An Article about the Pluto Frame, and the Unified Twin

I have observed in the, Your Letters, section of Roadholder 238 various requests for more material about the AMC Pluto frame that was meant to house the Unified Twin engine. Also for a more in depth article about the one-off Unified Twin engine. So I have written a small account of what I have been able to ascertain about the Plumstead Pluto frame, and the Unified Twin motor. I have made contact with a well know ex-AMC and Plumstead factory tester, who gave me some background about the Pluto frame. He actually rode a prototype version of the Pluto frame.

There were three Pluto frames made, but there is a rumour of a forth, but this has been hard to substantiate, or for any credence to be given to, the rumour of its actual existence. One frame is now located in Australia, and is powered by a Matchless G80CS single motor. This particular machine featured on the front cover of the Jampot magazine of the AJS & MOC, number 361, November 1982. Chris Reed the editor of the Jampot, of the AJS & MOC has a Pluto frame with a Matchless G12CSR motor installed in it. The third was written off or so I was very reliably informed by the above mentioned factory tester. This particular Pluto frame was running around Plumstead, in the 1960's with a Matchless G12 engine installed, as its motive power. The oil-in-frame Pluto then used 18-inch wheels and the oil tank backbone was 3½ or 3.5 inches in diameter. A specially fabricated petrol tank was also made, as the oil filler tube, and cap, were located in the centre of the top tube of the oil-bearing frame.

He was waiting at a stoplight in South London, when a scooter broad-sided into the side of the machine, and bent the rear of the frame, subsequently writing it off. The tester explained that it was the best handling AMC frame that he had ever ridden. He also stated that the rear of the oil bearing frame leaked a lot, as the swinging arm spindle went through the bottom part of the oil bearing frame. The problem with oil seepage was due to stress fractures around the swinging arm area. Many of the lugs on the Pluto frame came from those used, on the stock G12 duplex frame. This is as per the part numbers for the castings lugs, on the factory drawing, of the Pluto frame. The rear of the frame has a large engine-mounting lug that seems out of place when a pre-unit twin is placed in a Pluto frame. Real Classic Magazine will shortly be publishing an article about Chris Reed's Pluto framed G12 in a forth-coming issue. Both the Unified Twin and Pluto frame G12 engined machines were at the Calne Rally on 17th July 2004, I suppose the only time both engine and frame actually came together in the same place, as complete and fully working machines. The factory would have used at least some engine shell units to actually fabricate the Pluto frame in the first place. So there must have been a marriage of both parts at some time in 1959/60.

The Pluto frame also experienced frame breakages, when used off road. The breakages occurred at the headstock of the frame. This was conveyed to me by a friend of the late Tony Denniss, when the Pluto frame question came up for discussion. Tony Denniss being the development engineer, that was part of the design team involved with the Commando's inception. He also cured the P11's nasty habit of breaking its alloy oil tank, by designing a new steel oil tank, and frame mounting arrangement.

The rear swinging arm was, or looked like, the stock G12 unit, and the forks were AMC's well tried-and-tested Teledraulic units, that were used on all the duplex frames.

Brian Jones, who was present at the meetings at Plumstead, told me that the Unified Twin motor was destined for the Pluto frame, as this was the subject of many of the design meetings that he attended.

The Unified Twin had some unique features from the then Dominator twins that were being produced in 1959 and 1960. The cylinder head had a steeper angle for the inlet valves. The inlet valves are the same size as the Norton Atlas and the exhaust valves are the same as the stock Atlas, and 650ss. This I found out when I dropped in the stock 650 valves, and it did not fit properly, but the standard Atlas ones fitted perfectly. The balance factor for the crankshaft is 78% dry and 84% when wet, or filled with oil. So Norton were thinking of building a high revving performance motor in 1959, and this is contrary to popular opinion. The clutch that was used was a modified Norton Navigator unit, with a duplex engine and clutch sprockets. The gearbox mainshaft was longer than the standard Dominator one, to accommodate the duplex clutch sprocket. The gearbox mainshaft is about ½ inch longer than the standard Dominator one. The oil pump body is also different from the standard Norton twin. The Unified Twin oil pump has an extended front section, so the drive spindle section of the oil pump, that takes the drive gear from the crankshaft, is longer.

The crankshaft, which has a big end diameter of 1¾ inch or 1.750, was first tried on the Unified Twin, and then used later on the pre unit 650ss. The late Brian Jones explained a lot of the internal details of this engine to me. He also gave me the works drawing that showed a complete layout of the motor, but a really important factor that he informed me of was, that you could actually make engine parts from it. It was a very sad day when he passed away, as I always wanted him to see it running and ride it. He told me it lapped MIRA at over 120 mph, with Fred Swift on board, and when Fred came in and said to him that it was his turn for a ride, Brian then told me it was one of those times that he was so glad that it had started to rain heavily. The frame they were using was the Norton Model 77 type, and with a 650 twin giving between 44 and 48 bhp, it must have been quite a ride. Reynolds made all the frames for Norton at that period, and the Model 77 frame was used for economical reasons, at the time. (Norton not wanting to have a frame made just for this one off motor)

It had a lot of documented over-heating problems. This can be seen from the drawing, where a pencil sketch can be seen where the designers were trying to sort out the over-heating problematical situation at the time. There are also small design changes to the barrels, in relation to the fining. Some of the fins that go around the cam followers go all around the follower castings tunnels, and some of the fins stop at the front of the casting tunnels; a small point, but only noticed when you are up close and personal to the barrels. One of the cylinder heads was extensively modified to overcome the over-heating problems, and this head is currently fitted to the present running machine. The twin carburettor head has 32mm inlet ports, and the inlet manifold is also of a 32mm configuration. The breather assembly at the front vents straight out into the atmosphere, and it does not have any timed breather arrangement like the stock Dominator twins. A one-way valve has been added, so that no vented vapour is returned to the crankcases. The front of the crankcase has just a hole at the front, for the purpose of a breather arrangement, and a steel plate with a breather tube, is screwed to the top of a casting, and this bolted to the front of the crankcase casting. This breather arrangement can clearly be seen on page 29 of Classic Bikes review of the Unified Twin on September 2004.

The original push rods only had steel tops, and the bases of the push rods were just plain alloy. I have since had a set made that are of the barrel configuration, as per the 650ss, and Atlas type, with steel top and bottom cups. There were only two of these push rods with the consignment of parts when I obtained the machine. The crankshaft has a different internal sludge trap arrangement, and the bearings are twice the size of the standard Dominator twins. The Unified Twin has 77.5mm bore and 68.5mm stroke and has a capacity of 646.33cc (this for those who like the small details in life); these dimensions are shown on the drawing. There is a pair of over bored barrels, and may be a 750cc version was even envisaged at one stage. This will now be lost in time, as unfortunately most of these great men, have passed to the great racetrack in the sky. I was reliably informed by Brian Jones, that all the problems had been fixed, including all the over-heating problems, and the motor was good to go but, and this being a big BUT, and touched on by Frank in his brilliant article in The Real Classic Magazine, that it was a Bracebridge Street created motor, and not a Plumstead creation. Therefore it was deemed not to be of

any use in a commercial sense of the word. This I assumed after discussions with many of Norton's design personnel. I had a taste of this in the 1980's when I spoke to one of the former Bracebridge Street personnel, who was part of the design team, on the Unified Twin project. This particular gentleman did the drawings for the Unified Twin. During our conversation he turned round and said, "well you know, that lot down there". Baffled I asked, "who down there", and he exclaimed "you know, them in Plumstead" Now this being nearly 25 years after the event, and he still felt really strongly about the management, and personnel at AMC, SE18, Plumstead, South London. There was a sort of veiled animosity that came across, that Plumstead had ruined the great name of Norton at that particular time.

The following details are from the minutes of technical meetings at AMC in Plumstead, from 1959 through to 1961.

The report from a meeting held on 18 April 1961, and headed 1962 Models, and printed on 19 April 1961, shows item 26 under the heading, 1963 Models, states the following: -

1963 Models
26) Unified Twin to be deferred to 1964.

At a technical meeting held on 4 December 1959 the following was discussed and the decisions reached.

1) All design and testing for the next season is to be completed by 30th November.
2) All new integrated Twin engine was discussed at length
3) Three sets of drawings are to be obtained from Norton's and passed to Mr Watson on arrival. (That was a Mr H Watson)
4) Six prototype engines are being built and three will be allocated to AMC.
5) The drawing of the Project Department frame was inspected and discussed. It was agreed that this should proceed and a prototype (H W) should be built and tested. (H.W must stand for heavy weight)
6) Project drawings are to proceed with all possible speed and these are to be passed to Mr Watson on completion for detailing.
7) The Drawing Office will obtain any clarification required on this frame design with Mr. C. Smith of the project department.

The design of a new and inexpensive O.H.V 250cc engine is to proceed in the Project Office. Wherever possible this should incorporate parts from the new twin engine and in effect should be the equivalent of half the twin engine.

Meeting dated 27th July 1960 and headed as Design Projects, and states the following. New deigns have been the subject of full discussion and the following decisions have been made. They are listed in order of priority.

2) Subject to tests the new "Pluto" frame proving satisfactory, a scaled down version to accommodate the new 250cc, unit is to be produced and design is to proceed in anticipation.

Another meeting headed and dated as follows

1959 MODELS.

4. A redesigned Twin is desirable with a view to reducing cost. Time does not permit and consequently design work on the Twins will be restricted to the incorporation of an A.C. Generator. This will necessitate a new timing-side crankcase and possible drive-side also. If possible, the engine should be arranged so that the magneto type crankcase half can be used in special cases if required.

Another meeting headed as below and dated 11th December 1959

Design Meeting
1962 and Future Projects

"Of the items listed in the consolidated report of the 8th December and discussed on the 11th December, the following are to be regarded as Projects for the attention of Mr Walker's office and for subsequent procedure as agreed."

1) Redesigned Heavyweight frame including hubs.
2) Integrated 500cc and 650cc twin engines
3) Inexpensive 250cc OHV engine based on new twin components where possible.

The minutes of items 4 and 5 dealt with the two strokes gearbox ratios, and a change to the G5/8 and G2CS/14CS frame, tubular instead of channel cradle section for these models frames.

The Unified Twin was also known as the P8, the Integrated Twin, and the Bill Pitcher Twin. The late and lamented Bob Collier called it the Bill Pitcher Twin, when I was researching the Unified Twin back in the 1980's. Sadly he passed away not long after I had conversed with him about this motor. I contacted Bert Hopwood, who denied any knowledge of it, and his hatred of anything Plumstead also came through in his letter. I called Brian Jones - who was working for L.F.Harris, making Triumphs in Devon at the time - and told him about this. Brian explained that he was not that surprised by this, and he also explained, "Well if he tells you that he knows nothing about it, then he can get rid of you, like forever" Doug Hele was not that forthcoming about the Unified Twin. He was working at Shenstone at the time, and he sent me a letter about what he could remember about the Unified Twin project.

I contacted Mick Duckworth of Classic Bike, and an article appeared in Classic Bike, September 1988. Mick managed to speak with all those involved with the Unified Twin, and they were much more forthcoming with technical details than they had given me. I guess this must be the power of the press. The finished machine then appeared in Classic Bike September 2004, and also in Real Classic, ridden by our esteemed editor Frank Westworth.

The machine has now covered over 300 miles, with no discernible problems. The only problem so far encountered has been with the clutch actuating push rod levers hardened steel pin. This moved out of its location twice on the way down from Newmarket, being ridden by Malcolm Saggers, to prove that the recreated

Unified Twin's engine was capable of some form of sustained, long journey. Malcolm did not realise at first why the clutch lever just flopped back onto the handlebars. He investigated the inside of the timing cover and, with the judicious use of a piece of wire, managed to push the offending pin back into place. This also happened again, halfway over the Dartford Bridge and this, I have been reliable informed, never has be known to happen to that particular component. This particular part came from the AMC's groups Matchless G2, and AJS Model 14 250cc single. The machine then went from the Dartford Tunnel to junction 4 on the M25 at between 70 and 80 mph. I am glad this problem was rectified before our esteemed editor road it down at the Calne Rally in July. I suspect a shock horror situation would have occurred if this mishap had befallen him, when out on his rode test, through the town of Calne.

The contact breaker is a Lucas 6ca unit, and the A/R unit is a 54425657, that came out of my Ranger 750, now that I have since fitted a Boyer electronic ignition unit to the Ranger's 750 motor. The oil being used is a semi -synthetic, as recommended by Malcolm Saggers, just in case the so called over-heating problem returns to haunt me. This (touching wood now) has not occurred since I have used it. When the next oil change comes, the oil being used will be changed to a fully synthetic, this being more resistant to over-heating than a standard mineral oil.

The suggestion about putting a Unified Twin into a Pluto frame sounded like a plan, but when the idea to actually do this was tried, then the real, and most tangible reason why these two components did not become a marriage made in heaven, then came into view. The gearbox main-shaft is too high, and the swinging arm would have to be placed far too high; therefore it was not a viable proposition. There were also some concerns raised by some individuals, of my even wanting or attempting to have a Pluto frame fabricated, as this was construed as then being a fake. Therefore I have now decided on another course of action. So as someone once stated, "what one man has made, man can make again"

I hope to be able to go to the Norton day, at the Ace Café in April 2005, on the Unified Twin. The P11A, Ranger 750, though, being far more suited to the pothole riddled roads of North and South London, than the one of a kind Unified Twin. Well, for one thing I can now prove to Al Osborne that Norton actually did make a unit construction twin, even though he swore up and down that, to his knowledge, they never made one. The above he conveyed to me in a telephone conversation, last year, when I called him about having a wiring harness fabricated for the then proposed Unified Twin project as a running machine.

Anthony Curzon

24 December 2004