Section 1

History

Velocette

DEVELOPMENT HISTORY

In October 1948, the LE Velocette was unveiled before an astonished public; a model destined to be the backbone of Veloce's lightweight motorcycle range for their remaining 22 years. It was, in short a remarkable achievement in view of the machine's very unorthodox specification. The Mk.I LE had exactly the same basic features as all subsequent models; the readily apparent differences being the hand change lever for the 3-speed gearbox, and hand starter for the engine - then of only 150cc capacity and 6bhp. In addition it featured a unique "Multijet" carburettor, about which more will be said later, and BTH DC generator: both resulting from a lack of suitable "off the shelf" equipment at the time.

The BTH generator (Figure 1) was a miniature car-style electrical system, all fitted into a "biscuit box" at the front of the engine, that contained no less than a dynamo; consisting of an armature rotating inside a permanent magnet pole assembly, with brushes (1-1); automatic cut-out (1-2); ignition coil (1-3); contact breaker (1-4), with automatic advance mechanism and a distributor (1-5). Rather less unique was the engine's lubrication system (Figure 2); vaguely reminiscent of the 1920's. An oil pump (2-1) drew oil through a gauze strainer in the sump, and then sprayed it through the jet (2-2) at the roller big-end bearings (2-3). In addition an oil pipe (2-4) ran from the oil pump and sprayed oil in the direction of the reduction gears and clutch bearing. A drilling (2-5) took oil from this pipe to pressure lubricate the plain main bearing in the reduction gear plate. Lubrication of the remaining ball bearings relied on oil mist.

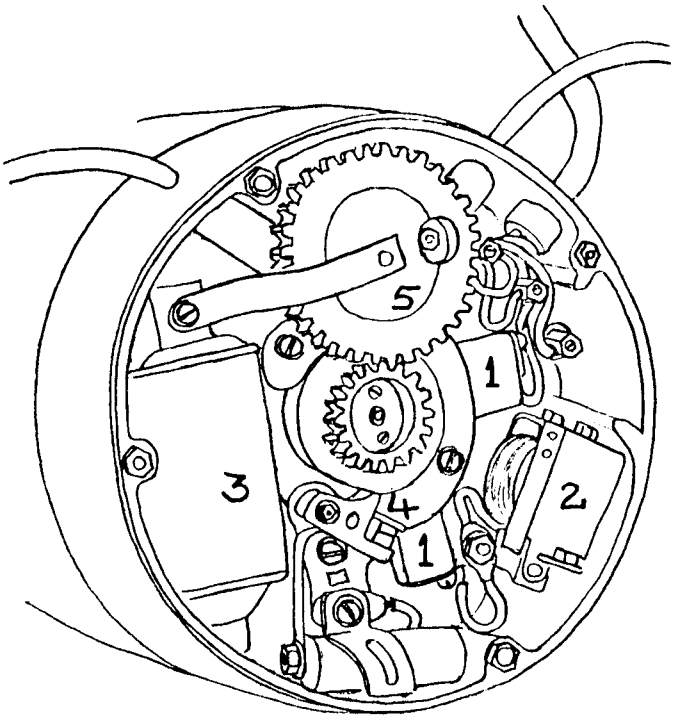

Figure 1

B.T.H. GENERATOR 1949-53

By all accounts the machine did not share the reliability of its later successors. This was hardly surprising in view of the austerity period in which it was produced, with associated shortages of fuel and materials hindering the building and testing of the prototypes. Government requirements also forced Veloce to export a lot of these early models, so that machines soon found their way to all parts of the world. The difficult task of de-bugging the LE now commenced in earnest, as reports of trouble started pouring in.

Starting in 1949, one of the most serious was the tendency for the gearbox to leak oil; at the back over the flexible rubber propshaft coupling, and at the front into the clutch, both with unfortunate results. Though cork and "goo" were used as a temporary expedient, the rubber coupling was soon changed to an all steel Hooke joint, which was better able to live with the oil. Heavy wearing of the starter mechanism parts necessitated another rapid modification, and for convenience the fuel tap was made detachable from the carburettor; convenient in view of the need to often remove the carburettor! The linkage enabling the stand to be raised with the starting handle was soon found to be a nuisance, when the machine whilst parked, was investigated by compulsive fiddlers - with disastrous results. Although the device was fitted until 1952, most owners quickly removed it.

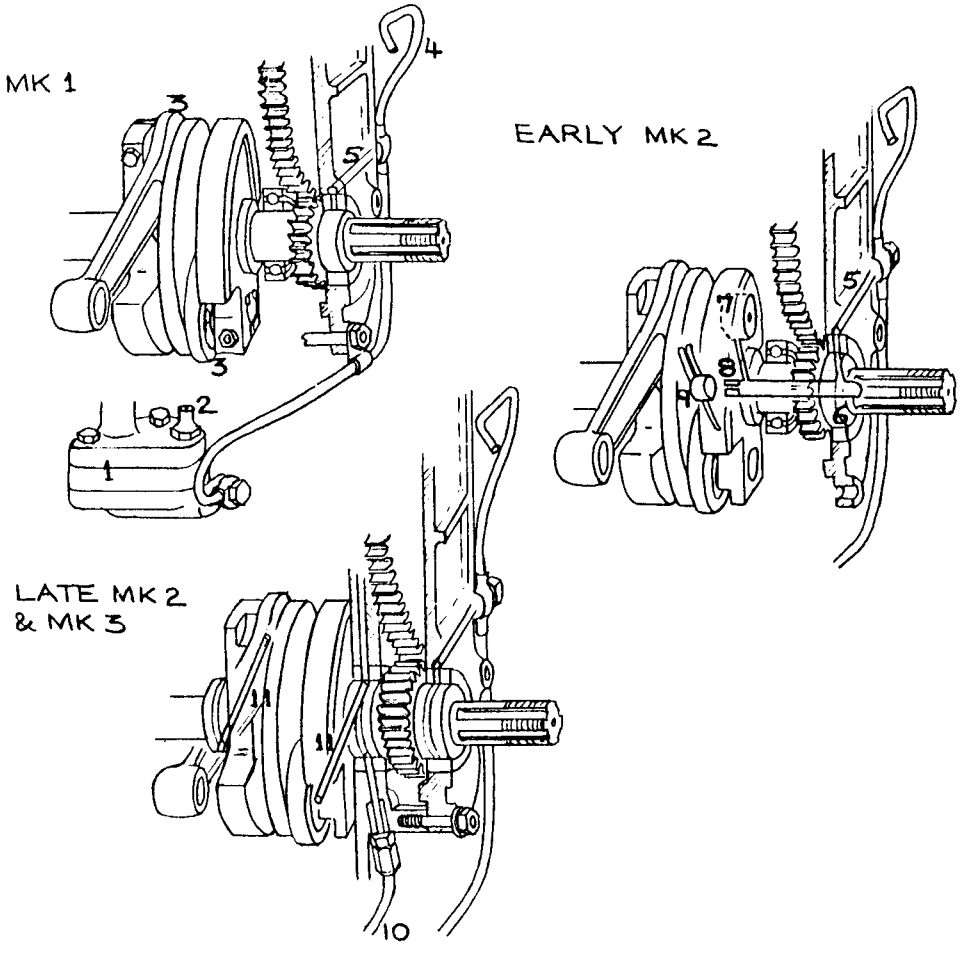

Figure 2

By 1950 problems with premature engine bearing failure were becoming far too common. The immediate result of this was that a change to a plain bearing in the clutch housing was made. Because of its greater oil requirement, this necessitated lengthening the oil pipe (2-4) so as to direct oil straight to it, though in taking the pipe around the large reduction gear, it subsequently made assembly more difficult.

The really major change came towards the end of the year with the unveiling of a larger 192 cc version, rated at 8 bhp, the result of popular demand. Its Mk II designation was earned by a whole host of modifications including new cylinder heads and a stronger crankshaft with press fitted balance weights rather than clamped ones. With the adoption of a larger cylinder bore, head gasket area was correspondingly reduced, requiring the use of stronger Plexeal gaskets in place of ordinary copper-asbestos material. Even so, this remained a slightly weak point for ever after.

The tappets had originally been of square section to prevent rotation, so that the tappet head could be designed for minimum wear. However these were abandoned in favour of a round, rotating pattern, since cases had occurred of the original type being incorrectly fitted, 90 degrees out of place. No harm came of this change; the incorporation of rotating tappets probably being beneficial.

Modifications were now being adopted thick and fast. The original aluminium wheel rims were abandoned in favour of more robust steel ones. A further problem experienced with the clutch was very rapid wear of the operating mechanism. This was due to both clutch thrust rods rotating with the primary gearshaft, partly due to inaccurate boring of the latter. Though various cures had been tried in production, a third rod was finally incorporated, carried in a bush at the front of the gearshaft. This bush was also meant to double up as a seal against oil leaking into the clutch, another trouble which still lingered on. A dished floating plate was incorporated in the clutch, to give a more progressive take up. Another troublesome source of oil leakage was from the bevel box brake side oil seal, onto the rear brake shoes. A drainage channel was added around this to collect any leakage. At about the same time, construction of the bevel box was simplified by discarding the vernier adjustment for correct meshing of the bevel gears; reliance being placed entirely on the use of shims.

The BTH generator was not trouble free. This was probably, inevitable because of its novel design. Principally, this piece of equipment will always be remembered for the way carbon dust from the brushes would cause "shorting-out" inside the generator. Try as Veloce might with seals for the brushes, they eventually realised that the best solution would be to do away with them altogether, and use an AC generator. The Miller AC alternator set was therefore fitted to most LE's from 1951 onwards. It is worth recording that trouble had also been experienced with the automatic advance and retard mechanism of the BTH unit, so that Veloce sent out many machines with this inoperative. These could always be distinguished by their lumpy idling as a consequence of the ignition timing being permanently advanced. The Miller AC3 generator was in fact laid out very similarly to the BTH, the fundamental difference, (apart from the conversion to an alternator) lay in the removal of the distributor in favour of a second ignition coil. This meant that a spark was supplied to

both plugs every revolution, instead of on alternate ones.

It has already been noted that premature engine bearing failure had become a source of some concern, witness earlier attention to the clutch bearing. The big-ends were the next serious problem, mainly due to inadequacies in the design of the lubrication system and aggravated by sludge formation in the oil. A major modification was carried out (Figure 2). Starting with the oil pump, this was substantially increased in capacity and the jet (2-2) removed. Instead, all the oil was fed to the big-ends via the existing drilling (2-5) in the reduction gear plate, through the plain steady bearing (2-6) into a drilling running along the centre of the crankshaft rear driving shaft. From here any oil present was centrifuged out into the sludge trap (2-7) and then oil was sprayed through a jet (2-8) into a receiving cup on the crankshaft centre disc (2-9) and from there by drillings to the fore and aft big-ends. In short, an improvement that did prove quite effective. A further worthwhile change was the increase of sump capacity from 1¼ to 1 5/8 pints, by raising the permitted oil level mark on the dipstick (by about 3/8 in).

The story now passes to 1952 with a minor modification to the Miller AC3 generator, by way of fitting a protective circuit breaker. It had been found that reversing the battery connections demagnetised the poles on the flywheel. As a further precaution, an ammeter was fitted as standard. Suffix P denoted the change - AC3P. Another improvement to the big-end journals was an increase in the crowding of the rollers, so as to reduce local bearing pressure, i.e., preventing the rollers moving over to the more lightly loaded side of the bearing. Trouble was still being experienced with oil getting onto the clutch plates, so the next idea tried was the fitting of an all enclosed aluminium clutch bell. The problem was only overcome finally, some months later, by blocking up the tiny oil holes in the primary gearshaft that lubricated the clutch thrust rods running through its centre. It was found that packing with absorbed oil was just as effective. A third friction plate was also squeezed into the clutch, by dint of making the two existing friction plates much thinner.

Also, in 1953 the Miller generator was improved once again to become the AC4 unit. This provided full, instead of half-wave rectification and therefore greater DC current output. The new rectifier was moved from a position under the fuel tank to the right hand side of the frame under the battery. The circuit breaker used in the AC3P was dispensed with, as it was now unnecessary. The rear brake had also come in for some criticism, so that as a result, shoes were widened from 3/4 to 1 inch as used at the front. Undoubtedly the long, flexible brake lever was also to blame for these complaints. In the starter department the unusual shooting tooth of the starter segment had been found liable to heavy wear, so a new plain segment, without this device was produced.

Though all the modifications described above had produced a reasonably reliable engine, development work on the bearings and lubrication system was still proceeding. One drawback of the improved lubrication system introduced in 1951, was the impossibility of cleaning out the crankshaft sludge trap, without first removing the crankshaft! A considerable improvement therefore was the fitting of a large external oil filter with renewable felt element.

When the machine was operated under the most extreme conditions, typified by lots of short journeys, crankcase condensation and consequently bearing corrosion became a further problem, as was ensuring a good enough alignment of the four main bearings. At the end of 1953 therefore, the engine was altered yet again with the ballrace main and big-end roller bearings being changed to plain bushes. Perfect alignment of the main bearings was ensured by line reaming in situ. Naturally, it proved necessary to modify the lubrication system so that oil now passed from the pump to a pressure regulating valve (necessary when running cold). From the valve oil passed through the new filter to a distributor, whence one pipe went to the flywheel housing to lubricate the two front main bearings. A second pipe (2-10) sent oil to the rear "forward" main bearing and a third, as before, went to the reduction gear plate, steady bearing reduction gears and clutch bearing. Drillways (2-11) though the crankshaft balance weights took oil from the main bearings to the fore and aft big-ends. Unfortunately the improvements attained in this conversion were to some extent offset by it being impossible to use really adequate size big-end bearings. Veloce had originally adopted roller bearings so that the crankpins could be made as narrow as possible. Without a modified crank and case, Veloce were now stuck with them. It is also worth mentioning that Veloce marketed a "conversion crankshaft" for earlier machines with just the plain big-end bearings but without the new pressure lubrication. Generally they were not a success. Much myth came to surround this great changeover - that the roller bearing engines were quieter and freer revving than plain bearing models. The truth is rather more difficult to ascertain.

One of the first modifications to come in 1954 must have subsequently saved many hours of labour time. Up to this point various procedures had been devised for removing the LE's engine, a not uncommon task, all of which necessitated removal of the front wheel and forks. At this stage the radiator subframe was modified so that it could readily be split in two at the footboard level, making it possible to wheel the complete frame and front end away from the engine/transmission unit after removal of a few bolts.

In the clutch department, the all-enclosed aluminium clutch bell was phased out in favour of the original steel type, though for the time being it was produced without the triangular shaped openings in the back. Presumably the reversion to the steel bell was made because the aluminium type wore badly.

The multijet carburetter was one of the Mk I's unique features since, as in the case of the BTH generator, no suitable proprietary equipment was available that would give the LE the desired easy starting - "on the handle", regular idling and unfaltering performance on the move. The latter was perhaps the stiffest requirement and was achieved by a system of two jets and two spray tubes, plus a further two jets for idling and one for starting. The starting jet was entirely foolproof and needed no flooding of the carburetter. Unfortunately, these jets were extremely fine, so that to reduce the chances of blockage, comprehensive fuel and air filters were used. The air cleaner was neatly housed in the centre of the radiator. However, partial blockages did occur in service, with the result

that the Multijet was often unfairly blamed for "flat-spots" and the like, despite the intentions of the designers. On the other hand some people will testify to exceptionally easy starting and uncanny flexibility of an engine so equipped.

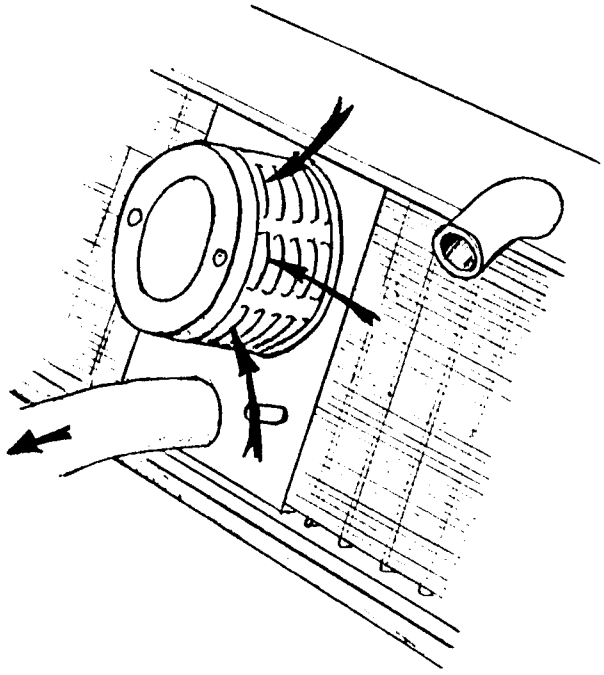

Figure 3

LE MULTIJET CARB: AIR FILTER

Another vice which caused much debate at the time was carburettor icing under certain climatic conditions. In 1954 Veloce redesigned the induction manifold so as to be warmed by the cooling water. Work was still progressing on the bearing problems, with the result that the last remaining ball bearings (those supporting the camshaft) were eliminated in favour of plain bushes. Lubrication was provided by taking an oil supply from the rear main bearing to the rear camshaft bush. From there a drilling in the centre of the camshaft led oil to the front bush. The big-ends were also widened to 11/32in.-the extra length of crankshaft being gained by the expedient of packing the flywheel housing out with a steel plate until early 1955 when the crankcase was properly modified to suit.

Veloce were now able to turn their attention to less weighty matters: how the machine's appearance could be improved. The result was that some rather attractive two-tone colour schemes became available as an alternative to the standard silver-grey. These comprised a silver-grey top half to the machine with the rest in ruby-red/blue/beige/mid green or dark polychromatic green, all offset with a little chromium plating. Other improvements included a dual seat option in place of the traditional saddle and pillion pad. Somewhat later, teardrop shaped metal pannier cases were available as an alternative to the cloth bags. 1956 was a very important year in the history of the Velocette lightweights. In order to fill a prominent gap in their range of motorcycles between the LE and the heavier

350 and 500 cc singles, Veloce unveiled the Valiant prototype which had the lines of the singles, but workings similar to the LE. It is often stated that the Valiant was no more than a variant of the LE, but in fact it was heavily modified with only the shaft drive, bevel box, forks and electrics the same. Otherwise it had a conventional tubular frame with 200cc aircooled flat twin engine using overhead valves and twin Amal 363 carburettors. A conventional kickstart was used as well as foot-operated gearbox with 4-speeds,. With 12 bhp to the LE's 8, performance and noise were also somewhat more sporting, though the superb handling was the same. To quite what extent Veloce designed the Valiant with the specific intention of making as many parts as possible substitutes for LE components is difficult to be sure of. Almost immediately however, the LE acquired the Valiant's 3.25 x 18in wheels, with full-width hubs in place of the 3.00 x 19in wheels with half-width hubs. The cast aluminium trailing arm replaced the original fabricated steel component. An Amal 363 carburettor became a substitute for the Multijet (the choke size was different on the Valiant); and the petrol tank was increased in capacity to 1 5/8 gallons.

Further "Valiantising" of the LE was carried out in 1957 with the result that from October it became the Mk III. These modifications included adoption of the stronger Valiant bottom end with 13/32 in wide big-ends; the 4-speed gearbox with foot change; the kickstart; the more modern handlebar layout, enclosed steering head with instruments mounted in the headlamp shell.

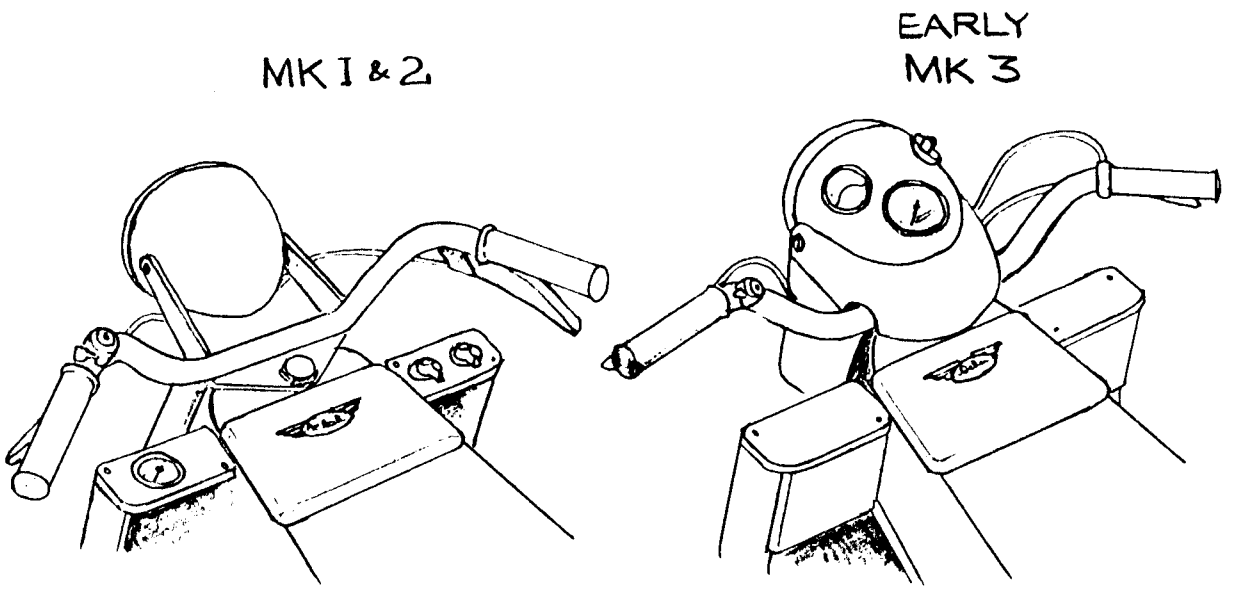

Figure 4

LE HANDLEBAR STYLES

The Valiant, which was now entering full production, was available in black or willow green. The LE was offered in standard silver-grey or just three options, of blue, willow green or polychromatic green two-tone finishes. At this point mention deserves to be made of the various Police Forces, over 50 in all, who had started to buy the LE, along with Local Authorities and

the like, for messenger and even park patrol duties: some private firms also brought the machine for uses such as security patrol work. It is doubtful whether, but for these customers, the LE would have stayed in production as long as it did. For the man in the street it was not a cheap machine to buy in comparison with simple two strokes such as the Francis-Barnett or BSA Bantam. The Police could afford - or had to be - more discerning.

Veloce were gradually able to offer a more and more comprehensive range of options specially for Police use; in particular to cater for their radio equipment. These options included larger capacity batteries, high output generators and special frames. 1959 was marked only by the introduction of the "Veeline" dolphin fairing for the Valiant, keeping in line with its "big brothers". It had also been found necessary to increase the piston/valve clearance slightly to help stop these coming into contact, if accidental over-revving occurred. This was done at the expense of reducing performance slightly. In retrospect, the end of the decade marked high noon in Velo's fortunes, for even though there were still some surprises in store a Japanese invasion was on the way.

The experimental shop at Hall Green must certainly have been very busy during these years since Veloce sprung another surprise at the 1962 Motorcycle Show - the Vogue. Not only was it a most attractive looking machine, but it used an all fibre glass bodywork with twin headlamps, a built-in screen and indicators, which had been developed in conjunction with Doug Mitchenall of Avon. In particular the body was impressively, a single moulding, including 2½ gallon fuel tank, from headlamp housing to tail. Underneath, things looked a bit more familiar with standard LE mechanicals hung from a new tubular backbone frame (Fig 5) and with a long extension filler pipe for the radiator, terminating under the dual seat. The standard colour scheme was sandstone and ivory, with matching panniers also available.

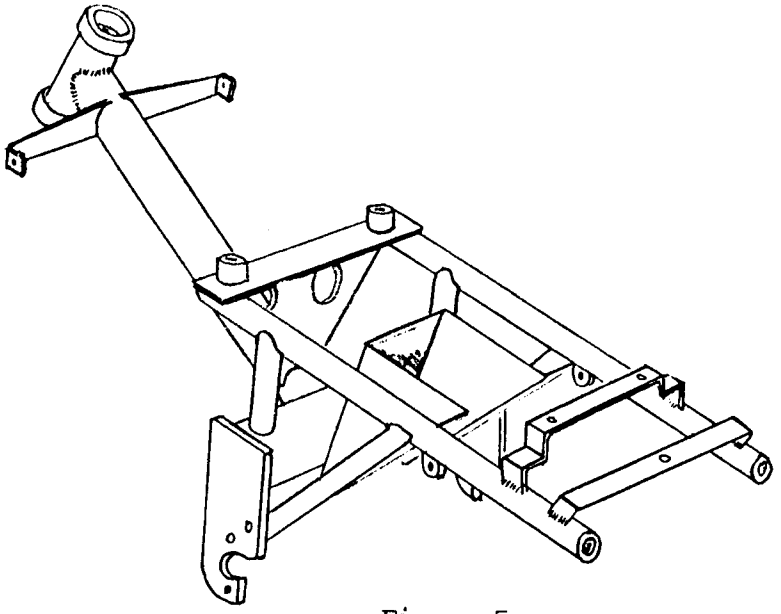

Figure 5

VOGUE BACKBONE FRAME

Work proceeded fast over the following months to put the Vogue into production, but sadly the decision was also taken to phase out the Valiant. Sales had only been mediocre, usually attributed to its high price and alleged mechanical frailty.

A minor modification incorporated on the LE (and Vogue) for 1963 was the addition of rubber "O" ring seals to the top rear suspension mounts, in an attempt to stop these seizing and cracking the frame. With the Vogue, it was soon discovered that the special high output Miller generator fitted was not entirely satisfactory in meeting demands of twin headlamps, with the result that in 1964 the LE boasted a bumper crop of modifications; heralded by a conversion to Lucas RM19 12volt alternator set; similar to that already used on the Viceroy but without electric starter. This change alone necessitated a new crankshaft front driving shaft, flywheel and generator housing. Provision for a 12 volt battery was also a problem so that some models were in fact turned out with a monstrous car size 18 ah battery. The other modifications were principally in the light of experience with Police machines and included stronger timing gears and crown wheel; recored water passages in the cylinder head and barrel to increase gasket area and life; increased oil feed to the rear main bearings to increase big-end life; and solely on the LE, a stronger frame and shoe protector on the brake pedal. Further special Police options listed included 6v Lucas electrics and a grey/ivory colour option was introduced for the Vogue.

Late in 1965 the LE received a minor set back when Amal discontinued their successful 363 carburettor for reasons of rationalisation. It was replaced by the Amal type 19/5 which though simpler, rapidly acquired a "colourful" reputation in true LE tradition for bad starting, leaking, flat spots etc.. The wheel really had turned full circle! The final few LE modifications revolved round the Lucas electrics, more due to their general development by Lucas than any troubles in their application to the LE. A resin encapsulated stator was introduced in 1967 and a new stator plate, contact breaker and lightweight coils in 1968 with the condenser mounted externally.

After much rumour about its demise, it was finally confirmed in 1968 that the Vogue was discontinued; another disappointing seller which, though clever in conception had merely turned out to be an alternative for the traditional LE buyer. By now LE production was down to a trickle and with the completion of a final large batch of Police machines in 1969 and 1970, there just remained the fulfilment of a few outstanding dealer orders in 1971. The last LE came off the line at the beginning of February, after 22 glorious years and over 32,500 machines being produced, the majority of which were Mk. II models.