera and Guzzi, fought tooth and nail for a share of the market. This led to the creation of specialised racing departments within those factories,

Monza Autodrome, mid 1920s.

Stanley Woods being congratulated by Giorgio Parodi of Moto Guzzi after winning the 1935 Senior TT on one of the company's v-twins. Carlo Guzzi is seen far left.

which produced a succession of exciting racers and record-breakers. They continued to do so right up to the outbreak of World War 2.

Until then, Italy's economy had been largely agricultural, but when the war ended in 1945, the country witnessed a rapid march towards industrialisation and a boom in the sales of personal transport. Motorcycles were all the rage, and manufacturers responded by rushing headlong into support for road racing on an unprecedented scale.

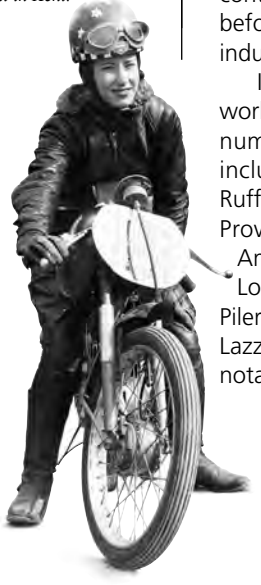
Start of the 500cc race at Monza, the scene of the 1957 Italian Grand Prix, MV Agusta, Gilera, BMW, Norton and Moto Guzzi - what a line up!

This period - now referred to as the 'golden age of Italian motorcycling' - lasted until the mid 1950s, by which time the sales boom was coming to an end. Something had to give, and at the end of 1957 three of the largest and most successful teams - FB Mondial, Gilera and Guzzi - announced their retirement from the sport.

This improved the chances of such marques as MV Agusta, Bianchi, Benelli, Morini and Ducati, who continued to fly the red, white and green flag of Italy with considerable success until the Japanese sprang on to the world stage in the 1960s. Even so, MV Agusta continued to dominate the 'blue riband' 500cc class until the mid 1970s.

In the lightweight categories, Italian machines provided world-class contenders - such as Morbidelli, Minerelli and Garelli - well into the 1980s, before finally being ousted by the all-powerful modern Japanese industrial machine.

The distinction of being the first woman to ride in an Isle of Man TT went to Londoner Mrs Beryl Swain in the 1962 50cc event. Her mount was a race kitted Itom - she finished the 2-lap race in 22nd position at an average speed of 48.33mph. She is pictured here in April 1962 at the Brands Hatch circuit in Kent.



Italy not only produced a host of world-beating machinery, but also a number of top riders. These included Carlo Ubbiali, Bruno Ruffo, Umberto Masetti, Tarquinio Provini, Walter Villa, Dario Ambrosini, Nello Pagani, Enrico Lorenzetti, Libero Liberati, Paolo Pileri, Pier-Paolo Bianchi, Eugenio Lazzarini, Mario Lega and, most notably, Giacomo Agostini.

This poster for the 1973 Imola 200 shows Giacomo Agostini (1) MV and Bruno Spaggiari (16) Ducati during the previous year's event.

Walter Villa (11) with his 124cc FB Mondial disc valve two-stroke single takes a flyer at the start of the Imola races, 16th April 1966.

In the course of compiling this particular book, I was fortunate enough to come into contact with many people who were able to help in some way. Almost all gladly provided whatever assistance they could. Unfortunately, there were so many that there simply is not space available to list them all, but I shall be eternally grateful for the help I received.

I offer acknowledgement to the following, in no particular order of merit; John Surtees, Bill Lomas, Peter Kinersley, Arthur Bullock, Doug Jackson, Barry Hickmott, Luigi Giacometti, Franco Valentini, Giorgio Grimandi, Gerolamo Bettoni, Arturo Magni, Gemma Pedretta, Hoss Elm, Herbert Namink, Jap de Jong, Tarquinio Provini, Sally Kelly, Arthur Wheeler and Michael Dregni.

Photographs came from a variety of sources, including, Len Thorpe, Phillip Tooth, George Nutall, Doug Jackson, Alan Kirk, Nadia Pavignani, Moto Guzzi, Moto Gilera, Ducati Meccanica, EMAP Archives, Peter Glover, Dr. Helmut Krackowiser, Vic Bates, John Churchill, Michael Dregni and Colin Perkins. Thanks to the VMCC who provided the transfers.

The 1963 Southern 100 races, run over a 4.4 mile road circuit near Castletown, Isle of Man, saw a hard fought battle between Aermacchi riders Terry Grotefeld (51) and Jim Curry (37), Grotefeld won at an average speed of 75.4mph.

The 1980 and 1981 125cc World Champion Minarelli team of Angel Nieto (3) and Loris Reggiani (6). By 1981 the Jörg Möller designed 124.68cc (44 x 41mm) engine was giving 45bhp and could top 140mph.

Mick Walker's Italian Racing Motorcycles is a much enlarged and heavily revised edition of an earlier work. It is the second of a series of titles looking at both major and minor players throughout the world who have produced racing machines of significant interest. All that is left is to hope that you gain as much enjoyment reading the finished product as I have had in compiling it.

Mick Walker
Wisbech
Cambridgeshire
August 1998.

Fifteen times world champion, Giacomo Agostini. All but one of his titles was gained with MV Agusta in the 350 and 500cc class. The other was with Yamaha (500cc, 1975).

Three times 125cc world champion, Pier Paolo Bianchi (1976 & 1977 Morbidelli, 1980 MBA).

The author winning at Silverstone in April 1967, on his narrow-case 248.5cc (74 x 57.8mm) Mark 3 ohc single.

Aermacchi

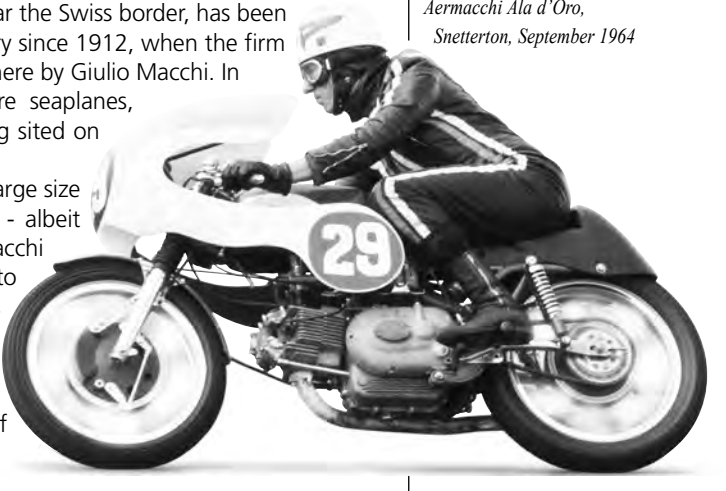
1

Varese, a small provincial town near the Swiss border, has been a centre for the Italian aviation industry since 1912, when the firm of Nieuport-Macchi was established there by Giulio Macchi. In fact, many of the early aircraft were seaplanes, which accounted for the factory being sited on the shores of Lake Varese.

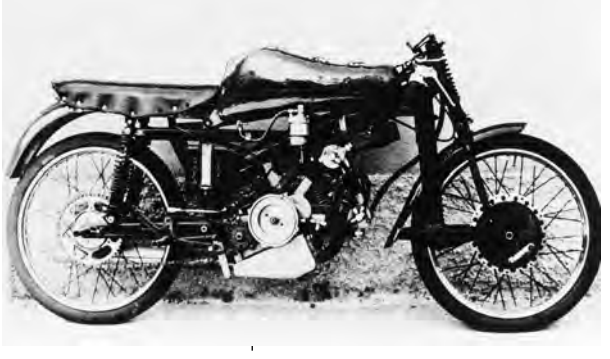
Nieuport-Macchi grew to quite a large size during World War 1, and continued - albeit under the fresh title of Aeronautica Macchi (soon abbreviated to Aermacchi) - to concentrate on aircraft in the years that followed.

The Varese company became one of the major participants in the famous Schneider Trophy series of seaplane races, and besides winning the event on more than one occasion, also had the distinction of setting a new world speed record of 440mph with the MC72 seaplane in 1934. During World War 2, now concentrating upon land-based fighters, it produced some of Italy's finest warplanes to take part in the conflict.

Unable to resume its aviation activities after hostilities had ended, Aermacchi decided to begin production of a three-wheeled truck. This was followed by a decision to join the motorcycle boom which was sweeping Italy during the late 1940s. Company chiefs realised that to achieve their aims of producing an attractive, quality lightweight, they needed a top designer. Their choice was Ing. Lino Tonti, who had been at Benelli and had worked on aircraft engines during the war.



Terry Grotefeld, 246cc Aermacchi Ala d'Oro, Snetterton, September 1964



Little-known dohc single cylinder Aermacchi racing prototype, built in 1951 and intended as a challenge to the likes of FB Mondial and MV Agusta at Grand Prix level. It was never raced in a Grand Prix.

Monza, Sunday 14th September 1966. Works riders Renzo Pasolini (left, without helmet) and Alberto Pagani. Both have just finished a brilliant 2nd and 3rd respectively in the 350 Italian Grand Prix at Monza. With factory Bianchi and Jawa twins behind, this was probably Aermacchi's finest ever GP performance.

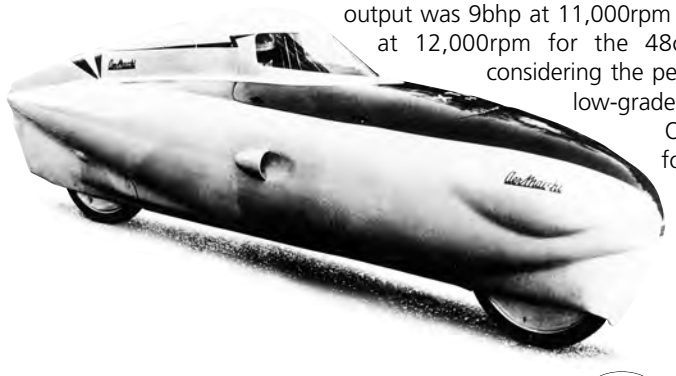
Tonti's first design for Aermacchi was a distinctly unorthodox 125cc two-stroke, the engine pivoting in unit with the rear suspension. It sold in reasonable numbers and enjoyed some success in long-distance trials, such as the ISDT. Other designs followed, and in 1955 Ing. Tonti conceived a record-breaker, making full use of the wind tunnel and other resources belonging to the factory's aircraft division (which, by then, had resumed production of both military and civilian types).

Designed by Ing. Lino Tonti (later to become chief designer for the likes of Bianchi and Moto Guzzi) a pair of Aermacchi streamliners were built in 1955. Powered by 48 and 74cc ohc engines, they established several new world speed records in their categories.

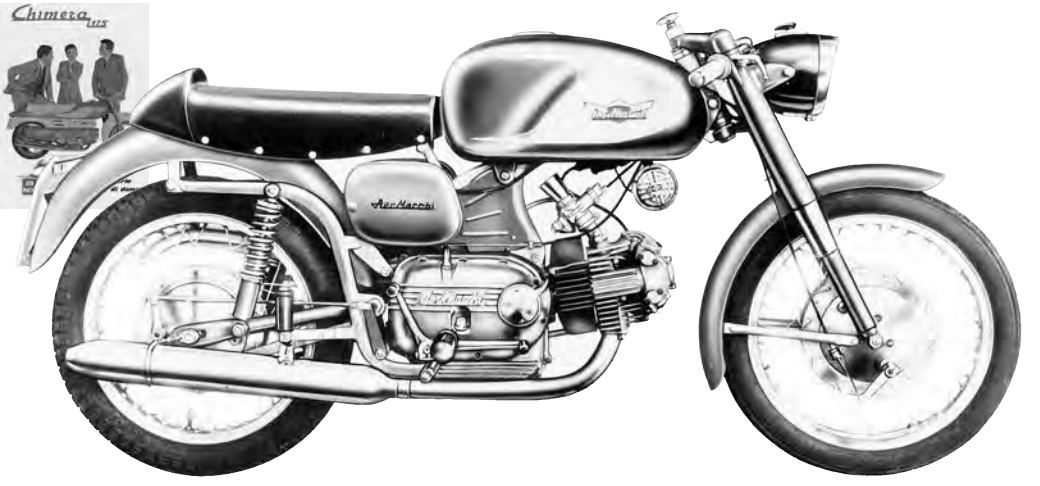
Powered by double-overhead-cam engines of 48 and 74cc, the Tonti-inspired streamliner was one of the very first examples of the 'Flying Cigar' machines, being very low and some 3.50m (10ft) in length. Positioned behind the rider, the engine was unusual in that it had its cylinder inclined rearwards at an angle of 20 degrees.

The overhead camshafts were driven by chain, while the bore and stroke dimensions were 44.5 x 43mm for the larger unit, and 40 x 39mm for the smaller engine. With a compression ratio of 10:1, the maximum output was 9bhp at 11,000rpm for the 74cc version, and 7bhp at 12,000rpm for the 48cc unit - reasonable figures, considering the period and the forced reliance on low-grade fuel.

Other technical details included a four-speed gearbox, wet-sump lubrication, a space frame, 18in wheels and a dry weight of 97kg (214lb).



The record attempts were made on the 4th April 1956, the venue being the Milano-Varese autostrada. Piloted by Massimo Pasolini (father of Renzo), the larger 74cc model broke the flying kilometre and flying mile records by a considerable margin.



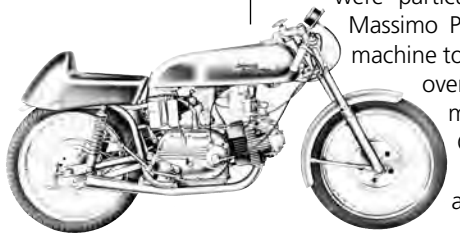
The machine which Alberto Pagani rode in the Dutch TT at Assen in June 1960 was essentially a race-kitted 242.2cc (66 x 72mm) ohv Ala Verde sports model; itself developed from the earlier 172.4cc (60 x 61mm) Chimera of 1956.

The record attempts were carried out on 4th April 1956, the venue being the Milano-Varese autostrada. Neither weather nor road conditions were particularly ideal, there being strong winds, but piloted by Massimo Pasolini (father of Renzo), the larger engine pushed the machine to a speed of 100.2mph over the flying mile, and 108.8mph over the flying kilometre. This broke, by a considerable margin, the records set only a few months previously by Germany's Adolf Baumm with his NSU 'hammock'.

With the smaller power unit, the standing mile was also broken at a speed of 51.25mph.

Soon after the record spree, Ing. Tonti quit Aermacchi to joinFB Mondial (see Chapter 11), and the company's directors chose the vastly experienced Ing. Alfredo Bianchi to succeed him. Previously with Alfa Romeo and Parilla, Bianchi had also manufactured his own Astoria engines and complete machines in the 1930s.

Ing. Bianchi's first task for his new employer was to design a brand-new production model from a sketch of an 'ideal machine', which had been penned by Count Mario Revelli. The latter was a well respected car stylist, who had also been a racing motorcyclist and had won the 1925 500cc Italian GP on a machine of his own manufacture.



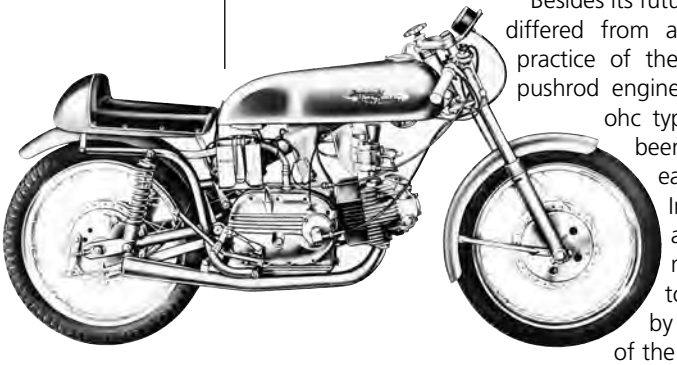
The first version of the Ala d'Oro production racer as it appeared in 1961. Long-stroke, wet clutch, 4-speeds, short megaphone exhaust and Oldani racing brakes

Bill Webster, later to become the factory's British importer, arranged for Pagani's machine to be used in the out-of-season British short circuit meetings in 1960. The rider was Percy Tait, seen here heading for a very wet victory at Oulton Park, 8th October.

The new design, the all-enclosed 175 Chimera, was introduced to the public on a wave of publicity at the Milan show in November 1956. Although billed by factory and press alike as the star of the show, the Chimera was destined never to sell in anything like the numbers hoped for, either in Italy or abroad.

Because of this, it was decided to 'undress' it and produce a more conventionally-styled 'naked' version. Ing. Bianchi was instructed to carry out a cosmetic facelift which, when completed, would transform the machine's appearance at the minimum of expense. Besides the restyling, the only other major alteration was to the rear suspension system, which was changed from the original, single horizontal suspension unit to the more conventional, vertical twin-shock layout.

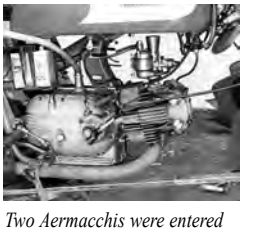
Horace Crowder on Bill Webster's 1961-type 250Ala d'Oro at Oliver's Mount, Scarborough in 1961.



Except for a hotter cam, an increase in maximum revs from 9,000 to 9,200 and a couple of extra horsepower, the 1962 Ala d'Oro was essentially much as it was in 1961. Cosmetically, the seat is a give away between the two years.

Besides its futuristic bodywork, the Chimera also differed from acknowledged Italian motorcycle practice of the period by featuring a humble pushrod engine, rather than the more popular ohc type. This type of powerplant had been chosen not only because it was easier to maintain, but also because Ing. Bianchi believed that, even for a faster sports model, there was no need for an ohc design. He was to be vindicated on the latter point by the success of the racing version of the design which was to follow.

When first displayed at Milan in 1956, the Chimera had a capacity of 172.4cc (60 x 61mm), but before long a 246.2cc (66 x 72mm) version had also been made. Shortly after the new 'undressed' models began to appear (in both engine sizes), their sporting potential was being explored. In 1958 a tuned 175, giving 15.5bhp instead of the standard model's 13bhp (at the same 8,000rpm), was being campaigned in Italian sports machine races. A pukka racing version, the Ala d'Oro, was constructed in 1959. Producing some 20bhp, it was good for a genuine 100mph and became the main rival of the Morini Settebello in national, junior category racing.



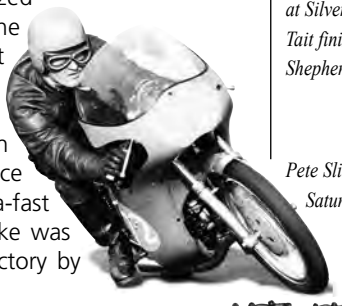
Two Aermacchis were entered for the 1961 Lightweight (250cc) TT. In those days the long-stroke engines were not up to the rigours of the ultra-demanding 373/4 mile Mountain Circuit and both Pagani and Gilberto Milani retired. Pagani though, had the satisfaction of moving up to eighth ahead of such notable names as Tommy Robb and Hugh Anderson before his retirement.

Stan Wright (138) leads Percy Tait, both Ala d'Oro mounted at the International meeting, Oliver's Mount, Scarborough, September 1962.

Imola, Sunday 15th April 1962. British star John Hartle on holiday in Italy studies Gilberto Milani's works Aermacchi Ala d'Oro. In the race Milani finished fourth behind Tom Phillis and Jim Redman (Hondas); and Walter Tassinari on one of the super fast works Morini singles, normally ridden by Tarquinio Provini.

A 250 version appeared in the following year, making its debut at Assen, the scene of the 1960 Dutch TT. Ridden by Alberto Pagani (son of the famous Nello), the pushrod Aermacchi came home a creditable ninth. If this result was not good enough, race experts were amazed when, against the cream of the latest works bikes, Pagani brought the Varese flat-single home in an outstanding fifth place a week later in the Belgian GP, held over the ultra-fast Spa Francorchamps course. Later that year, the bike was sent to Britain for evaluation and was raced to victory by Alan Shepherd at Scarborough.

The Bill Webster-pairing of Alan Shepherd (33) and Percy Tait during the Hutchinson 100 at Silverstone, 7th April 1962. Tait finished third and Shepherd retired.



Pete Slinger, Oulton Park, Saturday, 23rd March 1963.

Impressed with the prototype's display of speed and reliability, the management of Aermacchi - now owned jointly by the Italians and the American marque Harley-Davidson - decided to go ahead with a small batch of similar bikes for sale to private customers for the 1961 season. In addition, Pagani had been joined by Gilberto Milani as an official works development rider to contest the Italian Senior Championship and selected Grand Prix events.

Phil Read having his first outing on Syd Lawton's 250 Ala d'Oro at Mallory Park on the 21st July 1963. He won his heat and was second, behind Tommy Robb on a works-supported Honda twin in the final.

The 1960 prototype had given 24bhp at 8,200rpm, but a winter's development added two more horses, whilst maximum revs rose to 9,000. As the engine was still of comparatively low power output for a racing 250, Ing. Bianchi paid special attention to weight-saving measures; the 1961 Aermacchi Ala d'Oro DS 250 over-the-counter racer tipped the scales at 102kg (225lb) in racing trim. Another important factor which helped offset the comparatively low power was that the long-stroke engine gave excellent torque from very low revs.

Tommy Robb (12) and Brian Clark (61) on their production Ala d'Oros contest the lead during heat 1 of the 250cc event at Mallory Park's hairpin section, 10th June 1962. They went on to finish 3rd and 5th respectively in the final, which was won by Honda team captain Jim Redman, on one of the Japanese four cylinder models.

1961 246cc long stroke Racer, 66mm bore x 72mm stroke, wet clutch 4-speed gearbox, 30mm carb, cast piston, long conrod, DS2 cam, 10mm dia stellite tappets, 9,000rpm.

1962 246cc long stroke Racer, 66mm bore x 72mm stroke, wet clutch 4-speed gearbox, 30mm carb, cast piston, long conrod, DS5 cam, 10mm dia stellite tappets, 9,200rpm.

1963 246cc long stroke Racer, 66mm bore x 72mm stroke, wet clutch 5-speed gearbox, 30mm carb, forged piston, short conrod, 'A' cam, 10mm dia stellite tappets, 9,400rpm.

1964/65 248cc short stroke Racer, 72mm bore x 61mm stroke, wet clutch 5-speed gearbox, 30mm carb, forged piston, short conrod, needle rollers to inside of cam, 'A', 'AF' or 'F' cam, 10mm dia stellite tappets, 9,400rpm.

1964/65 344cc Racer, 74mm x 80mm stroke, wet clutch 5-speed gearbox (a few have 4-speed close ratio gears), 30,32 or 35mm carb, forged piston, long conrod, 'A', 'AF' or 'F' cam, 10mm dia stellite tappets, 8,000rpm.

1966 248cc Racer, 72mm bore x 61mm stroke, dry clutch 5-speed gearbox, wider gears, large dia flywheels but no outside flywheel, 30mm or 35mm carb, forged piston, short conrod, needle rollers to inside of cam, 'A', 'AF' or 'F' cam, small dia cam where it fits through camshaft outrigger bearing plate, small dia camshaft/points oil seal, small dia LHS engine mainshaft oil seal, RHS engine

As on the standard production roadsters, the four-speed (closer-ratio) gearbox was gear driven from the engine and transmitted power through a wet, multi-plate clutch to the rear wheel. Equipped with a cast, three-ring piston with a compression ratio of 10.2:1, the engine featured a DS2 cam, 10mm stellite tappets and a 30mm Dell'Orto carburettor.

Except for a hotter DSS cam, an increase in maximum engine revolutions to 9,200 and an extra 2bhp, the 1962 Ala d'Oro was essentially unchanged. Unfortunately, the extra rpm precipitated a bout of mechanical disasters on the 1962 batch of engines, including broken connecting rods and shattered pistons.

In an attempt to solve these shortcomings, the 1963 version was redesigned. The main changes were a forged piston, a shorter, stiffer con-rod (although the stroke remained unchanged at 72mm), and an 'A' cam. These improvements also allowed the engine revs to be increased still further - up to 9,400. Finally, with a tightening of the power-band, a five-speed gear cluster was specified.

Left; Bill Webster (seated on bike) was the man who first brought Aermacchi to Britain. An admirer of Italian motorcycles, having raced MV's for several years in the 1950s and a close personal friend of Count Domenico Agusta, he became the Aermacchi importer in 1961.

Ala d'Oro ohv Production racer - Changes year by year

main bearing located in crankcase with a large circlip on inside face (nearest to the flywheel), RHS engine mainshaft is located in the bearing by a distance piece and circlip on mainshaft, big-end feed is still through the camshaft outrigger plate as per all previous models. All clutch and gearbox parts from 1968 on are the same (apart from the availability of different internal ratios), 9,800rpm.

1967 to 1972 248cc Racer, 72mm bore x 61mm stroke, dry clutch 5-speed gearbox, small dia outside flywheel, internal flywheels are not full flywheels but bobweights, 30 or 35mm carb, forged piston, short conrod, 'H' cam as standard but where the engine has been improved 'L', 'LI' or DS 175 cams may be fitted, 10mm dia chrome tappets as standard but with later cams 12mm dia chrome tappets give greater reliability. From 1967 onwards 250 and 350s have different timing cover with two external oil pipes, the second pipe going to the bottom of the timing cover with the oil fed up through to a central bronze bush for the big end feed. A large dia camshaft/points oil seal is fitted. Also in 1967 the crankcases were modified from new with two ball main bearings on LHS crankshaft, the additional bearing being fitted into a bolted on main bearing housing located by four long allen screws. The LHS crankshaft is longer to accommodate the extra main bearing and the outside flywheel which is fitted on the end of this shaft - located by a large size key and a left hand threaded nut - the only one on the bicycle. The LHS oil seal is larger dia than previous models and fits over the outside flywheel boss. The seal is the same as the dry clutch gearbox bearing seal, and the 35mm Ceriani fork oil seal.

The flywheels are no longer located in the crankcase by use of the circlip on RHS mainshaft but from 1967 on simply by the use of shims on the engine mainshaft, usually on LHS, and never by use of shims less than .010in as they would break up. Correct end float is .008in to .010in. From 1967 onwards the standard 5-speed dry clutch gears are 'B' ratios, though a few engines are fitted with 'A' ratios which are closer. Most special 250s and genuine works engines have special eccentric rockers; this also applies to the short stroke 350, 382 and 402 works engines. The special 250s usually have 35mm carb in place of the standard 30mm, though on at least one ex-works machine a 38mm carb is fitted, 10,200rpm.

1967 to 1972 344cc Racer, the specification for all production 350s from 1967 on is as for the 250 except for carburettor size, which may be 35, 38 or 40mm, and also there are short and long conrod motors. Prior to and including 1967 most longrod 350s have a packing piece under the barrel approx .045in thick. From 1968 on the longrod 350 had this extra thickness added to the base of the barrel. Original 1967 350s had 'F' cams and 10mm dia stellite tappets. In 1968, the 'N' cam with 10mm dia chrome tappets was introduced and subsequently 'N5' and 'N6' cams. Generally speaking where engines have been updated by the fitting of later cams, 12mm chrome tappets have also been fitted to give greater reliability. Note that when fitting later cams it is also necessary to fit type 23 rockers having a lower lift ratio.

1968/72 349cc Racer, short stroke works special, 77mm bore x 75mm stroke, 38mm carb, forged piston, N6 cam, 12mm tappets, comp. ratio 11.5:1, max power 8,400 to 8,600rpm, 42bhp, ignition timing 30 degrees, otherwise as per 344cc model.

1968/72 348cc Racer, 38 or 40mm carb, forged piston, DSS L/1 cam, 12mm dia tappets, comp. ratio 11.5:1, max power 8,800 to 9,000rpm, 42bhp, ignition timing 36 degrees, primary drive ratio 2.09:1, long conrod, otherwise as per 344cc model. Ultra short stroke works special, 78.5mm bore x 72mm.

1968/72 382cc Racer works special, 78mm bore x 80mm stroke, special 20mm dia gudgeon pin and conrod to suit, 38 or 40mm carb, forged piston, L11 or special N6 cam, 12mm dia tappets, comp. ratio 11.25:1, max power 8,000rpm, 42bhp, ignition timing 35 to 36 degrees, otherwise as per 344cc model.

1968/72 387cc Racer, 78.5mm bore (as per ultra short stroke 348cc) x 80mm stroke, 38 or 40mm carb, forged piston, N6 cam, 12mm dia tappets, comp. ratio 11.25:1, max power 8,000rpm, 42bhp, ignition timing 35 degrees, otherwise as per 344cc model.

1968/72 402cc Racer, works special, 80mm bore x 80mm stroke, 38, 40 or 42mm carb, forged piston, N6 cam, 12mm dia tappets, comp. ratio 11.25:1, max power 8,000rpm, 42 to 44bhp, ignition timing 33 degrees, long conrod, otherwise as per 344cc model.

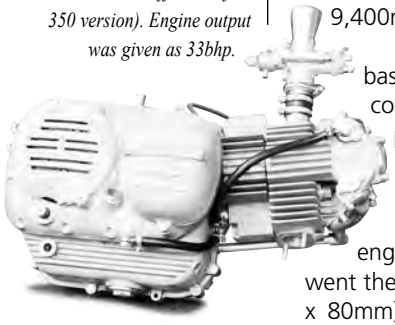
1968/72 249cc Racer, works special, 74mm bore x 48mm stroke, 38 or 40mm carb, forged piston as per late 344cc, DS 175 cam, max power 11,000rpm.

NOTE All short stroke engines, except the 249cc, have a larger bore in the mouth of the crankcase and larger dia sleeve and barrel, with the holding down studs spaced further apart.

1965/1966 works 344cc Ala d'Oro of the type used by factory development riders Milani and Pasolini. Lessons learned were incorporated in the production models the following season, helping improve both speed and reliability.

The Rickman brothers Don and Derek, built a batch of their Metisse frames for the Ala d'Oro engine, from an idea given to them by the Swiss rider/engineer, Othmar (Marly) Drixl. The first prototype appeared at the London Earls Court Show in late 1966.

New for 1966, Aermacchi works 250 engine with magneto ignition (only on the smaller unit since the fixed advance would be too difficult to fire 350 version). Engine output was given as 33bhp.



A mini-redesign occurred in time for 1964, when the DS-S model was introduced. This sported revised short-stroke, 72 x 61mm bore and stroke measurements, which gave a new capacity of 248.3cc. With the engine now capable of 10,000rpm, maximum power was boosted to 32bhp at 9,400rpm.

Back in 1963 the first 350 Aermacchi racer had appeared, being basically an oversize 250. The first attempts at creating this machine could be traced back to March 1961, when Pagani had tested a prototype with a 293cc (72 x 72mm) engine. Originally, this capacity had been conceived for motocross events, not road racing.

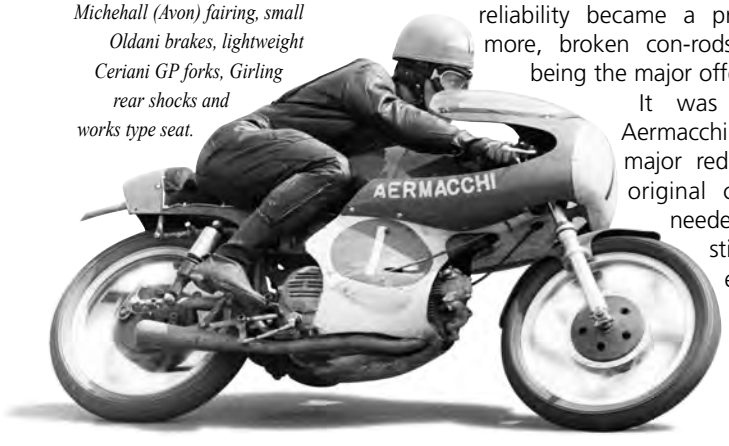
A production version of the 293cc engine was never built, instead Aermacchi went the whole hog, the result being a 344cc (74 x 80mm) version. In its first year of production (1963), only a handful were manufactured - all with four speeds. The first example made its debut at Hockenheim in May 1963, ridden by Milani.

Serious production of the larger engine did not begin until 1964, by which time it sported five speeds, as did the quarter-litre bike.

These machines (and the 1965 versions) in both 250 and 350 form still retained wet clutches, stellite tappets and several features from the earlier engines. Although they handled beautifully, reliability became a problem once more, broken con-rods and valves being the major offenders.

It was evident to Aermacchi that either a major redesign of the original concept was needed or, better still, something entirely new.

The works development 344cc (74 x 80mm) Ala d'Oro raced by Dave Degens in 1964 for British importer Syd Lawton. Features included dry clutch, Michehall (Avon) fairing, small Oldani brakes, lightweight Ceriani GP forks, Girling rear shocks and works type seat.



dohc Horizontal Single

Two separate designs of horizontal single Aermacchis built in the mid 1960s, now both owned by Swiss enthusiast, Yves Liengme. In the foreground (shown above) is the privately built version conceived by an employee of Aermacchi, Celestino Piva and in the background is the works version.

Liengme, who was also the Swiss Aermacchi importer for most of the 1960s, lifts the tank of the privately built dohc model. Maximum power was 35bhp at 13,000rpm.

Brian Setchell, 250 Ala d'Oro, 1965 Lightweight TT, finishing 8th. This is the very latest model with dry clutch, short-stroke, 5-speeds and non-standard larger (240mm) Oldani front brake.

The original idea was a double-overhead-camshaft version with several improvements to increase bottom-end reliability.

In fact, two prototypes (both 250s) were built - the first privately by chief race mechanic Celestino Piva, and the second by Ing. Bianchi himself, having been suitably impressed with Piva's creation! Sadly, Harley-Davidson put its foot down and insisted upon another pair of pushrod models.

The main improvements to both the 1966 model 250 and 350 pushrod racers were as follows: dry clutch, wider gears, larger-diameter crankshaft flywheels, improved piston, connecting rod and big-end bearing and larger carburettor (35mm for the 250 and 38mm for the 350). Maximum rpm of the 250 was 9,800, and of the 350, 8,000.

For 1967 more modifications were introduced, such as a small-diameter outside flywheel, internal flywheels that were no longer full flywheels but bobweights, 10mm chrome tappets (upgraded later to 12mm to give greater reliability), a different timing cover, and modified crankcases with two ball-race main bearings on the nearside and the nearside crankcase increased in length to accommodate the extra bearing. Some 250s, and the majority of works engines, had special eccentric rockers; this also applied to short-stroke 350, 382 and 402 engines, which appeared later.

During the 1960s Syd Lawton (left) was not only the MD of Southampton dealers Lawton & Wilson, but also (from 1963) the Aermacchi importer for the British Isles. He also sponsored a large number of riders, including John Hartle (seen here with Syd in 1966). Machine is a 1966 344cc Ala d'Oro.

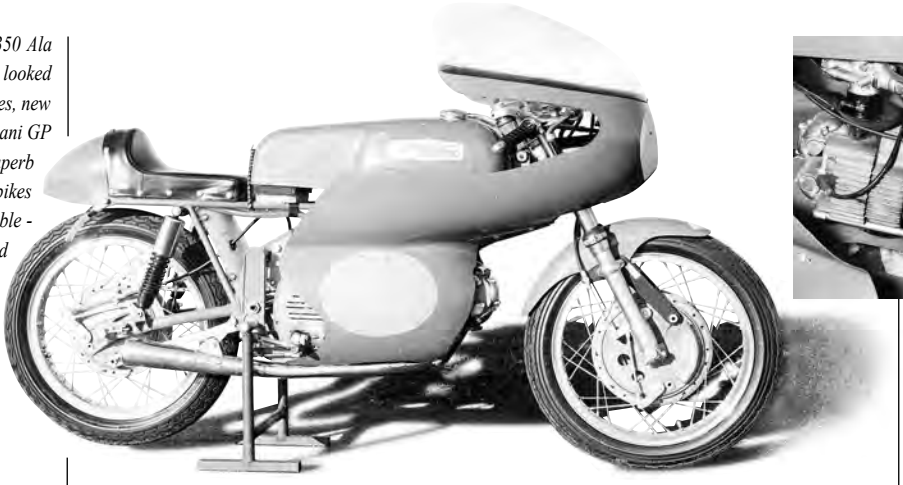
Pagani at Whitegates on the 350 works-supported machine he rode to 4th place in the 1967 Junior TT at an average speed of 94.91mph.

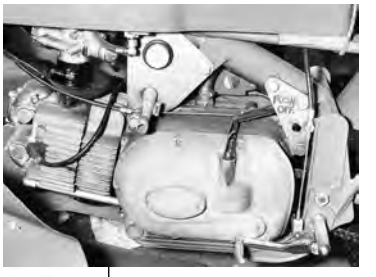
In the privately built model (above right) the camshafts were driven by a series of three large helical gears in the cylinder head. The two pictures below show the official factory design which is considerably different from the private effort.

The works engine shown left, featured gear drive to the cams, necessitating a smaller crankshaft and outside flywheel.

Alberto Pagani, Aermacchi (48) leads Tommy Robb, Bultaco (55) and Angelo Bergamonti, Paton (25). Imola road races (250cc class), 25th April 1967.

The 1968 250 and 350 Ala d'Oro production racers looked like this. Fontana brakes, new glass-ware, 35mm Ceriani GP forks and a generally superb style. By now these bikes were extremely reliable - more than could be said of the earlier versions.





The year 1968 saw more changes, a works short-stroke special making an appearance for the 350cc class. This displaced 349.2cc (77 x 75mm) and featured a forged 11.5:1 piston, N6 cam, 12mm tappets, and a 38mm carburettor. It produced 42bhp at 8,400rpm and was good for around 135mph on optimum gearing. Kel Carruthers rode just such a machine to third spot in the 1968 World Championship behind Giacomo Agostini, on an MV three, and former Aermacchi works rider Renzo Pasolini with a Benelli four.

In 1969 Milani, Carruthers and the young Irish star Brian Steenson gained a trio of second places in the Yugoslavian GP, Spanish GP and Isle of Man TT respectively.

British rider Alan Barnett, on importer Syd Lawton's machine, came second in the 1970 Junior TT in the Isle of Man, averaging 98.16mph, after lapping at 99.32mph - an outstanding performance. Another rider who campaigned the Varese singles with great success during this period was Angelo Bergamonti, who later signed to ride for MV Agusta.

There was also a number of attempts to create a viable 500cc class machine. These included capacities of 382cc (78 x 80mm), 387cc (78.5 x 80mm) and finally, in 1969, 402cc (80 x 80mm). All valiant efforts, but swept aside by the oncoming tide of two-strokes as the new decade dawned. Before looking at Aermacchi's own attempts in this sector, it is worth taking a detailed look at the machine which promised so much but, in reality, delivered so little - the Linto.

In basic terms, the Linto was a pair of 250 Ala d'Oro cylinders and heads coupled together on a common crankcase. Designed by Ing. Lino Tonti (aided by fellow engineer Alcide Boitti) as a private venture, with financial backing from motorcycle enthusiast Umberto Premoli, the Linto made its

The 344cc Beart Aermacchi Ala d'Oro without its fairing. Just some of the fine detailing work is evident in this view; the engine mounting plates, rear sprocket, foot controls, steering damper, crankshaft outside flywheel and front mudguard stays - all specially fabricated by the Beart equipe.

John Hartle (Aermacchi-Metisse) leads Dan Shorey (Norton) through Hohenstein-Ernstthal during the 1968 350cc East German Grand Prix. Although Hartle retired at mid-distance Aermacchis finished 3rd, 5th, 7th, 9th, 11th and 14th.

After some truly inspired rides on various bikes including most of all his Ronnie Conn 350 Ala d'Oro, Brian Steenson, a 23 year-old native of Belfast was being tipped for future stardom, a possible world champion even. But sadly, all this was not to be, Brian crashed fatally in the 1970 Senior TT.

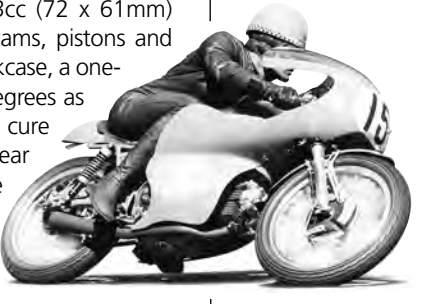
Runner up in the 1969 Junior TT, Irishman Brian Steenson hurtles down the Mountain on his near standard Ala d'Oro. Steenson benefited from a swarm of retirements until, on the last lap, he snatched second place from the much more experienced Jack Findlay on Francis Beart's machine.

The Austrian Grand Prix, 1st May 1969, Aermacchi works rider Gilberto Milani heads the field in the 350cc race. But after setting the fastest lap of the race at 80.1mph, ignition trouble caused his retirement a couple of laps from the end.

38mm Dell' Orto SS1 carburettor of the 1969 350 (and 380cc) works machines had this special fitment - slightly inclined to the nearside and left to breathe through a hole in the tank, normally covered by gauze wire (removed for photograph).

competition debut at Rimini at the beginning of April 1968. Two works prototypes were ridden by Pagani and Guiseppe Mandolini, and although electrical troubles stopped both machines, they showed considerable potential.

The Linto's engine consisted of the 1968-type 248.3cc (72 x 61mm) Aermacchi top ends (barrels, cylinder heads, valve gear, cams, pistons and conrods), but the four-bearing crankshaft was, like the crankcase, a one-off. The cranks were set at 360 degrees, instead of 180 degrees as on the original bench-test engine. This was an attempt to cure the excessive vibration which plagued the original. The gear primary drive was taken from the centre of the crankshaft, via a countershaft, to the dry clutch and 6-speed gearbox.



Australian privateer Jack Findlay rounding Ramsey Hairpin in the 1969 Junior TT on the Beart Aermacchi. The legendary Guildford tuner had acquired the machine the previous year. Findlay finished with a rostrum position (3rd), whilst on the same machine Clive Brown won the 1970 Junior Manx GP.

The 496.7cc Linto designed by Lino Tonti. First raced as a prototype by former Aermacchi works rider Alberto Pagani, the most interesting feature of the machine was its 'space' frame, with the engine unit slung underneath it, and the top part of the motor completely made up with short-stroke (72 x 67mm) Aermacchi Ala d'Oro components, with a one-off bottom end with coupled crankshaft. Although fast the Linto didn't prove too reliable in service.

After a season of further development, a batch of 15 Lintos were built for the 1969 season. Two of these were earmarked for Pagani and Jack Findlay, who had come second in the 1968 500cc World Championship on his McIntyre-Matchless. Besides these 'works' machines, the other 13 were sold, at £1,300 each, to leading privateers, including Swiss-Hungarian Gyula Marsovszky, Australian Johnny Dodds, West German Walter Scheimann and Britain's Lewis Young.

The Swiss-Hungarian Gyula Marsovszky (81) keeps his Italian Linto ahead of Australian Tony Dennehy's Honda (83) during the 500cc Yugoslav Grand Prix at Opatija, 14th September 1969.

The 1970 Junior (350cc) was the Aermacchi single's TT swansong. Lying fourth at the end of the first lap Alan Barnett, riding a Syd Lawton entered Ala d'Oro, finished a brilliant runner up. Barnett averaged 98mph for the 5-lap race, with a fastest circuit of almost 99mph (98.90mph).

Work on the prototype engines had raised the power output from 61 to 64bhp at 10,000rpm. The compression ratio was 10:1 and carburation by a pair of 35mm instruments, whilst the frame had been modified during the development period and was both neater and sturdier. Suspension was by Ceriani, and the stopping power was provided by Fontana - both brakes featured twin leading shoes, the front one being a double-sided 220mm device.

With a weight of 135kg (297lb) - the same as the much less powerful Matchless G50 single - the Linto seemed to have great potential. This was particularly so after some good results achieved by Pagani during 1968, including a second behind Agostini (MV) in the East German GP.

Although Pagani went on to win the 1969 Italian GP at Imola, the production version proved a terrible disappointment for all concerned. Soon there was a host of Lintos with 'For Sale' signs on them in the race paddocks of the Continental circus.

Pagani continued to race the works Linto until mid 1971, before switching to MV, but the problems were never really solved, even though several changes were made, including a switch to Dansi electronic ignition for the 1970 season. That Imola victory was to remain the model's only classic win. In the end, it was the rise of the big two-strokes, such as the Kawasaki three and Suzuki twin, which finally signalled the end of the road for Tonti's creation.

A complete Rickman-Aermacchi Metisse. Clearly derived from the original Metisse road racing chassis as supplied for British singles and twins, the Italian horizontal, single cylinder engine assembly necessitated the relocation of the Duplex front downtubes and cradle.

As for Aermacchi itself, it had begun a new era when, in 1967, the Varese company had built its first two-stroke racer. This had been derived by Peter Durr from the existing 123.15cc (56 x 50mm) roadster. The West German tuning wizard had succeeded in doubling the power of the touring model, taking it from 10bhp at 6,750rpm to 20bhp at 9,200rpm. In fact, in the prototype, most of the engine parts were the same, including the crankshaft and its bearings, which withstood failure after several gruelling tests.

Alberto Pagani prior to the start of the 1969 Senior TT with his works Linto twin. Sitting astride the bike is his father Nello, the first man to win the 125cc world title aboard an FB Mondial in 1949. Pagani Junior won the Italian GP at Imola later that year to give Linto its only Grand Prix win.

First seen at the 1969 Isle of Man TT this works 125 single raced by Kel Carruthers (and also Silvano Bertarelli) featured a twistgrip operated overdrive unit bolted on to the side of the original 5-speed gearbox. Like the earlier 50cc Kreidler, this effectively doubled up the available ratios, making ten in total.

Factory rider Alberto Pagani in action during July 1967 on the original prototype 123.15cc (56 x 50mm) single cylinder two-stroke racer at Zingonia circuit, near Bergamo. Designed by German engineer Peter Durr, it produced 20bhp at 9,200rpm.

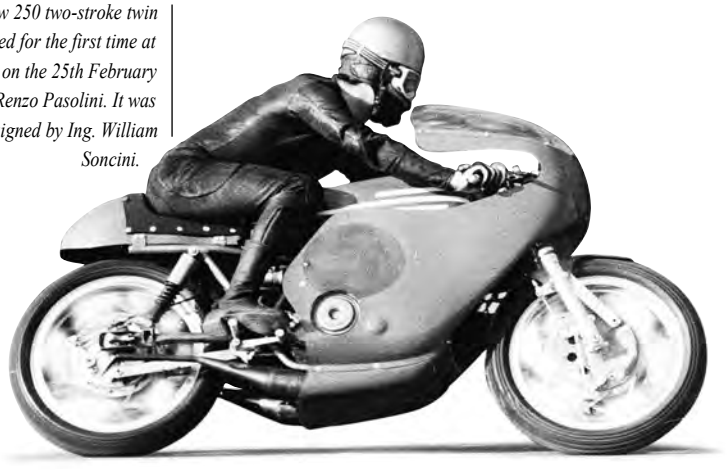
After many laps of Monza in June 1967, the prototype of the simple, single-cylinder, piston ported 'stroker' made its racing debut in the following month at the new Zingonia circuit, near Bergamo, in the first Italian Senior Championship event of the year. After a slow start, Pagani's machine (still with the roadster's four speeds) made its way quickly through the field to finish a very promising third, behind the FB Mondial and the Montesa of the Villa brothers (which both sported rotary disc induction and eight speeds!).

Encouraged by this success, Aermacchi decided to build some production versions for sale to private customers. To this end, experiments were soon being carried out with different gearboxes - a conventional five-speed, close-ratio cluster, and an interesting overdrive system (like that of the Kreidler 50cc GP bike of the early 1960s) with eight ratios, four controlled by a pedal and four by a twistgrip. Later still, a ten-speed type was also tested. However, production examples all came with conventional five-speed boxes. Two other changes were a switch from helical to straight-cut primary drive gears and modified porting.

Pagani in action during the 1969 Senior TT. After an opening lap of 97.37mph on his Linto, the Italian was forced out on the next lap in a race dominated by Agostini's factory MV with speeds of 104.73mph (race average) and 106.25mph (fastest lap). As proof of just how dominant the multi-cylinder MV was in those days, the second man, Alan Barnett (Kirby Metisse G50) averaged 98.28mph.

Percy Tait at Brands Hatch in early 1963 with one of the 250 Ala d'Oro racers with its fairing removed.

One of the Linto twins being given an outing in a modern-day classic event.



The new 250 two-stroke twin being tested for the first time at Modena on the 25th February 1971 by Renzo Pasolini. It was designed by Ing. William Soncini.

Hero of Varese, Renzo (Paso) Pasolini. After several years racing on a variety of machines (including single cylinder ohv Aermacchis and four cylinder Benellis) Paso soon made an impact with the new Aermacchi twins. By 1972 they were competitive, being victorious in the Italian, Yugoslav and Spanish 250cc GPs. But on the 20th May 1973 the bespectacled star was involved in a fatal accident which also claimed the life of Jarno Saarinen, when both men crashed (on oil left from the previous race) at the Curva Grande during the 250cc Italian GP at Monza.

The engine, slung below the frame's single top tube, breathed through a 27mm Dell'Orto carburettor. Ignition was by a Dansi flywheel magneto and external HT coil, the points and condenser being mounted on the magneto's stator plate.

All this added up to an extremely lightweight motorcycle, which tipped the scales at only 80kg (176lb).

The definitive version appeared at the beginning of 1969. It featured a new, much more attractive, double-cradle frame, new cylinder head and barrel, new piston and other more minor alterations. Power output had been increased to 24bhp - high for what was, after all, only a piston-port type.

Riders such as Kel Carruthers, Johnny Dodds and Silvano Berterelli all scored World Championship points that year, the highlight being Carruthers' runner-up spot in the Isle of Man. Even better was to follow in 1970, with Dodds winning the opening round at the Nürburgring, and Angelo Bergamonti coming home third in Yugoslavia.

That year had also seen the appearance of an interesting special built around the little Aermacchi 'stroker'. Constructed for the Mainini brothers, well-known dealers in Milan, by frame specialist Marly Drixl, it was even lighter in weight at 74kg (163lb), The engine had also received attention, being converted to disc-valve induction and employing a larger 32mm carburettor.

The lessons learned by Aermacchi with the 125cc single helped with the creation of the next new racing machine from the Varese plant. First mooted in 1969, it followed the successful Yamaha TD/TR racing design, which Aermacchi's Stateside partner was keen to counter in American events. Therefore, the new bikes were to be 250 and 350cc twins with orthodox, air-cooled, two-stroke power units without disc valves.

The 1970 version of the Aermacchi - Harley-Davidson two-stoke single. With improved porting, 28mm carburettor and 5-speed transmission, its 22bhp at 9,200rpm was good for 110mph. Dry weight was a mere 80kg (176lb).

The 4-carb, twin cylinder project.

Chief designer William Soncini was not content with the Varese company simply building air and water-cooled two-stroke 250 and 350 twins, so he created a unique 4-carb 500 version.

Although it was not to repeat the success enjoyed by the smaller models, this half-litre creation was none-the-less of considerable technical interest.

When first conceived, in early 1973, the engine was air-cooled. Early testing of the 498cc (66.7 x 70mm), 5-speed was undertaken by Renzo Pasolini. But the project was dealt a major blow when Pasolini (together with Yamaha star Jarno Saarinen) died in a horrific accident during the 250cc Italian GP at Monza, in May of that year.

Pasolini's crash effectively stopped the Aermacchi-Harley Davidson race team in its tracks. And even though Walter Villa was to eventually take the 250 and 350 models to world titles, the bigger engined machine was not to receive anything like the same priority after Pasolini's death - in fact it was to be over two years before it was actually raced in anger.

By then several changes had been made including water-cooling of the

Following the success of its 125 two-stroke single, Aermacchi's management authorised the construction of a brand new twin. This shared the same bore and stroke dimensions as the single, giving a capacity of 246.3cc; it was soon followed up by a 347.4cc (64.54mm) version.

cylinders and heads, an enclosed Campagnolo disc front brake (of a similar type used on Walter Villa's world title winning 250 and 350 models) revised exhaust and, most interestingly of all, a rear brake disc mounted on the transmission shaft, rather than the rear wheel itself. This final change had come about following experiences by MV Agusta with their 500 (raced in 1974 by Phil Read), which had suffered serious problems with rear stability, caused through the rear wheel jumping during braking. Soncini and his team attempted to avoid this glitch on their five-hundred by mounting the rear brake disc on the end of the transmission shaft, a solution which had been previously tried successfully in the four wheel world.

Besides the engine and braking system, the chassis also received considerable development. At first a conventional duplex frame with twin shock, swinging arm rear suspension was employed - and in fact it was in this guise that the machine had made its race debut (with Walter Villa in the saddle) during the early spring of 1975. But later that year Bimota were asked to build a new chassis, which they did, using a single rear shock.

By the beginning of the 1976 season, Bimota had taken over the whole project with not only an improved frame, now using a vertical instead of near horizontal rear shock, but using replaceable cams on the upper fork yoke of the steering mechanism, which in fact was the forerunner of the Suzuki GS750 four cylinder SB2 Superbike, itself launched by Bimota at the Bologna Show, in January 1977.

Under the Bimota banner the definitive version of the 4-carb HD 500 twin was campaigned in the 1977 Italian Senior Championships, by official Bimota entry, Vanes Francini.

Unfortunately, pressure of other work in the experimental department at Varese was to delay development of the twins, the result being that it was not until March 1971 that the design was first track tested (in 250cc form). This took place at Modena in the hands of former Benelli ace Renzo Pasolini, who later that week raced the same machine at the same circuit.

Despite crashing half-way through the event, Pasolini took seventh place against an international all-star line-up, including the likes of World Champions Phil Read and Dave Simmonds.

Chief designer William Soncini stated that he was 'very well pleased' with the initial results of testing and racing - as well he might have been, since the engine's 46bhp (at 10,500rpm) was over 11bhp up on the best figures ever achieved with the horizontal 250 pushrod single. Furthermore, the new twin's weight matched the single's 113kg (250lb) once the prototype's heavy iron cylinders were replaced by chrome-bore, light-alloy components, which produced a saving of 11kg (24lb).

1972 Harley-Davidson 350 two-stroke GPracer.

Number one plate for winning three 250cc world titles in succession (1974, 1975 and 1976) Walter Villa (seen here at Imola in 1977) was also the 1976 350cc World Champion; all were achieved on the Varese-built twin cylinder two-stroke machines.

Walter Villa, four times World Champion for Harley-Davidson.

Lubricated by a 20:1 petroil mixture, the twin had the same bore and stroke dimensions as the 125 single, giving a capacity of 246.3cc. Carburettors were 30mm Dell'Ortos, and the Dansi electronic ignition had the under-seat coils fed by a spark generating coil and pick-up on the nearside end of the crankshaft.

Many design features were aimed at simplifying maintenance and bypassing the need for specialised workshop equipment. For example, the two crankshaft assemblies were coupled by a split sleeve and two cotter pins, and could be separated with nothing more elaborate than a spanner. Bottom-end work was further assisted by the horizontal splitting of the crankcase. Moreover, although the primary drive was by straight-cut gears, the six-speed, close-ratio gearbox was bolted to the crankcase so that either unit could be removed independently.

The 6-speed gearbox showing the housing cluster. Little known is that the factory also tested a 7-speed box. But FIM international regulations limited GP bikes to six, so the plan was dropped.

By the time the 1972 season came around, a 347.4cc (64 x 54mm) version had joined the original quarter-litre model. In addition, Japanese Mikuni carburettors were specified.

Crankshaft, ignition and rev counter drive details of the 250 Aermacchi twin. Note crank seals and cotter pin crankshaft coupling device. The ignition was manufactured by Dansi, who, like Aermacchi, were based in Varese.

Works rider Pasolini contested both classes of the World Championship on the twins which, at that stage, were still air-cooled. He was particularly successful in the smaller class, and after winning three rounds (Italy, Yugoslavia and Spain), he lost the title to Yamaha's Jarno Saarinen by a single point. Furthermore, although he failed to win a GP on the 350, Pasolini still managed to finish third in the points table, thanks to regular leader-board places throughout the year.

Great things were expected from the combination of Pasolini and Aermacchi in 1973. However, after debuting a water-cooled 350 at the Italian GP and in the process, breaking the 200kph lap barrier for the first time on a machine of this capacity at Monza, Pasolini was to lose his life in a horrific crash in the very next race. It occurred as he was battling for the lead in the 250cc Grand Prix and also claimed the life of Saarinen.

The most successful British competitor on one of the production models was Mick James (25) seen here passing a Yamaha TZ at Snetterton on his Mick Walker-backed , Tommy Stoner tuned RR250 in 1977.

The crash effectively stopped the Aermacchi challenge in its tracks, although a number of riders, including the Frenchman Michel Rougerie and Gianfranco Bonera, had occasional rides on the machines later that year. It also halted development of a 498cc twin (66.7 x 70mm) which Pasolini had been testing.

Final version of the HD 250, two-stroke featured monoshock rear suspension, just visible in the top right section of this photograph.

In 1974 - with AMF Harley-Davidson on the tank (Aermacchi had sold its remaining shares and returned solely to the aviation business) - the Varese two-stroke twins were back with avengeance. With Bonera having departed to MV Agusta, the new team leader was the experienced Walter Villa, who was backed up by Rougerie.

Alongside the works machines the Varese factory, like rival Yamaha, offered production versions of their racers, known as the RR250 (and RR350). This RR250 sported Ceriani forks, Japanese Mikuni carbs (some machines had Dell'Ortos), wire wheels and Scarab disc brakes (denoting a 1975 model year machine).

The latest version of the 250 (now also water-cooled) pumped out an impressive 54bhp, something even Yamaha could not match that year. The result was the factory's first ever World Championship title.

The following year Villa and Rougerie repeated their winning performance. Villa came in first with Rougerie runner-up in the title stakes. Despite a horde of bikes, Yamaha still could not offer an effective challenge.

The Varese team also chose to bring out a development of the 1973 500 twin (but now water-cooled) for the 1975 season. However, although fast, this four-carburettor, 90bhp device was never the success it was hoped to be, and the engine was later made available to Bimota for a private effort (with Bimota chassis), which was raced in 1976 by Vanes Francini.

In 1976 Bonera returned to the Varese camp after two seasons with MV. Together with Villa, he rode the unbeatable 250, plus the, by now, highly competitive 350. The result was the best ever in the company's history, Villa becoming a double World Champion by taking both the 250 and 350cc titles making it four world crowns in three years!

The 1976 250 bikes gave 58bhp at 12,000rpm, while the 350s produced 70bhp at 11,400rpm. This resulted in maximum speeds of approximately 155 and 165mph respectively.

If 1976 had been a year of glory, 1977 was the reverse. Plagued by financial problems, the Varese plant could no longer afford to run a proper Grand Prix team, and Villa was forced to defend his titles with a privately-organised team backed by Nolan Helmets. The result was inevitable, performances becoming worse as the season progressed. Even so, Villa's new team-mate, Franco Uncini, still managed to finish second in the 250cc class, while Villa came third. The 350, however, was completely out of the frame.

By the following June (1978), the Varese factory was declared bankrupt and, subsequently, was sold to a local company by the name of Cagiva... the rest is modern history.

Originally designed in 1973, but not actually raced until 1975, the 498cc 4-carb twin as it appeared in 1975: Campagnolo enclosed disc front brake, rear brake disc mounted on transmission shaft and swinging arm, twin shock, rear suspension. This machine is watercooled, the 1973 version was air-cooled.

250cc Czech Grand Prix 1977. Walter Villa (1) leads Tom Herron, Yamaha (5), Kork Ballington, Kawasaki (15) and Alan North, Yamaha (22). Although he gained victories in Venezuela, Italy, Belgium and Finland, Villa lost the title by a narrow margin to the more consistent Mario Lega (Morbidelli).

Four-times World Champion Walter Villa in vivid action during one of his final rides on the Harley-Davidson twin-cylinder two-stroke, the 1978 West German Grand Prix at the Nürburgring circuit.

Aprilia

2

1994 RS 250.

Although Aprilia (no connection with the now defunct electrical concern of the same name) is generally regarded as a recent arrival on the Italian motorcycle industry scene, it was in fact created as long ago as 1956 by Alberto Beggio, the father of the existing president, Ivano Beggio.

Initially the fledgling organisation based its activities upon the construction of bicycles, but in 1960 Aprilia built its first powered two-wheeler, a moped. But until the mid-1970s Aprilia's principal source of revenue continued to be the pedal cycle. However, by 1975 this had begun to change - due in no small part to a rapid decline in sales figures. This was to prove a turning point when the younger element within the Noale (near Venice) plant backed a plan to build a brand new motocrosser. Ultimately this machine was sold with a variety of engine sizes; power being provided by bought-in engines including Sachs, Hiro and Rotax; the latter starting an association which continues to the present day.

1994 RS 125.

This project proved to the management that Aprilia-built motorcycles could compete with the very best, at least in competition events, illustrated by the company winning the Italian Motocross National Championships in the 125 and 500cc categories in both 1976 and 1977.

This success encouraged Aprilia to concentrate on the off-road sector until well into the 1980s not only with replicas of its motocrossers but also the production of trials and enduro machines too.

Aprilia factory (front entrance) November 1988.

Aprilia 250 racing 1991.

With all this competition success, both at factory and sales levels, it was perhaps obvious that Aprilia's next move would be into road racing. This also coincided with the Noale company offering street bikes.

Aprilia had seen how well the inline twin cylinder two-stroke disc valve Rotax engine had performed in machines such as the British Armstrong and Spanish Kobas. Rotax had followed the formula set by the all-conquering Kawasaki KR 250/350 inline twins which had scored no less than 8 championships during the late 1970s and early 1980s. But Kawasaki had quit at the end of 1982, to concentrate on its new range of liquid cooled 4-cylinder Superbikes, led by the GPZ900R which was launched in early 1984.

Marlboro Yamaha Team Agostini rider Luca Cadalora (left), congratulates Loris Reggiani after his win in the 1987 250cc San Marino GP, riding an Aprilia.

Aprilia's prototype racer made its debut at the South African GP at Kyalami on 23rd March 1985 ridden by Loris Reggiani. Eventually finishing its debut season in an excellent 6th overall in the championship table, the 1985 250 Aprilia GP used one of the latest Austrian built liquid-cooled inline Rotax twins. Technical details included: 247.35cc (54 x 54mm) twin, 38mm magnesium bodied Dell'Orto carbs, Motoplat electronic ignition, geared primary drive (featuring straight cut gears) and a 6-speed close ratio gearbox. The cycle parts were entirely Aprilia's responsibility and followed the latest racing fashion of alloy delta-box frame,

Max Biaggi, 250cc World Champion. Aprilia v-twin 1994/95/96.

Loris Reggiani, 250 GP racer 1985.