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# Velocette Venom 500cc

## Rebuild Project Part Three

from November 2020

This is the **START** of **PART THREE** of my 1959 Velocette Venom 500cc Motorcycle **REBUILD PROJECT**. It was “Bought as Seen - as a Basket Case” and covers **ALL** of the work carried-out so far (as per Parts One & Two of my Velo rebuild story) and therefore is a continuation of our ‘Journey together’. I’ve included the ‘Wheels’ photographs (from the last page of Part Two: 25<sup>th</sup> October 2020) as a starting place . . . for continuity.



The next *job on my To-Do-List* was to have the **Cylinder Head** completely reconditioned. I entrusted this work to **Criterion Engineering**. Stuart (who runs Criterion) reconditioned my **MAC Cylinder Head & Rocker Gear** to a very high standard, so I had no hesitation in getting him to do the work on my **Venom Head**.

He also checked-out my **Venom Rockers** and refaced the top of the **Rocker Cover Bolt Hole Fixing points**.



As you can see from ‘The List’ (photo right), I’ve had new **Colsibro Valve Guides** fitted, new **Valve Seats & Hairpin Valve Springs**.



Attention to Velocette Venom cylinder head & rocker box -  
 Remove valve seats & guides. Manufacture & fit new valve seats.  
 Fit new valve guides. Grind in valves. Assemble valve gear & check spring pre-load. Remove rockers, check & reassemble.  
 Remove bush from sleeve gear, fit new bush supplied & finish to suit new mainshaft.  
 Supply following items:  
 1 off Valve guide M3/5  
 1 off Valve guide M3/6  
 2 off Valve spring collar K4/4  
 2 off Valve spring collar, outer K4/6  
 1 off Valve cottar K5/6  
 1 off Valve cottar K5/7  
 2 off Valve spring bottom washer M3/4  
 2 sets Valve spring M6/4, M6/5  
 1 off Mainshaft BK5/8

Plus; New **Valve-Collars** and **Valve-Collets** replaced too. The ‘**Cylinder Head**’ is now **Fully Reconditioned** and is ready to fit.

At the same time, I asked Stuart to fit a new **Sleeve Gear Bush** into my **Sleeve Gear** and machine said **Bush to fit & match the new Gearbox Mainshaft**. (aka **BK5/8**) = **Check ✓**

There is one important thing to remember when building up a Bike that you have bought as a **Basket Case** (In other words, all in bits and in boxes & boxes containing dismantled motorcycle parts and fittings). In such circumstances, things very rarely go as planned as you discover that not all of the **Bike Bits** are there, or they are worn out or damaged beyond repair. So, you often feel like it is . . . “**One Step Forward and then Two Steps Backwards**”.

An example of this frustrating phenomenon (“One Step Forward and then Two Steps Backwards”) is my recent unfortunate discovery! Whilst cleaning-up the Venom Crankcases I found worrying signs of crack-like marks around the drive-side main bearing housing (see photo below left). They may, or may not be deep enough or even proper ‘Cracks’ . . . But, at this stage of my rebuild I really cannot take the chance, so . . .



With the Outer Main Bearing Race removed and the Crankcase cleaned-up I decided that I had a couple of options to consider in order to ‘address’ this latest challenge. I could either;

- or
- 1) Locate & buy a second-hand pair of undamaged crankcases (to replace my cracked crankcase).
  - 2) Get someone to make and fit a New *TOP HAT* style Main Bearing Housing.

After consideration, I decided on option two (2 from above);

So . . . the next time you see images of my Crankcase repair, hopefully (fingers crossed) you will see a shiny-new piece of well made and machined aircraft quality alloy ‘*Top Hat Main Bearing Housing*’ all ready and eagerly waiting to accept my new Main Bearings and fully reconditioned Crankshaft.

Well! As usual that’s the Plan

Two photos below: show my chosen method of making a permanent *VISUAL* ‘Chaincase Oil Level Gauge’. This devise comprises; a couple of ‘turned bosses’ fitted with small bore metal pipe (both silver-soldered together and then silver-soldered to the chaincase). The second photo below right; shows the “*New Fitting for the Oil Level guide*” as seen from the inside of the chaincase. The ‘Visual’ part of the ‘Oil Gauge’ is literally a short piece of clear plastic *Tube* fitted to each end of the two ‘Fittings’. The Oil Level checked at a ‘*Glance*’ with the added bonus that the short piece of plastic pipe can be easily replaced as & when needed.



When I reconditioned and rebuilt my lovely MAC 350, I replaced the 1/8” BSP Chaincase drain plug for a 1/8” BSP Banjo Bolt and Banjo fitting. The *VISUAL* part to my MAC “at a glance” oil gauge was enabled via a small-bore clear plastic pipe (as below photo) fitted to the Drain Plug Banjo. Whereas, the Venom now has a permanent gauge as well as retaining the original drain plug.



MAC Gauge

**5<sup>th</sup> November 2020:** As well as traditionally being Bonfire Night in the UK, the 5<sup>th</sup> November also marks two other important milestones. 1) It's the start of the 2<sup>nd</sup> National Covid-19 Lockdown in the UK (just what we needed . . . NOT!). And . . . 2) My Crankcases (& Piston) have arrived back home today Safe'n'Sound from having major surgery.

I entrusted this 'Major Surgery' to an engineering company based in Germany.  
I guess you are probably thinking . . . "Why Germany"?

Well! I asked around the usual '*Velo Suspects*' here in the UK (i.e. various Velocette engineering companies & Velocette experts) but the response I got back was NONE of them was willing to carry-out this remedial repair to my crankcase.

The engineering company chosen was recommended to me by my good friend and velo mentor Rick Essex. He had already purchased a couple of their 'well engineered products' and suggested that I contact them to ask them if they would be willing to machine out the damaged area and make and fit a new drive-side high strength aluminium bush insert (like a Top Hat) that will ultimately reinforce the area around the bearing housing.



**WHAT A GREAT JOB DONE!** Thank You Christoph for an excellent engineering solution to my problem.



**I can't wait now to start putting it all back together again.**

At the same time . . . I also 'posted-off' my ASSO Piston (in the very same 'crankcase' parcel to Germany) to have a new set of modern piston rings fitted, including machining the piston ring grooves to match the dimensions of the new Rings.

I now have a modern chrome ring occupying the top compression ring groove and the bottom oil control ring is now a modern spring assisted oil controlled ring.

Bl\*\*dy EXCELLENT conversion. Finally, my 1959 engine has 21<sup>st</sup> Century Piston Rings fitted.

Come-on . . . you must admit it! They do look the part and more importantly 'These Modern Piston Rings' must surely last a lot longer than the sixty-odd-year-old cast iron rings that are the usual 'Option' and do a better job.

The proof of the pudding . . . etc. will be when I've put loadz'o'miles on the clock.



Before sending off my ASSO Piston to Germany for machining (to accommodate the fitting of the new Rings) I 'Heat-Treated' the Piston (as per an article I read in an old Fishtail that I was directed to by my good friend & Velo Mentor Rick Essex).

The process was to put the Piston in an oven and heat it up to 200 degrees for at least two hours and then let it cool-down again naturally.

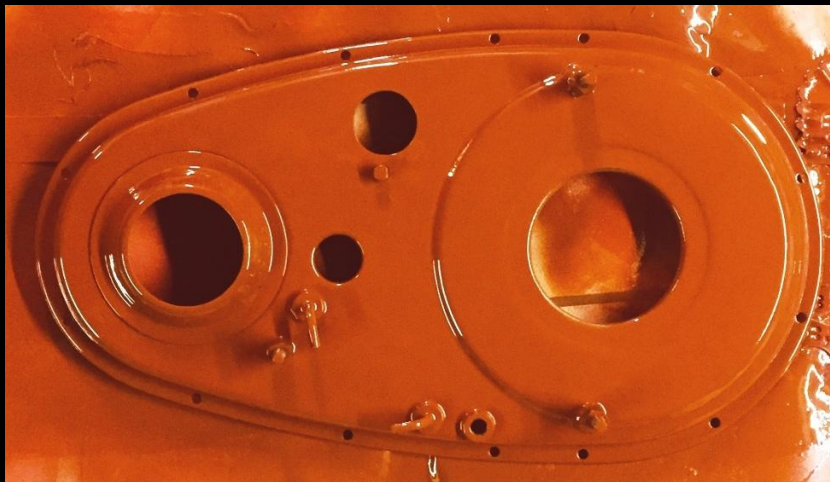
This process was carried-out three times.

The reasoning behind this heat treatment was to 'Normalise' the piston material, as it was suggested in said Fishtail article.

It stated that when a Piston has stood for a long time and then fitted into the engine (and then fired up) there is a possibility of said Piston 'Seizing' (or partial seizure) due to the Piston 'Growing'. Well! That's what was suggested, hence the above heat treatment.

So, I thought I'd give it a go!

The above work was carried-out by Christoph Axtmann of Motorradrestauration ([www.motorradrestauration.de](http://www.motorradrestauration.de))



Primed with red oxide



Top coat applied

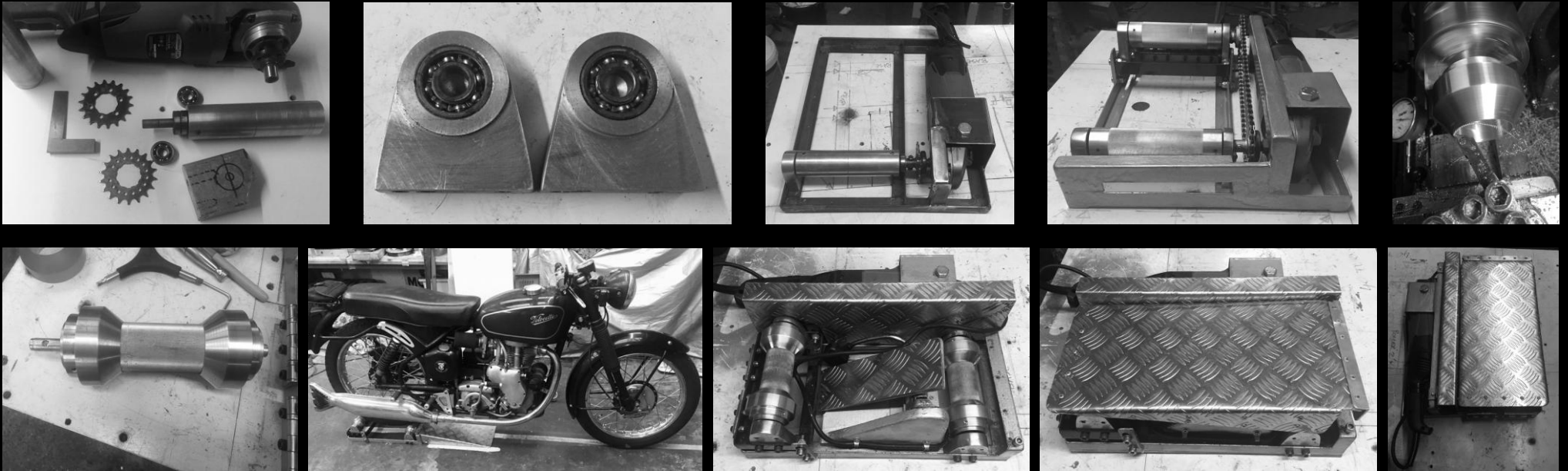
## Venom Work is momentarily put on hold . . . as Non-Velo Work continues . . .

**23<sup>rd</sup> December 2020:** Latest update just before Christmas 2020 on the lack of 'Venom Rebuild' which has been put on hold (during late November and most of December) due to various reasons, including family commitments, unexpected roof repairs (to our business premises) as well as a few other 'petty-excuses'.

In my defence, my unheated garage during this recent UK cold-spell hasn't helped motivate me into Velo Engine & Gearbox reassembly work-mode. Plus: my tendency for 'procrastination' doesn't really help either. Like Granny always reminded me . . . "don't do anything today that you can put off doing tomorrow".

And finally . . . my easily distracted RAM (random access memory) intervened, which happens quite often – making me change direction (yet again) into doing another little side-project (instead of working on the important stuff) . . . look what I've ended-up making.

My latest *RAM distraction* took up most of my 'garage-time' constructing a new 'Roller Starter'. I fabricated the frame from 1" angle-iron to 'Mount' the Disk Grinder (which powers this apparatus). Bearing housings made of aluminium with Rollers made from Ali-Tube and Alloy Cones to keep the rear wheel central with home-turned roller-ends. I used four small old gearbox bearings, all driven by two BMX sprockets & chain. Finally covered in Ali-checker-plate.

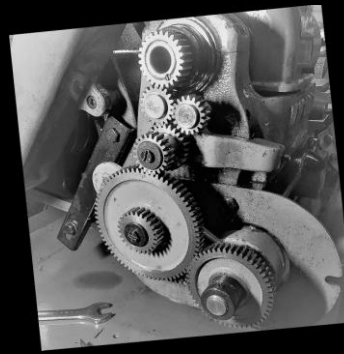
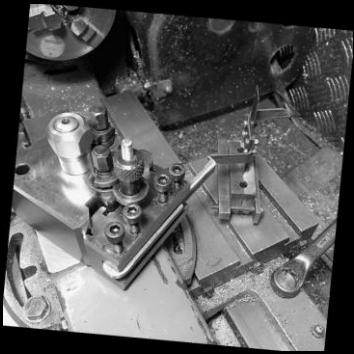


2<sup>nd</sup> photo above; the 'Roller' was 'Tried' on the MAC and I am pleased to report that it works really, really, REALLY Well.

My initial motivation for building this device was to get ready for 'when' I eventually manage to complete the Venom and use my new Roller-Starter to circulate the oil (prime) around the engine prior to firing-it-up for the first time (and obviously to help start the *Begger*). But, now its finished (The Roller-Starter that is) . . . it is working extremely efficiently (as intended). It also 'packs-away' really neat & tidy. In 'Storage-Mode' the home-made foot-treadle starter-switch nestles between the Rollers and the 'Ramp' then doubles-up as a great little cover for the whole assembly.

My new Velo Roller Starter (aka MacStarter) will also come in handy starting the MAC and the Venom, as well as any of the other bikes I have parked-up in my workshop / garage at anyone time (including my Norley)! So, all-in-all, I think it was a rewarding distraction that will prove most usefull in the future. Merry Christmas & a Happy New 2021 to you all.

**3<sup>rd</sup> January 2021:** Well! If you are reading this . . . you have survived Christmas 2020, which has come & gone as quickly as ever, and hopefully you and your family managed to 'See-in' 2021 as safely as is possible under these strange covid times.



The remaining weeks during January 2021 (under the UK's Third National Covid-Lock-Down conditions) was spent working on my Myford ML7 Lathe. I purchased and fitted a new quick change tool holder system and made various cutting tools to suit. I reconditioned & reset the transfer gears and finally modified the Myford 'Oiling system' which has improved the delivery of daily lubrication and aids future maintenance. What this means is that all of the above 'Non-Velo' work that was carried-out (in December & January) was good preparation in readines for the 'BIG BUILD' starting soon. At least the Myford is now ready and able to cope with all of the screw-cutting, bush-making, parts turning & boring duties needed to make the various Velo parts 'fit-each-other', etc. etc.

#### **4<sup>th</sup> February 2021: The Venom re-build recommences for the first time following the Christmas break**

I have finally re-started work on my Venom. After a good clean-up in the workshop *a.k.a. The Office, or more oftenly referred to these days as The Ice-Box, due to the near zero temperatures experienced in my workshop.* The bench was prepared with clean heavy-duty white wallpaper (I've used this formula for years and find it easier to locate the inevitable small parts when dropped). The cylinder bore was re-measured and compared with the Asso Piston and after all calculations made & considered, it became apparent that I needed to enlarge the Bore by at least 0.0055" (five & a half thousandths of an inch) to get the required 0.008" (eight thou") *Piston to Barrel* working clearance. Various Velo Books state six thou" clearance but in Geoff Dodkin's book; he recommends at least eight thou".



The first photo above left: shows the American made AMMCO Self-Lubricating Cylinder Grinding Tool (which is as old as the Venom Barrel). It's a great bit of kit with various 'Sized' attachments that accomodate a wide range of cylinder diameters. Four Tool Carriers hold the carburundum 'Stones' in place (see 2<sup>nd</sup> photo above). They come in both Course & Fine 'Grade Stones'. The Course Stones are for roughcutting & grinding and the Fine Stones for honing & finishing (used to produce a smooth accurate finish). Unfortunately, due to the freezing conditions . . . I'm only managing to spend a couple of hours per week on the Venom.



Photos above: show me assembling the honing 'Blades' and oiling the internal expanding mechanism and using the AMMCO Tool in the Venom Barrel. The last photo (above far right) shows me checking the clearances with internal micrometer (several times – after each pass) and then re-checking yet again with the 3" to 4" external micrometer just to compare and confirm the results of my labours.

As you can probably gather from my warm winter padded coat, the temperature is yet again down to 5 degrees above freezing. Bbbrrrrrrrrrr!

Also; even though this AMMCO Grinding Tool is listed as "Self-Lubricating" I still used a mixture of Paraffin & Oil on the Stones as I made the "Passes' through the Bore. This type of work (and/or similar finishing work) is what I class as fine fettling and 'detailing' (which requires loads'n'loads of patience) & lots'n'lots of time and methodical planning to get the desired, accurate results. I try to keep in the forefront of my mind the motivational 'Sign' that was hanging in the *Veloce Hall Green Work* . . . "For a good job look to detail".

I've seen Allen Millyard (on his YouTube channel - re: Honda XL175 engine repair – *In the Shed* - series) using basically the same Boring Tool as I did . . . So that is 'as good-a-recommendation' for me as I can get ! Allen's work is most inspirational and reminds me that 'Where there's a will, there's a way" and quite often, 'That Way' is not always the most traditional choice ☺

So far – So Good (as they say)! The Piston & Barrel are now 'paired-up' and ready to work together. The new Piston Rings have been 'Gapped' into the new dimensions of the Barrel. Although this job is now completed, I'm not quite ready to re-unite said parts with the rest of the engine so I've simply oiled the parts and wrapped them up ready for safe storage (ready for future use). The next 'Job' was to check & set the four thou" 'Pre-Load'. I clamped the crankcases together with four thou" Shims (spaced-out equally) and then checked the crank end-play with a Dial Test Indicator on a Magnetic Base. Yet another job tackled.



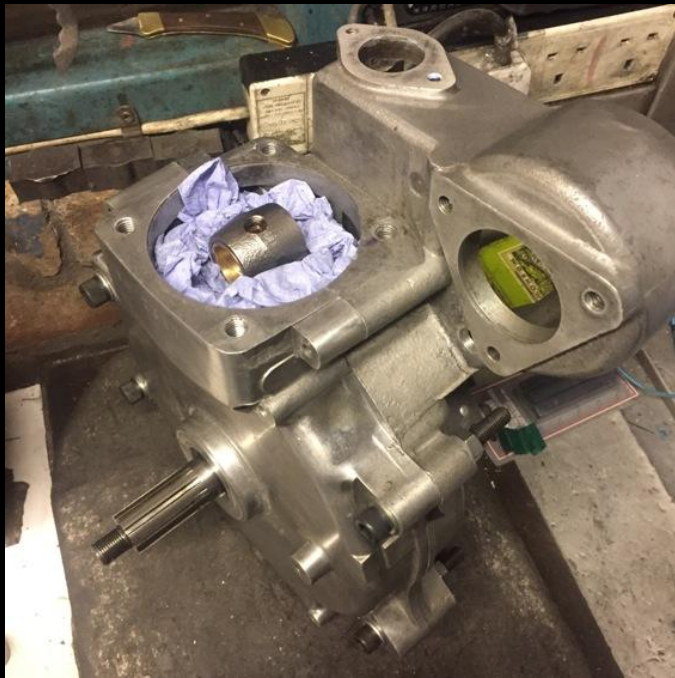


Photo Left: The small-end of the Con-rod is now 'lined-up' with the centre-line of the two halves of the crankcase, as checked with a pair of inside spring callipers, to ensure the Crankshaft is perfectly in-line with the Barrel & Cases (just like I did with the MAC rebuild). The big difference is that the MAC had literally 'Zero' main bearing pre-load, whereas my Venom now has a main bearing pre-load of four thousandths of an inch.

Photos below: As suggested in John & Stuart's article in this month's VOC Fishtail magazine (page 39, #474) I decided to drill a 5mm drainage hole at the lowest part of the top mounting webs on my gearbox to "... allow accumulated water to drain away". Thank you (John, Stuart & Fishtail) for the suggestion.



Another quick gearbox job carried-out this week was to clean-up the threads in the front of the gearbox (where the outer cover is bolted onto the front of the gearbox with a 1/4" BSF tap.

I think that the Chart below is a useful reference tool when it comes time to do the Valve Timing (hopefully, this will prove useful to others too).

The following chart list 'Two Sets' of figures for checking the Venom Valve Timing. Both 'Sets' of figures are correct (so I've been told). These figures are taken directly from the Velocette Service Manual (aka the 'Red Book'). It doesn't matter which method you use *providing* you stick to the same method for both valves.

In 'Method 1' the Tappet clearance is set to 0.030" (thirty thousandths of an inch) and checked with a timing disk attached to the drive side crankshaft, with the Top Dead Centre (TDC) Zero degrees set to coincide with the actual top dead centre of the Piston position in the Cylinder Bore. A 'Pointer or Marker' is placed in such a way to point to the 'Zero' point on the Timing Disk and by turning the crankshaft carefully & slowly in the correct direction – the degrees can be 'Read-Off' on the disk and compared with the actual movement of the Valves, as checked with a Dial Test Indicator (DTI) Gauge.

In 'Method 2' the Tappet clearance is set to 0.053" In. (fifty three thousandths of an inch for the Inlet Valve) and set at 0.052" Exh. (fifty two thousandths of an inch for the Exhaust Valve) and just as in Method 1; checked in the same manner, using a Timing Disk attached to the drive side crankshaft and a DTI on the Valves.

It is important to remember to remove the Exhaust pushrod when setting the Inlet timing (& remove the Inlet pushrod when setting the Exhaust timing). Plus; Note to Self (& others reading this); DO NOT FORGET to reset the Tappet clearances to the correct 'running clearances' before starting the engine.

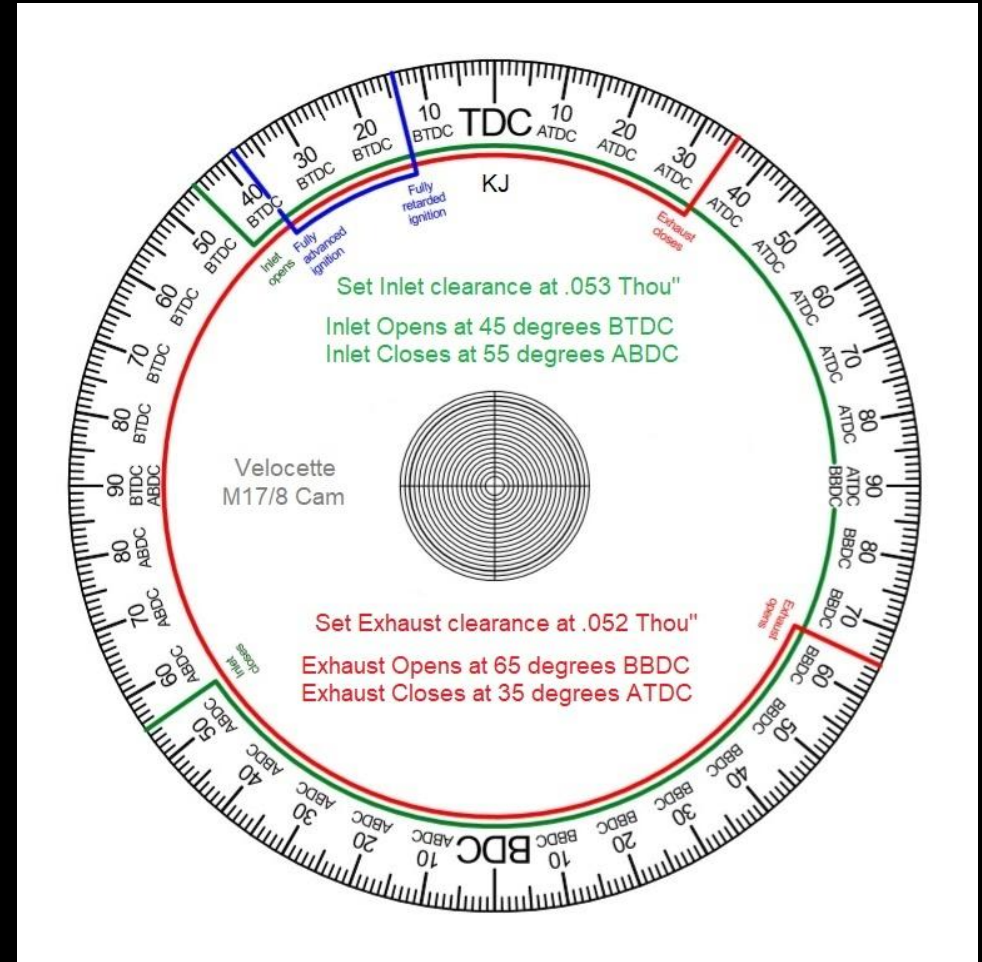
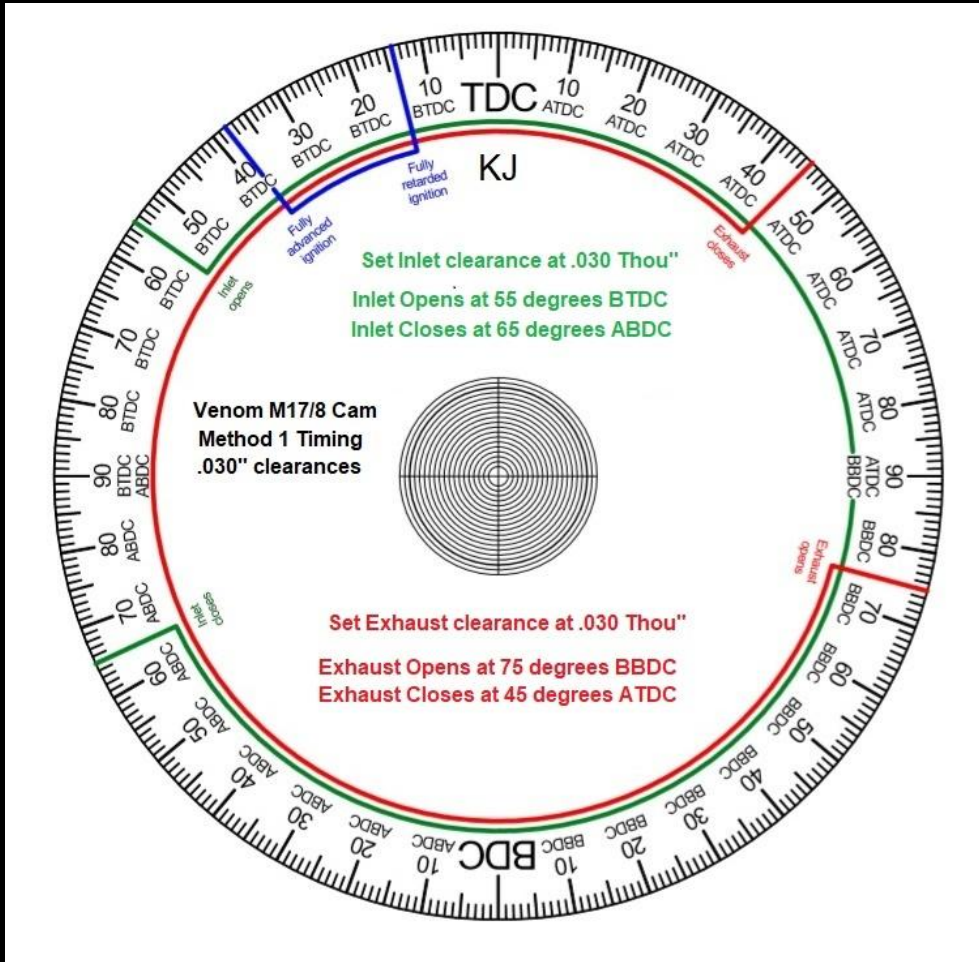
M17/8 Cam	55° - 65°	75° - 45°	0.030"	Method 1 for M17/8
Venom & Thruxton	45° - 55°	65° - 35°	0.053" in.; 0.052" ex.	Method 2 for M17/8

Example for Method 2:

Inlet Opens at 45 degrees BTDC  
 Inlet Closes at 55 degrees ABDC  
 Exhaust Opens at 65 degrees BBDC  
 Exhaust Closes at 35 degrees ATDC



Method 1: (Timing Disk on Left below) with Tappets set to 0.030" clearance (thirty thousandths of an inch clearance).



Method 2: Timing Disk on the Right (above) with Tappets set to 0.053" for the Inlet & 0.052" for the Exhaust clearances.

The reason for setting the Tappets to .030" (as per Method One) or setting the Tappets to .053" & .052" (as per Method Two) is to take into account the lengthened 'Cam' shape on the Venom Cam Followers. These Cam Followers have what is more commonly known as "Quietening Ramps" profiled onto these Followers, and this gradual 'Lift & Fall' needs to be factored-into the process when it comes time to set the Valve Timing accurately. Plus; the most accurate method of checking this whole process is by using a good quality Dial Test Indicator together with a suitable Timing Disk (as above) but it is essential to ensure Top Dead Centre is accurately located (in order to achieve accurate results).

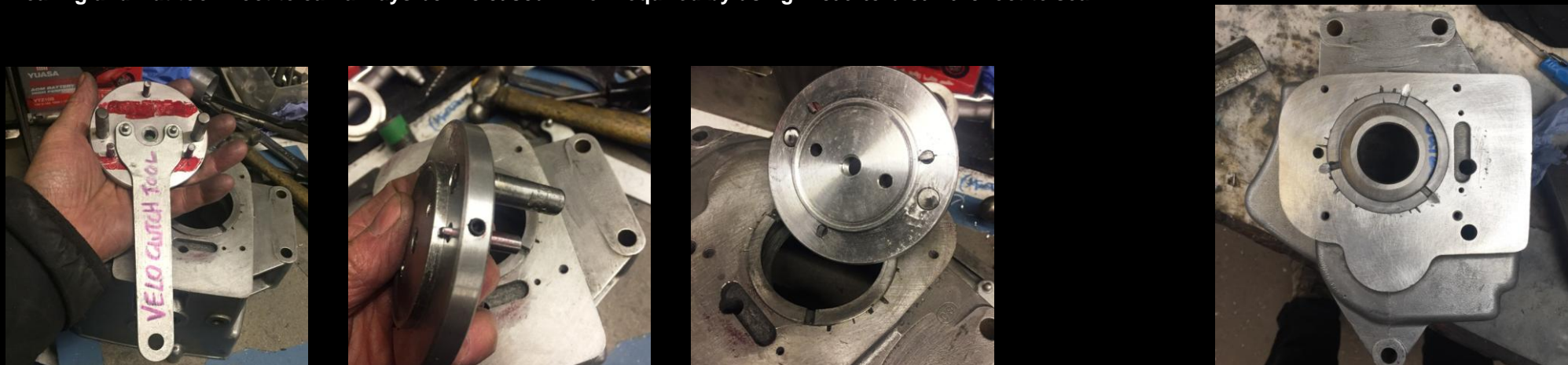
**4<sup>th</sup> March 2021: Gearbox rebuild:**

I finally got around to cleaning-out the Venom Gearbox ready for the rebuild. I started by 're-surfacing' each of the joint-faces of the gearbox. *Flattening* each Gasket Face. I already have ALL of the bits to rebuild my Box (as purchased at the end of last year from Nick Payton) so . . . I sorted them all out and started the process by fitting the two new bearings (shown below). 1) The Layshaft Bearing RHP LJ5/8J. And; 2) The Sleeve Gear Bearing (both still wrapped and ready for use) together with the two new oil shims, again all ready for instalation.



The photos below show my home-made Tool for tightening the Sleeve-Gear Bearing Retaining Ring (B39/26). This Retaining Ring (more commonly known as the 'Sleeve Gear Nut' tightens & holds in place the main shaft gearbox Bearing (B22, and the two oil retaining Shims – B31/2). The photo below left; shows a Peg Spanner fitted into two holes drilled into the tool. But you can also see two Larger Pins in the tool to facilitate a large Bar to apply extra torque / leverage to help tighten this vital part securely.

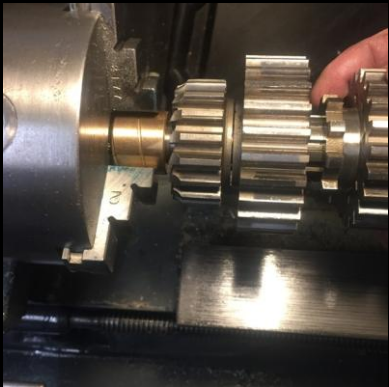
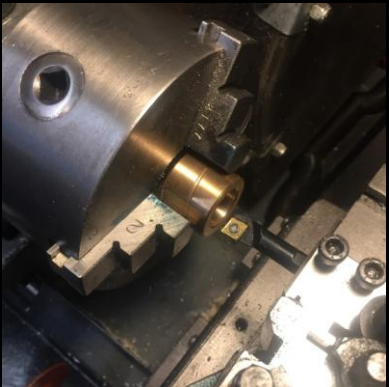
The final stage of this job is to lightly 'Peen' the area in between the three 'slots' of B39/26 to 'Lock it all together' and to prevent the Nut from coming undone. This is a brutal but Veloce recommended method used (see end photo below far right). But as usual . . . I have also used Loctite to secure the Sleeve Gear Bearing and Nut too. Loctite can always be 'Released' when required by using 'Heat' to break the loctite seal.



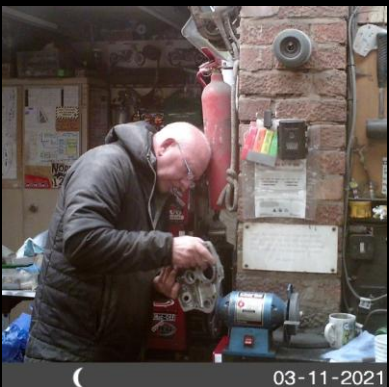


Gear change plate (photos top left). I removed all of the sharp edges off the change plate (where the selector fork pins locate). I used a carborundum stone to 'smooth off' all of the groove contact edges.

Photos top right: show the damaged 26 tooth layshaft drive gear & the replacement gear (as supplied by Nick Payton last year), shown ready for fitting.



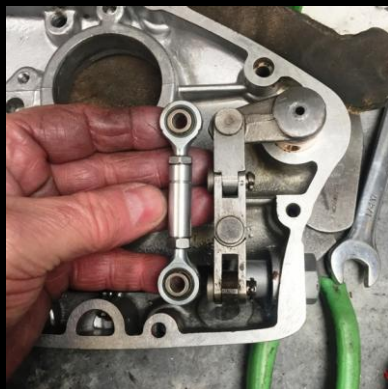
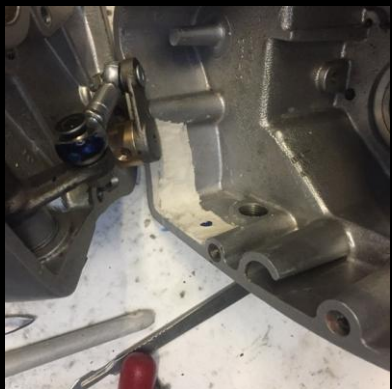
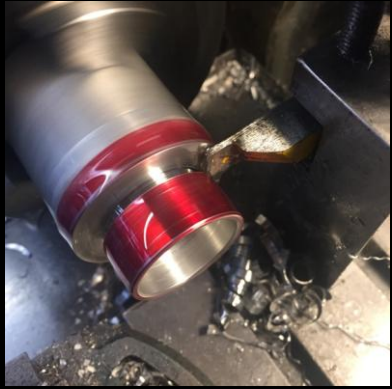
Two photos left: show the new kickstart bearing bush being 'bored' on the Myford to the exact size of the layshaft. This means that ALL of the bearings and bushes have now been replaced, together with a couple of new gears (plus new shims & new oil thrower, etc).



Photos (above right) The Gear Chage Lever Bush, *Chamfered* to take an 'O' ring oil seal.

03-11-2021

I made an 'End-Cap' out of aluminium bar to fit over the end of the gearchange bush (this 'cap' is designed to help secure the 'O' ring oil seal in place). This modification will hopefully keep the usual oil-dribble and/or oil-mist from escaping via this brass bush. Yes I know . . . it's such a miniscule amount of oil loss from this *point* but never-the-less, this is one of those annoying '*traditionally accepted*' oil leaks that can be sorted using modern 'O'rings and a bit of machining.



As there was a lot of 'Play' in the Velocette designed *universal joint gear change linkage*, I decided to replace it with a couple of 6mm 'Rose-joints' (from my Honda FireBlade gear change).

After turning and threading an aluminium bar to the correct size, the next stage was to fit the two 'ends' and check-out the clearance between the top of the rose-joint and the inner gearbox casing. This was achieved by using white Plasticine (& some *Stuarts engineers blue*) to identify any 'fouling' of the inside of the gearbox.

Job Done! RESULT! No more 'excess play' inside the gearbox (or at least not in the gear change linkage department).

I decided to cross-drill my new gear change linkage (photo below) and secure the threads using split pins (as well as the two locknuts).  
 Like I said before = Belt & Bracers ✓



The two photos (left) show:

- a) Kickstart layshaft thrust washer (Velo Parts No. BK83). The reason for three different thicknesses is to hopefully sort out the 'layshaft end float' with one of these shims. And . . .
- b) New thrust pins (Velo Parts No. K191 x 3) along-side these are three old corrosion-pitted thrust pins. These thrust pins fit into the Kickstart Ratchet (Velo No. BK14).

Layshaft end float checked & SORTED ✓

I also purchased (ages ago) one of the VOC Spares *Kickstart Return Springs*, with the extra-long 'tang' that is designed to help stop the spring from becoming coil-bound. The next gearbox related job was to make an oil seal housing (to hold a modern oil seal) fitted to the kickstart shaft. The idea being to turn a piece of aluminium bar to accept a small oil seal. This new oil seal housing to be bolted onto the outside flat surface of the kickstart housing (instead of fitting the seal in to a 'turned recess' like that fitted to the MAC). Again, this modification will only stop a miniscule amount of oil loss from the gearbox, but every-little HELPS!



First, I had to make sure the kickstart housing was fitted in the Lathe Chuck 'true and square' (hence the Dial Gauge & Verdict Gauge used above) before turning a 'Flat-Face' ready to accept the new oil seal holder. These two 'Flat Surfaces' should effect a good sealing face (and just to make sure, a touch of RTV will help ensure an oil tight joint). I drilled & tapped the kickstart housing with M3 threads. 3mm counter-sunk screws holding everything in place.



Kickstart Oil Seal 'Sorted' . . . So! The gearbox is not far off being rebuilt, with many new parts fitted, all new Bearings and a few extra Mods done too.

Photos below: One final job to do on the gearbox before full assembly takes place . . . I found the inner face of the Kiskstart Housing where the three 9/16" thrust pins (Velo Parts No. K191 x 3) make contact with the housing was damaged and deeply pitted with uneven wear. So I took the opportunity to 'Mill' the contact surface 'Flat' once more, to allow a nice smooth bearing face for the pins to rest evenly upon (see the last three photos below right – housing being *Milled* flat).

Obviously once machined, I had to re-check & re-set the Layshaft End-Float yet again.



The Velocette Service Manual (aka The Red Book) page 54, re: Layshaft recommends:

"End float must not exceed .015 –in. and is best left about .005 –in."

Fortunately for me, I already had several Thrust Washer Pads (BK83) in various thicknesses ready to use. I then re-set the correct *Layshaft End Float* to 5 thou".



Photos Left:

I made two new '*shouldered*' bolts on the Myford Lathe to secure the Rose joints to the internal gear change levers.

Both holes in the gear change levers are quarter of an inch diameter (1/4"), but the internal diameter of each Rose Joint is 6mm (hence the shouldered '*Step-down*').

The most obvious choice of thread for these new bolts was 6mm thread and these new shouldered bolts to be held in place using 6mm Nyloc Nuts.

Enough about the gearbox (already) ! The next job on '*The List*' (once the gearbox has been assembled) is to re-start on the Engine rebuild.



Before . . .



During . . .



& After.



Venom & MAC Plates

The photos on the left show the Venom timing gear steady plate (Velocette part # M199/2).

I've successfully modified a few of these Velo timing gear steady plates now (see the end photo left) showing comparison with the MAC steady plate & the modified Venom steady plate).

I modified the MAC steady plate a couple of years ago.

The main reason for modifying the above timing gear steady plate (relating to the above photos) is so the intermediate gear spindle (Velo part # M200/4) can be loosened, adjusted and tightened (to correctly set the backlash in the timing gears) without the need to remove the steady plate. All three 1/4" BSF intermediate gear spindle bolts (Velo part # SL8/5) are accessible for adjustment using either socket spanner and/or appropriate box spanner with this modification.

My thinking is: when the steady plate is removed – to carryout the backlash adjustment – the end of the camshaft spindle and the end of the intermediate gear shaft are unsupported (whilst adjustment takes place). I do understand that both of these gear shafts / spindles should be held quite tight in their crankcase housings, but there is still a possibility of unwanted movement . . . BUT, with the steady plate bolted firmly 'in place' – there should not be ANY unwanted movement whatsoever (in these 'shafts / spindles') whilst adjustment is being made, and therefore allow for a more accurate 'setting'.

Well! That's what I think anyway.



In between engine & gearbox rebuilding . . . I decided that I wanted to change the nuts that hold the rear shock absorbers on to the swing arms, with something a bit more interesting and unusual – So, I turned a couple of knurled conical nuts (1<sup>st</sup> photo above left shows the original Hex nuts & the 2<sup>nd</sup> photo shows the new nut). 3<sup>rd</sup> photo shows the 'C' Peg Spanner made to tighten these conical nuts. You may also notice that I've removed the Speedo Gear Drive from the Back Wheel and replaced it with an aluminium Dust Cover / Spacer. I intend to fit an electronic Speedo to my Venom instead (and fit an electronic Rev-Counter too). The last two photos (above right) show my new Brake Torque Arm Bolt. I threaded the bottom bracket 'Lug' (of the Swing Arm) and fitted a countersunk stainless steel cap-headed screw (and countersunk aluminium disk / washer). This now only requires one 'Allen Key' to tighten-up this new brake torque arm bolt.

Photo left: I've fitted a manually operated 'On / Off' Shut-Off Oil Supply Valve replacing the original Velo designed anti-sump valve (Velo Part # MAS14 Ball valve union assembly). The main disadvantages of the Velo MAS14 valve assembly are:

- (1) The Ball valve only 'Lifts off its Seat' when there is oil in the feed pipe. If there is 'Air' in the feed pipe (for whatever reason) the Ball is unable to lift off its seat and therefore potentially starves the engine of oil.
- (2) The original MAS14 Ball Valve also 'Restricts' the flow of oil because the way the oil has to flow around the Ball and past a tiny valve seat. But you don't have to worry about turning on the valve because it's *automatic* (providing it works).

The main benefit of My New Oil Shut-Off Valve is increased & relatively unrestricted *oil-flow* to the Engine. *HOWEVER* . . . The dangerous downside is, if you forget to turn the Oil Tap 'On' . . . You KILL your Engine (Yes! Velo-Engineaside, or Engine Murder !).

To ensure that I Do Not (accidentally, forgetfully & unintentionally) Kill my Engine . . . I have fitted an 'On / Off' Ignition Switch. It is now impossible to start the engine without turning the Oil Valve 'On' first. Once the Oil Tap is activated the Ignition Switch can be turned to the 'On' position. When the oil tap is closed it automatically turns off the ignition. RESULT!

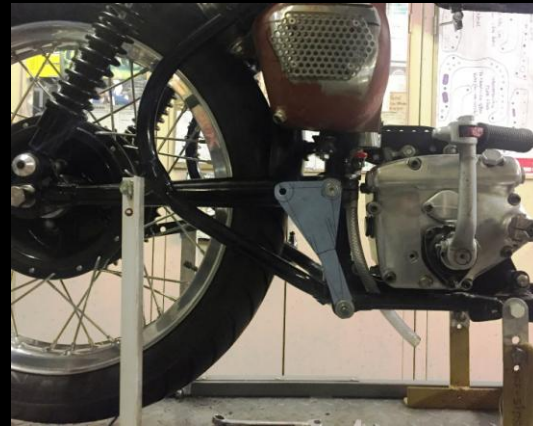


Photos Right: The Oil Tank has been given a (KJ) Thruxton styled make-over but with a removable *Heat Shield*. I've *silver-soldered* these fittings in place.

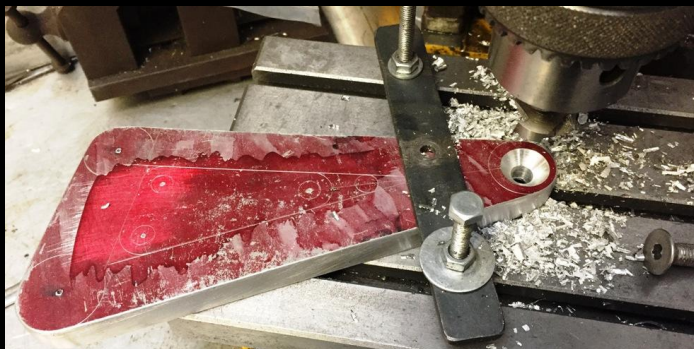
Photos Below: show the process I went through, using my usual CAD (Cardboard Aided Design) method to design a new 'Set' of Rear-Set Foot-Rests.

As can be seen by the three photos below; the 3 cardboard templates which are much narrower than the first pair of plates that I made some time ago. The original Pair of rear-set plates (that I made for the Venom) I fitted to the MAC to 'Trial'. I loved the riding position so much that I left them on the MAC and therefore need to make new 'Rear-sets' for the Venom again.

Photo one & two of the cardboard templates (below left) don't look quite right! So, I'm going with the last photo below (far right); with a cut-out inserted, so that the swing-arm grease nipples can be easily accessed for regular maintenance.



All I've got to do now . . . is to turn this cardboard cut-out (end photo top right) into the real thing – made out of 1/2" Duralumin-plate (see more photos below)



Obviously a fair-bit of sawing, filing, milling, cutting and tapping ahead, with plenty of reshaping, polishing and . . . well, lots of extra *fettling* to say the least.



I tapped the half-inch thick rear-set-rest plate to 7/16" BSF to accept the footrest 'Foot-Peg'. As can be seen by the two photos below (right) I've made a new footrest out of 5/8" mild steel bar, turned down at the end to 7/16" & 'tapped' the end to 7/16" BSF (to match the rear-set-plate). With the experience gained on the MAC, I decided not to have a folding footrest on the venom (as I can easily kick-start the MAC without folding the off-side footrest 'out-of-the-way').



I've made these Rear-set Plates out of 'half-inch thick' Duralumin plate (instead of the 'quarter-inch thick' Ali-plates used on the MAC). With these thicker plates I can dispense with the usual rear strengthening bar (that goes from the rear-set-plates to the rear footrest peg mounting Lug). Also, as it is now sporting a bespoke single seat there is no need for passenger footrests to be fitted either.

1<sup>st</sup> photo (below left) = more hack-sawing. Me removing the inner section: i.e. cutting-out the triangular section between the three large drilled holes.



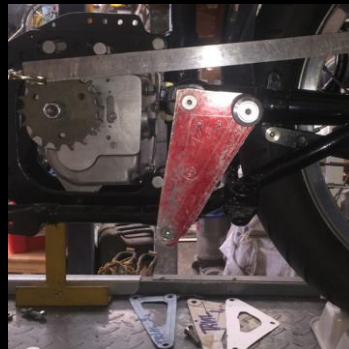
The middle photo shows the *Plate* being neatened-up in the Milling machine (with an End-cutter) and finally, the Near-side *Rear-Set-Plate* and Footrest fitted = Result! One side done . . . & one to go!

I realise these modifications may not be *everyones'* cup of tea, but Hey! It is my bike & It's me that's gonna ride it!

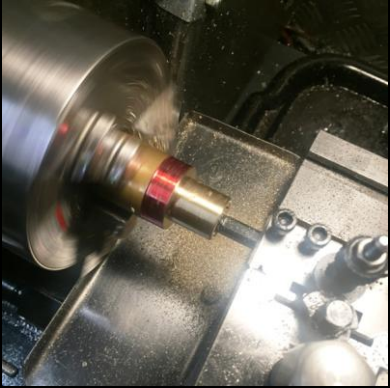
The Near-side footrest plate cut-out ready, drilled and countersunk to replicate the shape & style of the O/S plate (bottom left photos).

Note to self: I really need a Bandsaw

26<sup>th</sup> June 2021



3<sup>rd</sup> July 2021: bespoke rear brake lever made.



Photos Right:

The 'Rose Joint' fitted to the top of the Brake Lever (for the rear brake) has an M8 female thread and the brake 'Rod' is threaded with a male thread 'quarter of an inch' BSF . . .

So, I had to make a 'knurled' adapter to join the Rose Joint to the Brake Rod!



Photo Above:

Shows the near-side triangular Rear-Set-Rest Plate in relation to rear Brake Lever which has been designed and made to allow full access to the Trunion Swing Arm Grease Nipple (for ease of regular maintenance greasing).



Repositioned rear brake lever (right) fitted to the rear brake plate



First Photo Above: Shows the five cardboard template variations that I tried (with slightly different angles & shapes) to get the 'look' that I wanted for my new gear change Lever.

Once sorted (2<sup>nd</sup> photo above) I transferred the outline from my cardboard template onto 'half inch' thick Duralumin Plate.

The next couple of photos above show my efforts with a *Hack-saw* and set of *Files*.

(Note to self: I must invest in a Band Saw!)



After loads of filing, re-shaping and polishing (both photos Left) show the next stage turning the round hole into a *Square Hole* (to fit onto the square gear change mechanism that comes out of the gearbox).

I'm making this new gear lever because of fitting the new Rear-Set-Rests, but also . . . So that the gear change orientation is 'Reversed' so that 'DOWN is for DOWN' & 'UP is for UP' regarding all gear changes.

I did the same modification to the MAC !

But, I think this gear lever (below) is much better than the one I made for the MAC



The next job on my *July List* was to make another (slightly longer) Kickstart Lever. The main reasoning behind this mod is: When I'm riding my Velocette whilst wearing motorcycling Boots, I find it most awkward to change gear because the original gear lever is so small and difficult to engage whilst wearing my big Clodhopper Boots. So . . . by making a new 'Base' for the Kickstart Lever I am able to move the kickstart lever outwards, i.e. further away from the gearbox, allowing for a Longer Gear Change Lever 'Peg' to be used.

The clearance prior to modification was 4cm (from the gearbox outer casing to inside edge of the kickstart shaft). This new extension modification (at the base of the kickstart) now gives 6cm of clearance, allowing for a much longer gear change-peg to be made & used (making gear-changes easier). The added bonus is more clearance at the Foot Rest position too (when kick-starting the Velo). This means I no longer need to have a folding Foot Rest Peg (as the Kick Start Lever also 'clears' the Foot Rest).

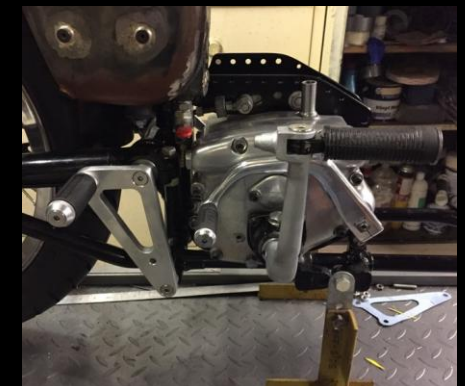


Photo Left: I was going to make the Kick-Start 'Base' exactly like the MAC Kickstart Base (which is a pre-War side folding model).

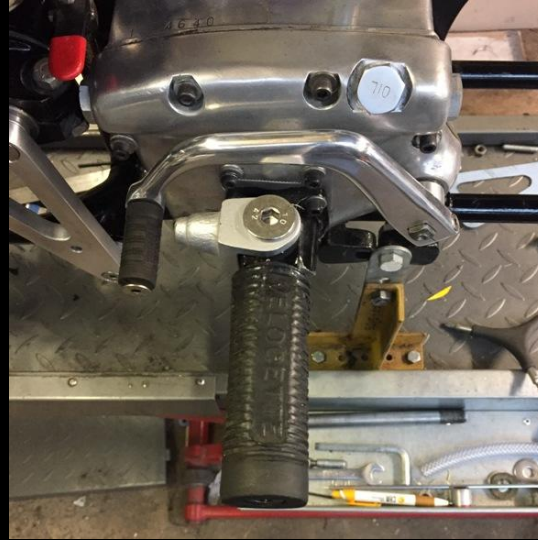
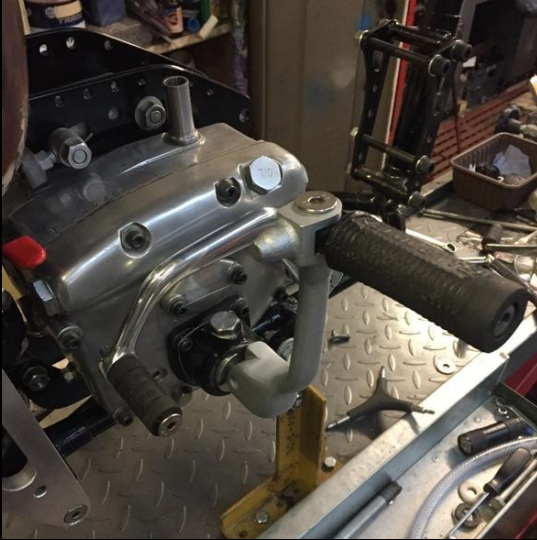
But . . . halfway through, I decided to use the old top-folding Kick-Start Lever and 'Cut & Shut' these two parts together to achieve the clearance I wanted.



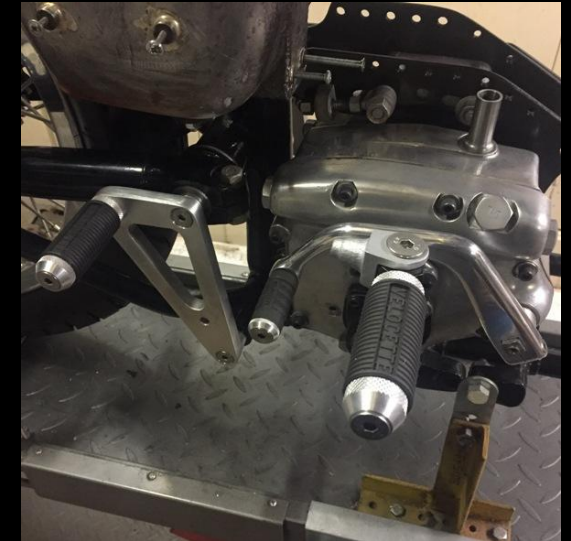
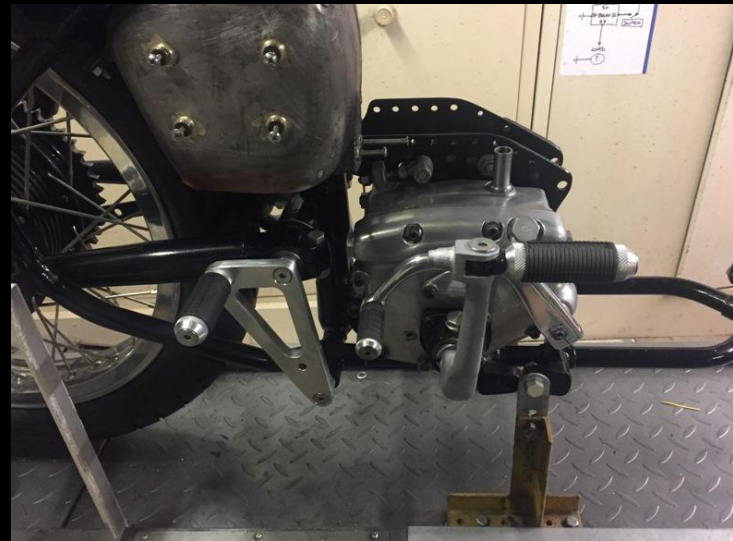
I extended the base of the kickstart Lever 'outwards' to allow more clearance for a longer gear-change lever to be used. This modification also gives more room at the Footrest, so it doesn't have to fold.



**Two photos below:** Obviously a new 'Velocette' Kickstart Lever Rubber needed.



So . . . I made a couple of knurled Kickstart Lever 'Ends' out of aluminium bar, tapered at each end, to match all of the other modified fittings that I've made (see kickstart photos below).



Above photo (left) shows the new knurled end caps & Velocette Rubber fitted to the Kickstart Lever. The middle photo shows the new Kickstart Lever in the 'Folded-in' riding position, with the end photo (above right) showing the Kickstart Lever 'poised' in the ready position.

This means that both Footrests, the Gearlever and the Kickstart Lever ALL match now, with conical-ended aluminium 'end-caps'. ALL bolted in place using stainless steel countersunk Allen-headed bolts.

This is the second time that I've pressure-tested the Venom Oil Tank (photos right).

I thought it prudent at this stage to test the Tank again, since I drilled the Tank and silver soldered new fittings to the Oil Tank last month.

It's not that I don't trust my soldering (&/or welding for that matter), but I would much prefer to find a leak 'Now' . . . rather than later, when the Tank has been painted.



The photos below show the Oil Tank after the 'Primer' has been applied (yet again) in readiness for the final 'top coat'.

The two holes at the bottom front section of the Tank are threaded bosses, silver-soldered in place to accept the new Ignition Switch that can only be switched 'ON' when the Engine Oil Tap is turned to the 'ON' position.

This is my Oil Shut-Off Valve 'fail-safe' switch!



(Photos below) Pushrods & Inner Clutch Housing Plate cleaned-up on the Myford Lathe and I've dismantled the Oil Pump for inspection



The Oil Pump Baseplate is quite 'marked' and in need of surface grinding flat (no problem – just time consuming). The internal gears are also slightly 'marked' in a few places but can be 'Stoned' back into servicable condition quite easily so this is not too much of a worry (once reconditioned) and ALL should be Okay.



As you can probably tell from the photos, I haven't made much progress on the Venom rebuild since July.

The main reason for this is that I was forced to tackle several unexpected jobs on both my other vehicles, as well as on our business premises.

The first hick-up was in mid-July when my MX5 was targeted by Scum-Bag-Thieves (armed with iron bars & Machete) who stole my Catalytic Converter whilst my car was parked on my front driveway, just after 2am on Sunday morning.

Emergency Services (999) was called for immediate assistance (especially as these thieves threatened to kill me if I tried to stop them) but sadly, the first sign of police was on the following Wednesday (only 3 days late)! Needless to say no one was caught for this theft.

So, after having a complete new exhaust fitted to my MX5 (due to the amount of damage caused to the manifold section as well as the back section & Lambda sensor) I proceeded to make & fit a new Cat-Guard, which now covers that part of the exhaust system. This probably will not stop future theft but will delay them as there is now far more metal to cut away to get to the 'Cat', thereby making it less of a target????

The idea is to make any future attempted 'Cat-Theft' too much trouble and time consuming for them to bother with.

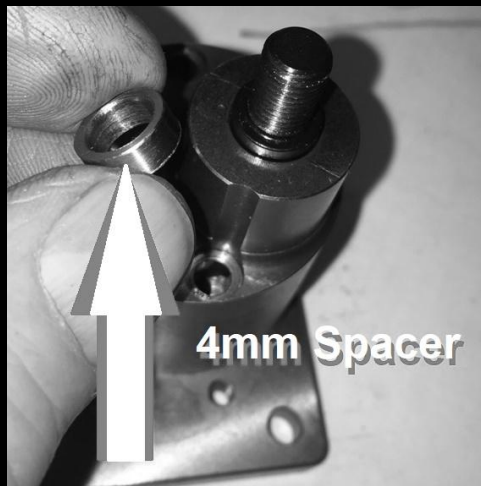
Well that's the Plan.

1<sup>st</sup> December 2021 Venom Work resumes (photos below) Chasing all 3/16" Whitworth threads for Timing Case Cover, plus; Oil Pump reconditioning completed.



I've 'hand-ground' the Baseplate flat using diluted grinding past on a Flat-Plate and cleaned up the marks on the internal gears. I've also replaced the two external gears i.e. new bronze Drive Worm Gear (M206/2) and a new Driven Gear (M217/2).

As per an excellent article in the VOC Fishtail magazine I decided to make a 4mm spacer (on my trusty Myford Lathe) to fit onto the Oil Pump Drive Spindle. The idea for this improvement came from Stuart McGuigan of Criterion fame, stating the; “. . . Spacer under the oil pump drive pinion – fitted upside down – to give full engagement with the drive worm on the crankshaft . . .” (copyright SM & VOC Fishtail). This modification makes perfect sense, offering more contact area to both drive pinion and bronze worm gear which in turn should lengthen the life of both parts.



Other upcoming work due is to:

- 1) Insert Oil Pump into the Crankcase and fit the Crank into the two halves of the Crankcases together.
- 2) Sort out ALL of the new parts for the rest of the rebuild such as; Timing Gears, Cams, Cam Followers, Gaskets, Seals, Bushes, etc. etc.
- 3) Set the Valve timing with the aid of dial test indicator, timing disk, etc.
- 4) Rebuild the all-new Clutch Assembly and fit the new drive chains. Assemble the Chaincase Covers.
- 5) Finish-off welding-up my Petrol Tank. Pressure Test it (for leaks) and then prepare it for painting. Then Paint it.
- 6) Start to rebuild the Front Forks (I've already bought the new Legs, Bushes & Seals, etc ready for the 'build'.
- 7) Install the rebuilt engine into the Frame and start connecting up all of the ancillaries, fittings, pipes, carburettor, ignition unit and alternator.
- 8) Fit the new Amal Carburettor, petrol pipes and Cables.
- 9) Fit new Handlebars and all levers & fittings, and Brake & Clutch Cable.
- 10) Complete electrical re-wire, followed by checking all lights, horn & charging 'works'.
- 11) Sort the Front Brake – Not sure if I'm going to make a Twin Leading Front Brake (like I made for the MAC)? I may try out the SLS Brake 1<sup>st</sup>?
- 12) Fit the new Front Wheel into the rebuilt Forks. Fit the new Front Mudguard.
- 13) Top up ALL oils and
- 14) Fettle, Fettle & probably a bit more Fettleing to do to get it ready to start.

And . . . I've probably missed-off my list quite a few other essential jobs (& parts) that will become more than apparent when I get hands-on and progress with the rebuild. Probably followed by even more Fettleing no doubt !

Well! As usual . . . that's the Plan.



1<sup>st</sup> January 2022: 1<sup>st</sup> Job of 2022, cleaning-up and polishing the crankcases – in readiness for the New Year Rebuild !



I've polished the crankcase and 'Map of Africa' Timing Cover to within an inch of its life, which is quite unusual for me as 'polishing' bike parts and polishing 'bikes' in general is one of my least favourite things to do.

I'd much rather be riding my Velocette , , ,



It's coming along, slowly but surely. I will post more photos & details soon as work has been completed.

This web-blog was last updated 3<sup>rd</sup> January 2022

Please visit again to see my progress with this 1959 Velocette Venom 500cc Rebuild / Restoration project during the rest of 2022 to see this 'Thoroughbred' taking shape.

<http://www.wyjc.co.uk/bikes.htm>

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