The BMW Club

Vintage & Classic News

Issue 22/2009

'In The Workshop-6' - The ACU National Rally - Flywheels - Why do Engines Need Them?



Mick Taylor's Superb BMW Racer

Mick purchased the above machine a few years ago from Brian Heap a gentleman in his seventies who used to race. Brian rode the machine in the Isle of Man T.T. Parade laps for about ten years until 2005 when bad health stopped him taking part. The engine bottom half is from an R45 and the rest has been modified, including the gearbox, by Steve Scriminger of S.E.D. to race specifications. The rear sub-frame has been welded to the main frame that has also been strengthened. The machine is well known in racing circles and has recently taken part at the Spa Classic Meeting.

Editorial

Within this 'News' are articles on the BT-H ignition system that has been fitted by quite a few members. I must however report that BT-H will **not** be producing any more units for the BM's. If you wish to go the route of electronic ignition and 12v electrics I would recommend the system manufactured by www.powerdynamo.biz who were formerly known under the MZ name. Units are available for almost every BMW back to 1923. There is now a British distributor, Western Road & Race Ignitions in Somerset who can give advice on the systems and believe me there are a number of peculiarities on the machines that determines what unit to fit. There is a 'Club Discount' with them so make it clear if you order that you are a BMW Club Member. Their web site is www.roadandraceignitions.co.uk tel. 01278 438289

Register Diary for 2009

5th September
Sleaford Historic Car & Motorcycle Show.
Contact Bill Rodgers on 01526 834480

Sunday 20th September
The 'Stinkwheel' Show,
Beaumanor Hall
Woodhouse, Leics.
(Informal gathering)

Thanks to the following for their contributions:-

'The Amateur Mechanic'
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Mike Lunn
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Keith Thomas
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BERLIN 1971
by 'The Amateur Mechanic'

When I was given a copy of Mick Walkers 1992 book ' BMW Twins, Restoration', covering 'All flat twins, 1955-1995', it seemed a suitable publication for a detailed review in this newsletter. Unfortunately, within the first 50 or so pages I had enough critical comment on the contents to fill several pages! Suffice it to say that as well as inaccuracies in the text there are wrongly captioned pictures and line drawings. My Advice to anyone tempted to use this book as a reference work would be to check *any* information in here against other known sources…however…

One thing did catch my eye. At the top of page 31 there is a picture, taken in September 1971 and originally published in Motorcycle News, showing several BMW Club members about to leave for Spandau, Berlin to visit the new BMW motorcycle manufacturing facility. The machines featured in the photo are two R60/2's, an R69S and Fred Secker's (then very new) R75/5.

As some will no doubt remember, the late Fred Secker was a real BMW enthusiast and held the post of President and later National Secretary of The BMW Club. It was the then National Social secretary Barry Wilson who organised this trip, although I believe Fred Secker had quite an input. Quite how I came to go on it with them is lost in the mists of time!

After the 'photo opportunity' outside Fred's home in Edmonton, London, we all left in convoy to meet the rest of our party in Dover. From here we caught the ferry to Zeebrugge. A ferry service that became infamous in 1986 when the Herald of Free Enterprise capsized…

Our party consisted of the following machines: 2 Honda 750/4's; 2 R75/5's, 2 R60/2's (one with an R50 engine), R50/5, R51/3, R60, R50S and an R69S. A fair spread of current and older hardware!

After our overnight ferry crossing we left Zeebrugge at around 6.30 local time en-route to the West/East German border at Helmstadt/ Marrienborn where we intended to find a small 'Pension' for our first night stop. As you can imagine, keeping 11 machines together in convoy through Belgium and into Germany proved to be something of a problem and it wasn't long therefore, before we started having difficulties. We stopped to re-group in Belgium and whilst waiting I found my true forte – as tea-maker for the group, much to the amazement of Russ Engineer (R51/3) and George Shand (R60).

At this point it would be opportune to say a few words about Russ. He represented India in the 1954 World Cycling Championships, held that year in Zurich. In Europe during 1955 he competed in the gruelling Prague/ Berlin / Warsaw road race, finishing a creditable 74th overall. During 1955 he came to the UK and worked for a Triumph and Norton dealer before joining NSU GB who sent him off to the factory at Neckersulm. He went back to Bombay in 1961, returning to England in 1962 with his good friend Bob Porecha. Russ certainly knows a thing or two about putting BMW (and NSU!) engines together. His R51/3 had the legs on both the R60's and was equal in performance to my R69S on this trip (to be fair I had fitted lower compression five ring R68 pistons). I understand that the ports on Russ' R51/3 had been polished but other than careful assembly (95% of all tuning, I reckon) the engine was standard, and, according to Bob Porecha, 'a bit loose'. I can only say that it was this trip that later influenced me when I had the opportunity, many years afterwards, to buy an R51/3! Later on Russ acquired an R68 engine (through Bob) but soon reverted back to the 500 as, in his opinion, the 600 wasn't any better (or quicker!)…

After we re-grouped and finished the 'tea-break' our party set off again, but before long we lost Bill Beale and his son (R50S). On the ferry journey Bill had informed Fred that he had never ridden more than 150miles in a day…we were on our way to Helmstedt about 350 miles from Zeebrugge! Bill dropped off the back as a result of a navigational error that saw us cross the central reservation of an autobahn to correct the mistake (its amazing to think that there was so little traffic we could actually do this!). Unfortunately this manoeuvre escaped the notice of our R50S rider and we didn't see Bill or his son again until the following morning at the East German border.

At every stop Robin Warren, rider of one of the Honda 750's on the trip, would open his top-box, put on the rubber gloves from within and proceed to adjust the chain. Stretched no doubt as a result of his 'dicing' with Fred Secker on his R75/5. No 'O' ring chains 36 years ago! Eventual-

ly we made it to just south of Dortmund when we realised that the R60/2 ridden by Barry Wilson was also missing.

A couple of weeks prior to the trip Barry had blown his R60/2 engine and in order to keep the bike on the road (it was his only form of transport at that time) he had bought, through Bruce Preston, an R50 engine for £25 from club member Maurice Farmer who, I believe, subsequently emigrated to Australia. This untried engine soon cried enough with full throttle cruising and threw in an exhaust valve in. It has to be recorded that this wasn't the only valve the (very) hard riding Barry ever dropped! (He later converted all his heads to 8mm (R50S) valves (including his R27 and completely resolved this recurring problem.)

We, those that remained that is, carried on regardless and eventually arrived at the border town with a group of 7 bikes from the 11 that started the day! Having booked ourselves in to a small 'pension' that could accommodate us we found a suitable place to be fed and watered before retiring after what had been a pretty eventful day. Little did we know what was in store…

The following morning after breakfast we rode to the border, only to find the rest of the party (minus Barry) already waiting for us. Bill Beale had far exceeded his previous best days riding by covering, I seem to recall, well over 500 miles! The others had found accommodation a bit before us and left themselves more to do in the morning. At least we were almost all together. For a while…

Thirty-six years ago travel into eastern block countries was not that easy. Apart from obtaining our visas at the border we also had to take out vehicle insurance and purchase a fixed quantity of Ost Marks, currency that was absolutely worthless outside East Germany, but of course the Russians needed the 'hard' currency of the West. The stop, search and general harassment we went through in the 110miles or so to the West Berlin checkpoint would make an article on its own! My abiding memory of eventually crossing 'no mans land' between the East and West Berlin is of Robin Warrens Honda covering the whole distance with the front wheel in the air, such was his relief at actually making it back to 'civilisation'. Barry had pre-booked a hotel near the centre of Berlin but when our travel stained motley crew turned up in front of the place there was suddenly no reservation made for us. We were eventually sent to a small 'pension' round the corner called, oddly enough, the Hotel/Pension 'Sir'. The bikes had to park on the pavement in front of the place whilst the 'Sir' appeared to be run by a strange old (to me at 24) woman dressed from head to foot in flowing black robes, but at least we had a roof over our heads for our two-night stay in Berlin. Later we found a handy bar round the corner that also served food. Returning to the 'Sir' we were surprised to find Barry in our room, rather worse for wear!

Having dropped the valve and rolled onto the hard shoulder he soon had a visit from the Police. They proved very helpful in removing the BM from the autobahn to a safe location in a barn and giving Barry a lift to the local railway station. From here he caught a train to Frankfurt am Main then on to Hannover where he bought a one-way flight ticket to Berlin. He duly arrived at the hotel we all *should* have been in and was redirected to where we were actually staying! By the time he made it to the pension 'Sir' we were out for a meal and a beer so decided to do the same. Unfortunately not in the same hostelry. Each time he returned to the 'Sir' we still hadn't returned so it was out for another beer… Hence his 'legless' condition when we eventually came back…

The following morning we rode to Spandau for our pre-booked factory tour. I had only visited one motorcycle factory before (Velocette in York Road, Hall Green, Birmingham), a place where, in 1967, all the machines were driven from flat belts running off a single shaft that ran at high level through the 'works'. The newly equipped BMW facility was therefore a world apart! We had a tour of all areas seeing the frames being electric welded, the paint shop, hand lining of the tanks and mudguards as well as the engine/gearbox assembly lines. It was in the engine assembly area that we saw the cleaning process on the recently machined crankcases. The operation didn't seem all that thorough to me so I wiped a finger in one of the so-called 'clean' cases only to find it covered in swarf. No sooner had I done this than our tour guide signalled for this crankcase to be removed from the line and returned to the cleaning facilities. I did wonder about all the others on the production line…After the visit I said there was no way I would be buying one of these 'plastic' /5's, three months later I bought my new 75/5…Maybe mine had the

twice cleaned crankcase as its still untouched mechanically after some 87000 miles!

After our tour we got back to our bikes outside to find that the rotted silencers on Bill Beales R50S had been changed (free of charge!) as had the petrol tank on Bill and Veronica Selby's R50/5, dented when the petrol pump attendant put the fuel nozzle in the tank and then leaned down on it. (Remember the far off days before 'self service'?) I simply can't imagine the factory changing parts FOC these days.

Leaving the factory we made our way to Klaus Verworner's BMW dealership in Mullerstrasse to buy some spares as well as sorting out a valve and piston so that Barry could re-build the R50 and ride it home. In the days before we had the facility of breakdown recovery I'm sure we were all much more resourceful! And much younger! Barry wasn't sure of the bore size but realised that if he bought a standard piston it would go in no matter what, even if it rattled a bit!

We were just leaving Verworner's when Ray Dukes (R75/5) collapsed with what turned out later to be a duodenal ulcer. The ambulance duly arrived and rushed him off to hospital. Destination unknown! Not knowing exactly what to do under these circumstances some of us took up the offer of one of the staff in Verworner's to give us a guided tour of the West Berlin red-light area. My only excuse for this behaviour now is that we were all youngish lads of around 24 at the time!

The following morning, with Ray still in hospital and Val at his side, Bill and Veronica Selby decided to stay on for a few days to help whilst the rest of us set off home. I took Barry on the back of my R69S, which caused another minor problem. I had gone in through the East solo but was returning with a passenger. Barry had no visa as he had flown in and therefore didn't require documentation. It took some time to convince the authorities that we weren't trying to smuggle him out!

Once back in the West we rode together for a while before going our separate ways. I took Barry back to where his bike was stored and left him rebuilding his R50 engine. I was due back at work the following morning in Birmingham and managed to make it (just)! Barry rebuilt the engine and rode home to London the same day. Bill Selby and his wife Veronica returned to the UK on their R 50/5 after staying on for a few days with Val. Bill returned a couple of weeks later by car with Mike Warrilow when Mike went out to Berlin to bring Ray and Val back home. Bill rode Ray's R75/5 back, which, as the last bike home meant that, eventually, the whole group had been repatriated!

Some trip! But still a vivid memory!

Postscript: Where are they now?

Both Fred Secker and Bill Beale have passed on. George Shand is still about but not, I believe, riding bikes. Russ Engineer still owns the same (quick!) R51/3. These days he is more likely to be seen on his R90/6 riding in the company of his son (who rides an R1100S). Robin Warren was last heard of some time ago but still had a bike at that time. Ray and Val Dukes are currently riding an FJ1200 Yamaha. I see Bill and Veronica Selby at events from time to time but they no longer ride or currently own a bike. The whereabouts of John Butcher and Mike Berry are unknown to me. As for Barry Wilson and me, well we went our separate ways in the late 70's, got back in touch about 1990 and are in regular contact. We sometimes ride in the same VMCC events, me on an R69S and Barry on an R60/2. In fact it's the same R60/2 and currently has the 'Berlin' R50 engine fitted! I sold my original R69S soon after the trip to finance the new R75/5 but I've recently put another R69S back on the road, a 'kit' I was given by another good friend over 25 years ago.

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WIN A MOTO-BINS £10 VOUCHER

WHAT MAKE OF MOTORCYCLE DID BERNIE ECCLESTONE OF FORMULA 1 NOTORIETY RIDE IN HIS EARLY DAYS OF RACING? LETTER OR EMAIL TO ME THEN THE FIRST CORRECT ANSWER OUT OF THE BAG WINS.

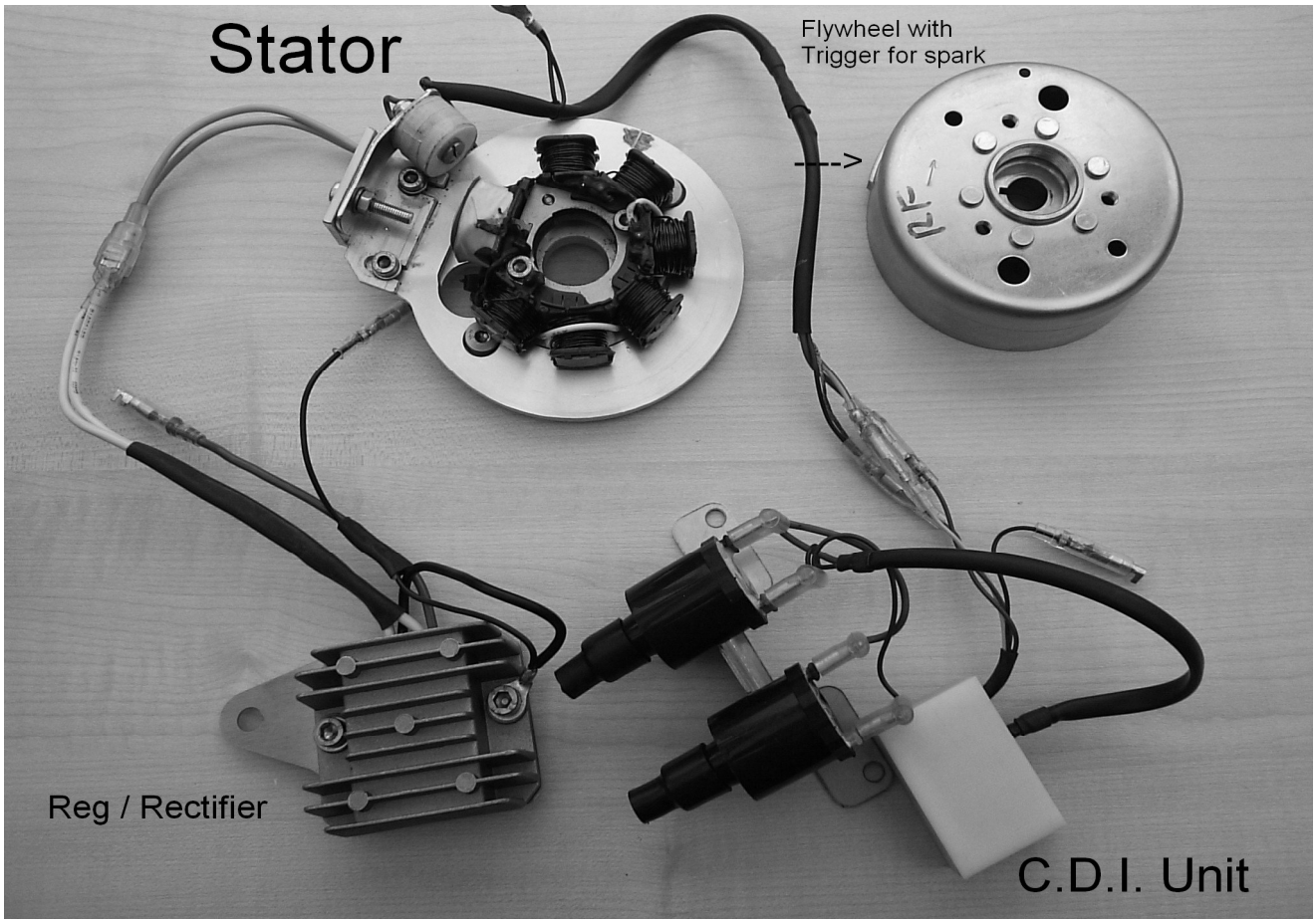


T.T. Push-Start or Fitting the BT-H Electronic Ignition System

by Robert Freeman (The Jolly Jester)

Select second gear, pull back upon compression, 4 steps and bump, with luck the engine fires, whip in the clutch, and a slight throttle increase. This routine was now the norm after ½ an hours riding. Cold start, from the garage, 1st kick, a steady chuff, chuff, chuff.

How many of you with Earles Fork BMW's have experienced this? I have, and with increasing years, both the bikes, and mine, it was time for something to be done. As I understand things the Bosch Magneto Coils have come to the end of their service life after 45 years. Genuine replacements, as I am told, are no longer available, those offered for sale, pattern parts, are as good as the one you are about to throw away.
However, BT-H Ltd, have now produced their 12 volt conversion kit that bolts straight on. Apart from the kit, one needs to replace the battery, and all the bulbs. In America, I believe that a similar set up has been tried using MZ electric's, but I personally don't know if anyone here has fitted it. (*they have with some success. Ed.)* The unit was designed for the twins and is available, for both crankshaft sizes ranging from the R51/3 to the R60. The only disadvantage is that on the 'S' machines, 50 & 69, one is unable to fit the vibration damper on the front of the crank shaft. Therefore unless you are in the habit of riding at high speed, 6 - 7500 rpm mile after mile, there should be no problem. My self, with an 'S' bike, very seldom even approach the legal limit let alone the 10 - 15 miles an hour over that I did thirty years ago.



The unit I have was part of the second batch made by Tony Harris, who now owns and runs the BT-H Magneto business, but I would add, he does not offer a repair service or supply any parts for the old original BT-H magnetos, it also seem unlikely that any more will be made, at least in the near future. For those of us who have purchased a unit, should any replacement parts be required, I was told they are standard components that BT-H use across its range of magnetos, which cover AJS, Ariel, BSA, Gilera, J.A.P, Matchless, Norton, Royal Enfield, Scott, Truimph, Velocette, & Vincent.

What you get is a Stator & Back Plate with Flywheel, HT Coils & Brackets, C.D.I. (capacitor discharge ignition unit) with coil connections, a Regulator / Rectifier that fits outside the engine under the tank, a blanking adapter for the camshaft, 17 or 19 mm crank shaft adapter, various screws & bolts, plus a flywheel extractor. One will also need to replace all bulbs, and battery. A 12 volt battery of 8 amps is sufficient. The unit produces its own power, but of course there would be no lights when the engine stops.

Fitting is fairly straight forward. The Bosch magneto and generator are removed completely, with the voltage regulator. Keep the magneto rotor in situ with the magneto body, as it could lose it magnetism. My self, I have securely boxed these units, marking them with the bikes engine number, so if at some time in the very distant future, the BMW passes to another owner these are part of its heritage. A marker pen with the brand name ‘Sharpie’ is very good, and will not smudge or wear off.

One problem that arose was the fact that the Camshaft blanking adapter was not long enough to actually meet the lip of the oil seal. It would seem the R50S camshaft is slightly longer. Careful measurement and a phone call to Tony Harris resolved this and he turned out another blank 5 mm deeper. This allowed the blank to fit inside the oil seal about 3 mm, enough to make the seal but without contacting the breather plate on the camshaft.

The engine is set up with the ‘F’ mark on the flywheel just visible in the bottom of the timing hole on the crankcase. On fitting the stator plate and rotor flywheel, both of which have scribed lines to match up, just tighten the locking bolt and that bit is done. On the BMW wiring loom, all wires are pulled back through the tunnel, where the small filter is behind the upper engine mounting plate. The ‘old’ red and black wires are joined together, having previously removed the 6 volt battery and bulbs. The blue wire that carried power to the charge light in the head lamp is redundant and I have wired in the indicator flasher unit pilot to the red charge lamp. The brown wire is still used as earth.

New HT wires are fitted to the coils and plug caps. 5 Ohm resistor plug caps are recommended, though Tony Harris said he has not had any problems with un-suppressed plug caps usually used on the Earles fork BMW’s. Other wires are joined to their respective terminals clearly marked. The engine is now ready to start, which it did! Using a 1960’s Halford’s Strobe Lamp I found the timing was a gnat's knee cap retarded. Another adjustment and I could see the flywheel ‘S’ mark spot on, moving up in relation to the increased engine speed.

It was a few days i.e. it rained, before I could actually take the bike out for a 20 mile run. The engine does seem smoother and a slight vibration in the footrests at 55 - 60 has gone. What did show up however was how the carbs were now out of balance. I had over the years tweaked the settings to suit the imbalance in the timing given by the advance and retard bob weights, maybe two or three degrees. That was as close I could get on the mechanical set-up.

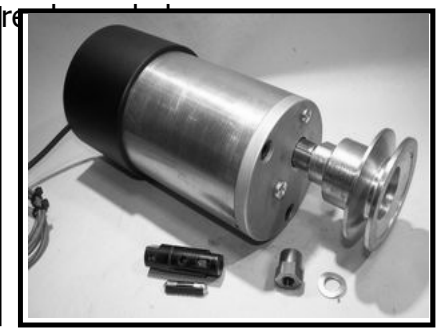
The electronic timing generated by a magnet on the flywheel rotor passing a fixed coil, is spot on for both cylinders, while the C.D.I. unit advances the timing, or so I was told. So hopefully, I can look forward to another 40 years riding this BMW, after all, I will only be 106 ! But.... I may need to get my Grandchildren to lift me on and off the saddle.

REPLACEMENT IGNITIONS FOR CLASSIC AND VINTAGE BMW's

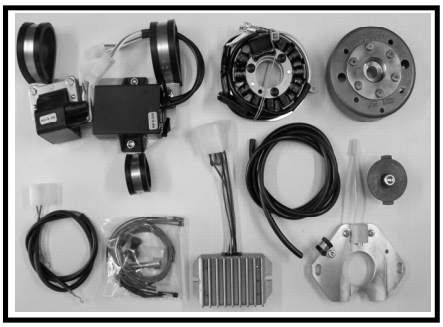
PowerDynamo produce a wide range of replacement ignition systems, alternators and mag-dynamos for classic and vintage BMW's. Their range covers most models from the 1923 R32 through to the 1984 R100. Their products provide a complete replacement for the original system and provide improvements in reliability and output, with most systems providing a regulated 12v output. A



Magdyno with digital advance to replace Bosch type D1 or D2, or Bosch battery dynos type RS1 or LS2, or similar, for 4 stroke twins (flat or parallel twins, not V-engines)



Alternator to replace Bosch Dynamos (RD, DD) or similar with 76mm diameter



Complete replacement ignition kit for later models, including rotor, stator coil and ignition advance unit

Based in Berlin, PowerDynamo, formerly MZ-B, has been offering a wide range of motorcycle electrical parts for many years and fulfil around 6,000 individual orders annually. Representation in the UK is provided by Western Road and Race Ignitions based in Somerset. If you need assistance call them on 01278 438289 or email enquiry@roadandraceignitions.co.uk and mention that you are a member of the BMW Owners Club.

Systems are available for the following models:

Model	Year		Model	Year		Model	Year
R2	1931 - 1936		**R39**	1925 - 1927		**R63**	1929 - 1930
R3	1936		**R42**	1926 - 1928		**R66**	1938 - 1940
R4	1932 - 1937		**R45**	1978 - 1985		**R67**	1951
R5	1936 - 1938		**R47**	1927 - 1928		**R67/2**	1952 - 1954
R6	1936 - 1938		**R50**	1955 - 1960		**R67/3**	1955 - 1956
R11	1930 - 1934		**R50 US**	1967 - 1969		**R68**	1952 - 1954
R12	1935 - 1939		**R50/2**	1960 - 1969		**R69**	1955 - 1960
R16	1930 -1934		**R50/5**	1969 - 1973		**R69S**	1960 - 1969
R17	1935 - 1937		**R51**	1938 - 1940		**R69S US**	1967 - 1969
R20	1936 - 1938		**R51/2**	1950 - 1951		**R71**	1938 - 1940
R23	1938 -1939		**R51/3**	1951 - 1955		**R75**	1940 - 1944
R24	1948 - 1950		**R52**	1928 - 1929		**R75/5**	1969 - 1973
R25	1950 - 1951		**R57**	1928 - 1930		**R75/6**	1973 - 1976
R25/2	1951 - 1953		**R60**	1956 - 1960		**R75/7**	1976 - 1978
R25/3	1953 - 1955		**R60 US**	1967 - 1969		**R80/7**	1976 - 1978
R26	1955 - 1960		**R60/2**	1960 - 1969		**R90/6**	1973 - 1976
R27	1960 - 1964		**R60/5**	1969 - 1973		**R100**	1980 - 1984
R32	1923 - 1926		**R60/6**	1973 - 1976		**R100/7**	1976 - 1978
R35	1937 - 1940		**R61**	1938 - 1940			
R37	1925 - 1926		**R62**	1928 - 1929			

More on Rear Main Bearings
By Mike Lunn

Here is some information to add to the discussion on rear main bearings on pre 1969 twins. *(As Mike put it to me "It is somewhat anoraky, if that's the word , but might fill a page". Ed.)*

To understand the problem we need to understand what is happening in the engine in service. The crankshaft is located in the crankcase by the front main bearing the outer race of which is clamped to the housing and the inner race is clamped to the crankshaft. The position of the rear main bearing in the crankcase is floating; the outer race is not located axially at all.

When the engine heats up from cold the bearing and housing change their relative positions. The crankcase is aluminium alloy and the crankshaft is steel and the difference in their expansion is proportional to their coefficients of linear expansion and the temperature range. I would guess that the crankcase heats up first maybe by as much as 80 degrees centigrade which would give a relative movement of about .004". However as the crankshaft heats up to the same temperature the relative distance would reduce to about .002". This movement may be taken up by strain in the crankshaft and crankcase, play in the bearing or by axial movement of the bearing outer race in the crankcase. My guess is that it is initially strain and bearing play, but that as the temperature rises and the interference fit of the bearing in the housing decreases axial movement of the bearing outer race predominates.

This axial movement of the bearing in the housing probably promotes rotational movement at the same time and this cycle takes place every time the motor heats up and cools down. BMW were obviously aware of this phenomenon which is why the rear main bearing was fitted in to a replaceable housing.

The next question is the best choice of material for the housing and here BMW have changed several times. The pre war twins I have looked at (two R5's, one R51 and one R66) have had bronze bearing housings. As to the early post war engines with three stud fixings I have only looked at one and this had a steel housing. Finally we reach the later R51 and R67 engines which have the aluminium alloy housing which was used up to the end of Earles fork production. The obvious question to ask is which material is the best? Each has advantages and disadvantages. Bronze has a coefficient of expansion slightly less than aluminium and so requires little interference fit in the crankcase. Its main advantage is in wear resistance which is generally much better than cast aluminium alloy. The pre war housings I have looked at have all been re-usable with little wear.

Steel is a good choice although it needs a greater interference fit into the crankcase for it to still be secure at running temperature. There will be little change in the fit of the bearing outer race in its housing and so it needs to be a push fit in the steel housing when cold. It does have very good wear resistance and the only housing and crankcase of this type I have is re-usable even though the engine has had a long and arduous life.

Aluminium alloy is best described as adequate. It expands with the crankcase and so it can be a push fit in the hole. It expands and permits the bearing to move, but it does wear and after high mileage will probably require replacement.

Obviously the one thing I have left out of the equation is cost. Aluminium alloy is the cheapest, steel is the next highest cost and bronze the dearest of all.

What is the best of all?

My opinion is that a high grade nickel aluminium bronze would be far superior to aluminium alloy, but that best of all would be a housing of bearing steel at about 62 Rockwell C hardness. It would be an interference

fit in the crankcase with a temperature difference of 100 degrees C to fit it, it would have a flange with five hole fixing and the bearing outer race would be a light push fit when it was installed.
I am well aware that the sports engines used a spherical roller rear main bearing and that this was to permit crankshaft flexure at high RPM whilst still having a much higher load carrying capacity than the standard ball race. The way that this bearing functions in the crankcase is no different from the standard ball race as there is little axial play in the bearing. I have often wondered about the feasibility of fitting a cylindrical roller bearing as the rear main in a touring engine. This would need to be the type of bearing which permits axial float between the races and it would need to be positively retained in it's housing, using loctite or similar material. This would then allow this axial movement to take place in the bearing itself with no relative movement between the outer race and the housing. I am sure that at normal touring RPM the flexure of the crank would not significantly reduce bearing life. Does anyone know of this being tried out?

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IN (and out of) THE WORKSHOP (No. 6)

with The Amateur Mechanic'

(1) Instrument Problems

Ever since I bought the R90S in October 2007 I have had a fault with both the speedometer and the rev. counter, so, with a day or so to spare the faults were investigated.

The Speedometer

The fault on this was simply that the reset knob for the trip recorder would turn (in either direction) but in doing so failed to engage and reset the trip. Having disassembled the combined instrument, which also involves removing the printed circuit board for the illumination and warning lights, it was obvious where the fault lay. The 'plastic' reset knob is retained by an 'E' clip and has a 3 mm square drive section that slides into the steel tube with a brass gear on the end that engages with the trip meter. On earlier (1973-1977) black-faced instruments the reset knob can only be turned in a clockwise (when looking at the speedo face) direction. Some previous owner must have felt considerable resistance as they continued to apply pressure anti-clockwise and break off the square end. The direction of the twist in the remaining 'plastic' confirmed that turning the wrong way had caused the breakage. Repairing the damage proved to be a fairly easy job. First my engineering 'guru' ground me a short (1") length of 3mm square steel on his surface grinder. I machined the end of the reset knob square in the lathe then drilled a 1/8th hole to a depth of about 3/8th inch. Having filed a lead-in taper on the end of the 3mm square steel it became a simple task to press this into the 1/8th hole. All that remained, once the overall length required had been established, was to check the 'O' ring on the shaft that keeps out any moisture and to replace the 'E' clip. Job done! Hopefully a good, long lasting repair!
During the course of this repair I had a look at the later (1977-1984) green-faced speedometer only to discover that while fundamentally similar it is possible to turn the reset knob in either direction without damage to the mechanism. Is it possible MotoMeter may have undertaken this 'modification' as a result of warranty issues on the earlier instruments?

The Rev-counter

Right from day one of my ownership the rev-counter needle always had a tendency to 'wander' but initially this was attributed to a poor cable run. Having re-routed the cable things improved marginally and my next thought was that the original run had caused a strand of the inner to fray, the frayed strand catching on the outer, causing a 'wind-up', which when released, gave a sudden movement on the needle. However, when the inner was removed no such problem was revealed! The fault

obviously lay in the instrument. Having ascertained through my local dealer that (in February 2008) there was one rev-counter in the bunker (well that's what they call the stores of BMW GB at Bracknell) and twenty four in Germany available at a cost of around £130, I thought it could be worth having a look at what had gone wrong! Like the speedo this rev-counter is a cable driven magnetic device, the magnet being effectively spun on the end of the cable inside a dished metal disk onto which is mounted the needle. The faster the magnet spins the more the disk moves round, moving the needle and winding up the return spring.

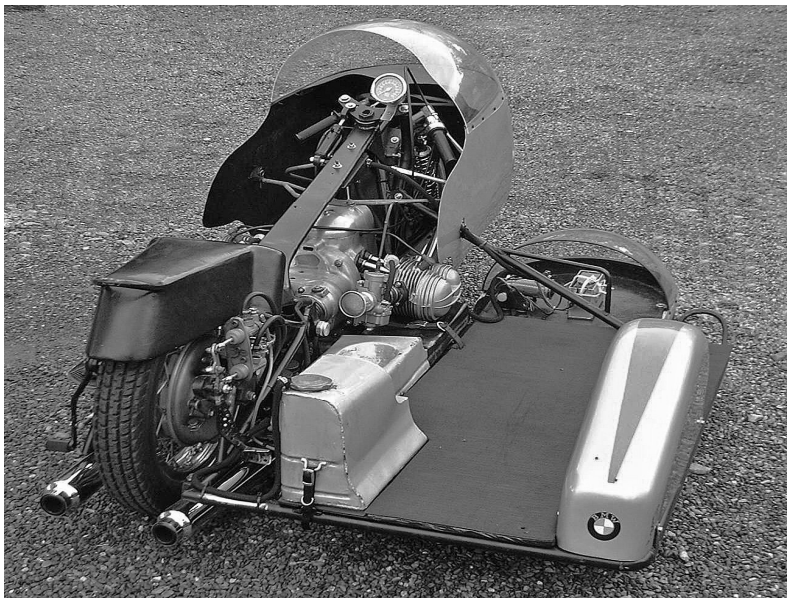
Fortunately (as my hands are about the size of dinner plates!) the delicate face, needle and return spring is easily removed from the rest of the mechanism and can therefore be stored safely whilst inspection and work is undertaken on the remaining parts! With the main diecast body separated it was obvious that excessive play in the shaft bearings was causing 'wobble' on the magnet, which in turn caused it to 'catch' the dished disk and drag the needle across the instrument dial before releasing it. Hence the excessive swing on the needle. Two nylon bearings support the magnet shaft. The one in the rear case is about 3mm deep, held in by 3 small screws whilst the top bearing is a disk about 22mm diameter. Both are made from what appears to be white nylon and would be easily replaced. If only you had a source for MotoMeter spares! I thought re-manufacturing both these items would be a very time consuming operation so looked for an easier alternative. There is a hole bored in the main die casting concentric to the shaft of around 12mm diameter so I decided to utilise this to fit a third bearing roughly situated in the centre of the shaft. Using a suitable length of similar nylon a bush about 12mm long and with a 6mm hole in the centre was pressed into the casting as further support for the shaft. Having ensured that the shaft would still run reasonably freely on 3 bearings I re-assembled the rev-counter. Result? Absolutely rock steady readings over the whole scale and a saving of around £130!

(2) 1951-1969 Dynamo's

In spite of working on Earles models for over 40 years now I've found that there is always something to be learnt. I'm in the throes of trying to complete the 14 year rebuild of my 1951 R51/3 S501 Steib outfit and have recently installed the major part of the engine unit. I needed to source a suitable dynamo from my stock and fit the new electronic regulator purchased some time ago. Having picked the dynamo I considered to be the best of the bunch and fitted the regulator all that remained was to check the brush springs and fit new brushes. I had brushes 'in stock' but when I tried to fit them they were too large and the wire connection was clearly in the wrong place. For the first time I had tried to use the only Norris dynamo amongst my 'stock' and had discovered that Bosch brushes (only) fit the Bosch dynamo and Norris brushes (only) fit the Norris dynamo. Obvious really!

(3) Gear change Problems

A good friend of mine left to attend the Stella Alpina rally on his R80GS only to find, about 50 miles out of Le Havre, that it was becoming increasingly difficult not only to change gear but also to stay in gear once he had managed a change. Concerned that the problem would only get worse he abandoned the trip, caught the next boat home then rang me for advice. My suggestions ranged from a weak detent spring to selector fork problems to a badly worn nylon roller engaging the selector plate and an offer to take the back off the gearbox to have a look inside and trace the problem. In the short term, as most of his journeys were going to be local ones, he decided to stick with it for a while and monitor its progress. I forgot all about it until a few weeks later when he rang, rather embarrassed, to say he had not only found but cured the problem. On his way to his voluntary job as a researcher at the National Motor Museum he had tried to change gear only to find that there was nothing there to change gear with! The Allen bolt that the GS gear lever pivots on and is screwed into the lower frame rail had now fallen out and disappeared down the road. Having completed his journey to and from work in 2nd gear, he subsequently replaced the bolt and has had no further selection problems. With hindsight I should have suggested looking at the linkages in the first place and not feared for the worst!



Register Members Keith Thomas & Michiko Kato's Racing BMW Outfit

The only BMW to feature in the 2008 VMCC calendar is an outfit owned by myself and my partner/ passenger Michiko Kato which we raced at VMCC / BHR meetings. It is a Continental style outfit eg. it has the chair on the right-hand side. The outfit has a BMW R50S engine fitted. The frame is a modified R50S frame with sidecar attachment welded on; the frame and engine have different VIN's, so the outfit appears to have been built out of two R50S's, both manufactured in 1961 and both supplied to the same Austrian dealer (Denzel in Vienna). The outfit was brought into the country by Cyril Malem, one time producer of Egli frames I believe. He said that he had got it from an "Austrian industrialist", for whom he had been doing some work on a collection of Steyr (?) cars. Unfortunately, although I spoke to Cyril several times by telephone he was never able to recall this industrialist's name. Cyril also said that at one time the outfit had been owned by an Austrian Count !

I imagine that it was around on the club racing scene in Austria in the 60's or 70's -- one interesting thing about the R50S engine, which might help to trace its history one day, is that the top rear engine cover (through which the HT leads pass) has a rough engraving which depicts a Masonic style 'all seeing eye' flanked by 2 wood-axes and underneath, the initials CW.

The outfit was in a pretty rough state when I bought it in 2003 from a collector in Surrey – I did a largely cosmetic restoration and entered the IoM TT Parade Lap in 2004, and managed 11 miles before the outfit broke down. Through 2005 the outfit ran intermittently at a few of the VMCC / BHR meetings, culminating in our meeting Mick Barr at the final meeting of the season at Cadwell Park. Thankfully Mick agreed to look after the mechanics of the outfit, and completely re-built the engine and gearbox in time for the 2006 season. From memory, Mick found the engine to be pretty standard : cylinder bore 69mm, inlet valve 38mm, exhaust 34mm; he also discovered that the camshaft was out of true by a couple of degrees, and the rest of the engine had been pretty much cobbled together over the years ! Following the re-build, Michiko and I completed several meetings through 2006 and also completed the IoM Parade Lap. The engine is now fitted with an electronic ignition developed by Rex Caunt of Leicester, and also has upgraded brakes which comply with ACU rules and keep the scrutineers happy. Mick continued to support the outfit despite his failing health through 2007, and it was a personal blow to us when Mick died in April 2008; his widow Glenyse continues to encourage our low key racing effort, for which we are very grateful

For 2009 the R50S outfit is pretty much retired but it will hopefully have an outing at the Festival of 1000 Bikes (Our outing there in 2008 can be seen at http://www.reillystudios.co.uk/performanceart.php?p=PREV&id=652010&start=25 race number 528)

Michiko and myself start campaigning a new BMW R75/5 powered outfit, chassis built by F1 and F2 sidecar builder and racer Tony Baker and engine built by Jim Cray – an entirely different looking 70's style outfit, which can be seen at http://www.sport-pics.co.uk/2008_Season/bhr/8cadsat/8vca4963.htm (race number 24).

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Continuing on from issue 21/2008 Mike Fishwick, Technical Officer, gives details of the Reidel Engine



I have been able to find a few details of the Reidel starter engine used on the BMW 003 and Junkers 004 jet engines of WW2.

It is a very over-square bore/stroke configuration, of about 2:1, and was designed by Norbert Reidel, owner of a small motorcycle company. It produced 10 bhp at 6,000 rpm, running on a 5% petroil mix of 80 octane petrol. The main turbine also ran on a weaker two-stroke mixture, to lubricate the fuel pump and control valves. The capacity was about 250 cc - the bore looks to be about 70 mm and the stroke about 35 mm. Close examination shows a single piston ring and the aluminium bores, and electric starter. There are no cylinder liners visible, making me wonder if this engine is one of the very first to use plated (Nicasil etc) bores. The electric starter (operated from the cockpit) can be seen on top of the engine, and at the front top the double-ended HT coil, sited above a rotating magnet. At the front can be seen the auxiliary pull-cord starter (lawn mower type) which was connected to a ring mounted in a hole at the tip of the intake cone. This provided ground crew with the ability to start the engines if the batteries were flat, or the electric starter failed.

As the engine ran up to speed, a centrifugal clutch transferred the drive to the turbine shaft, bringing it to about 1,500 rpm, after which ignition took place and the engine spooled up normally.

After WW2 the US Army Air Corps wanted a quantity of these engines, and provided Reidel with all the necessary facilities, which he afterwards used for the manufacture of small motorcycles, built in 1949/50.

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BMW R51 - 70 Years On

by Patrick Howell

In 1939, the storm clouds of war were gathering as Germany prepared for war on a massive scale, a war which was to trample most of mainland Europe into subjugation under the Nazi jackboot.

The Bayerischen Motoren Werke (Bavarian Motor Works, or B.M.W.) had been producing motorcycles since 1923, and by 1939 were renowned for their quality, as well as for their prowess on the racetrack. In that year, they were producing the R20 and R35 single-cylinder models (198 and 348cc respectively), as well as the R51 (494cc), R61 (600cc), R66 (597cc), and R71 (745cc) boxer twins.

The R51 succeeded the R5, which had been produced from 1936 on. The R51 differed from its predecessor in that it had a plunger rear suspension as opposed to a rigid frame. It had an overhead valve engine, developing 24hp at 5600 rpm, coil ignition, telescopic forks, interchangeable wheels, a four-speed foot-change gearbox, and, of course, shaft drive. Its de-luxe specification was however compromised by matt-black silencers, chromium being earmarked for gun barrels as part of Germany's war preparations. That notwithstanding, by contemporary British standards, it was still way ahead of its time. The sole British concessionaires were AFN Ltd. of Falcon Works, London Road, Isleworth, Middlesex, who also sold Frazer-Nash-BMW cars. The R51 retailed at £123, which was not far short of the Brough Superior 1150 Special (£130) and the Austin 8 of that year (£132+), so it can be seen as something of a rich man's fancy.

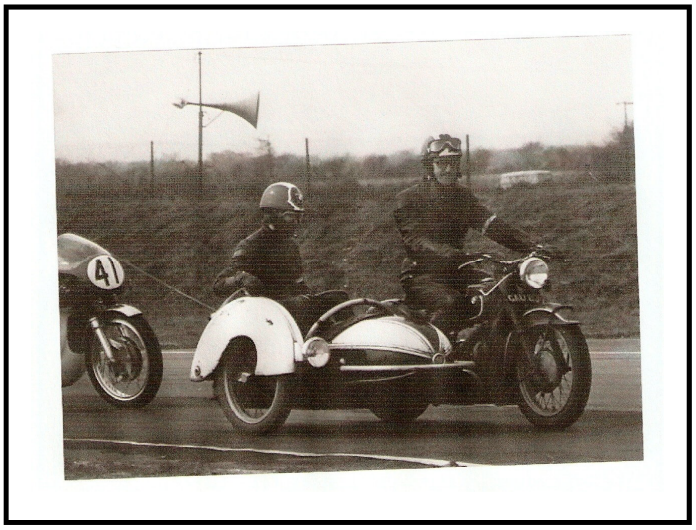
GAU837 was exported to Britain on June 29, 1939, just over two months before Hitler invaded Poland. Following Hitler's refusal to withdraw, Prime Minister Neville Chamberlain declared war on Germany on 3 September. Exactly a month later, on October 3, GAU 837 was registered in the

County Borough Council of Nottingham to Gerald Waterworth Cafferata,of Meadowside, Epperstone, Notts, a Midlands industrialist (of Italian ancestry, but by then, well and truly British), whose family ran quarries in the area of Newark. It conjures up a picture of a tweedy gentleman having to run a gauntlet of little boys shouting “Hun, Boche, Nazi...” etcetera as he rode his brand new German machine around. I suppose it would be the equivalent of a German then riding a new Norton International down Unter den Linden in Berlin.

That he did ride the bike is evident, as in 1943, he was riding it home in Home Guard uniform, no helmet of course, when he skidded in one of the family’s quarries, and was so seriously injured that he was not expected to live. Gerald proved them wrong, however, surviving until the age of nearly eighty in 1986. At all events, his eyesight and co-ordination could not have been affected, as he went on, in one capacity or another, as captain and coach to the British pistol team at the Olympics between 1948 and 1964. He was able to pass on the bike to his son Michael, who rode it between 1956 and 1962. Michael is still with us, and remembers that he learned to ride on the bike (presumably by then repaired), trading it in for a van just before he married in 1962, and receiving £25 for it. He now says he wishes he had never sold it (where have I heard that before?!).



In the next few years, the bike passed through several owners, landing up in the hands of John Milligan of Coltishall ,Norfolk, in 1966. John was able to find the original receipt for his purchase of the bike from Geoff Priest, Motorcycle Engineers, of St.George’s Works, Norwich. The price was £12 (ah, happy days!) although that must have reflected the fact that it was a non-runner. One of the pistons was holed, so he stripped the engine to clear it of debris, but was unable to find a replacement. He therefore welded the old one, and had it machined back to normal. After refitting , the bike ran quite well, and he added a right-hand Steib S501 sidecar, whilst retaining the solo gearing. Whilst a sidecar on that side may have had its inconveniences, like remembering to forget all previous left-hand chair handling, it was nevertheless a logical step, given that all BMWs of the period were built with right-hand fittings, unless you ordered otherwise from the factory. John’s wife, Joan, says that being a passenger on the outside was not at all terrifying, and in fact proved an advantage, as she could look ahead down the centre of the road, while John could easily see down the verge, all-round better viewing. John has a photo of his outfit in 1966 (*see below*), with Joan aboard, towing a racing bike round the Snetterton circuit.



On a later trip to Holland to deliver a BSA Gold Star engine to an old friend, J.W.(Willy) Notten, of Ruysdaelstraat in Brunssum, John was talking to Willy about his wish to obtain an R51 piston, whereupon Willy went to the cellar, and handed John a complete spare engine. This was brought home on the rear carrier of the R60 and sidecar being used, and subsequently put into the R51. Records maintained by BMW Munich confirm that this engine was in fact exported to Dutch importers, Stokvis and Zonen, of

Rotterdam, in 1938, so the present engine pre-dates the bike by about a year. Presumably, the engine had lurked hidden during the war, when Holland was occupied by the Germans, otherwise it seems certain that it would have been requisitioned.

John Milligan had the bike for twenty-nine years before selling on to Michael Anson of Nottingham as a pile of parts. In fact, it took several van-loads to carry away all those parts(where are they now?). Michael then started a restoration involving repainting all cycle parts, including tank, rebuilding the wheels with stainless spokes, and skimming the brake drums. This restoration lasted several years before he sold the bike on to dealer John Lawes, of BEMW Derby. I then acquired the bike in 2008 from John, who fitted electronic voltage control and rebuilt the gearbox as part of the deal.

GAU 837 is thought to have done less than 500 miles since restoration, and now appears well sorted. It sits low on the ground, so that even a titch would have no difficulty in putting both feet down at standstill. It usually starts first kick without choke (there is none) , and immediately settles down to a quiet tickover. The clutch is light, and the gearbox emits the standard clonk when changing gear. The 200mm internal expanding brakes are reasonable if unexciting. The engine pulls well, with a reputed maximum of 88 mph (142kph, 76 knots), though I have never been near that point, partly out of respect for the engine, and partly because I have used up my nine lives already. It is very manoeuvrable in traffic, and in short is a pleasure to ride. I feel a particular affinity for the bike, as it was built the same year as I was, although it is in rather better condition. It commands free road tax, which is just about the only thing which is cheaper today than in 1939, when it was £2-1-4d. (Two pounds, one shilling and four pence) a year.

Some 3775 R51s were produced before production ceased in 1940, though few now survive, probably because many were consumed in the German war effort. After the war, the Allies imposed an embargo upon the production of large capacity machines, hence only 250cc singles were produced until 1950, when the Allies relented, and allowed BMW to restart production of larger bikes. Such was the devastation caused by the war that engineers had to pull apart previous models, take measurements, and reconstruct the drawings.

In 1950, the R51 was relaunched as the R51/2, with detailed changes such as split valve covers, and normally pivoted control levers in lieu of the old inverted-pivot levers. 5000 R51/2s were produced in 1950 and 1951,with the later model R51/3 selling 18,420 before production ceased in 1954. By then ,BMW motorcycles were back in the forefront of quality but expensive motorcycles.

It is not generally known that for a fee of £5, the DVLA will supply any current owner details of all previous owners. Whilst the list they supplied was incomplete, I was able to establish more history by reference to the old buff logbook, and the list did confirm what I had suspected, namely that the wrong registration date had been inserted in the modern documents. The clinching feature was that the wrong date – 31 December 1939 - was a Sunday, and even then, the licensing authorities did not work on the Sabbath! Thus I was able to have the registration date corrected. If anyone out there has any more information on GAU837, spare parts, or manuals, I would be happy to hear from them at 6 Millers Bank, Broom, Alcester, Warwickshire B50 4HZ, 01789 773801, email hotfoothowell@hotmail.com

In the meantime, wish her a happy 70th birthday, and many more to come!

3 Golds, Eighteen Hundred Miles & 72 Hours.

By Robert Freeman



It all started when as a small boy I found in a draw a small bronze plaque cast with the words National Rally, the logo of the Auto Cycle Union, and simply inscribed: Lilleshall. 1937. C. Freeman. 285 Marks.

Now some seventy one years on, I am prompted to write a little about the effect this had on myself, and in a way, how it pointed my social life in a certain direction, which has all in all, been very enjoyable.

So you have worked out that my Father took part in the 1937 National Rally scoring 285 marks. He rode a 350cc Velocette MAC, Solid Frame, Girder Forks Leather Storm Coat, Gauntlets, Cap back to front with Goggles. Where he commenced from, the route, or just how good 285 marks were are lost in the mists of time and the ACU do not seem to hold any detailed records either, there were however 433 competitors. This was the one and only time he rode in the National Rally.

The Velo' lasted until early 1938, when it was traded in for a, would you believe, brand new 500cc BMW R5 This make and model also had a direct effect upon my life which continues to this day.

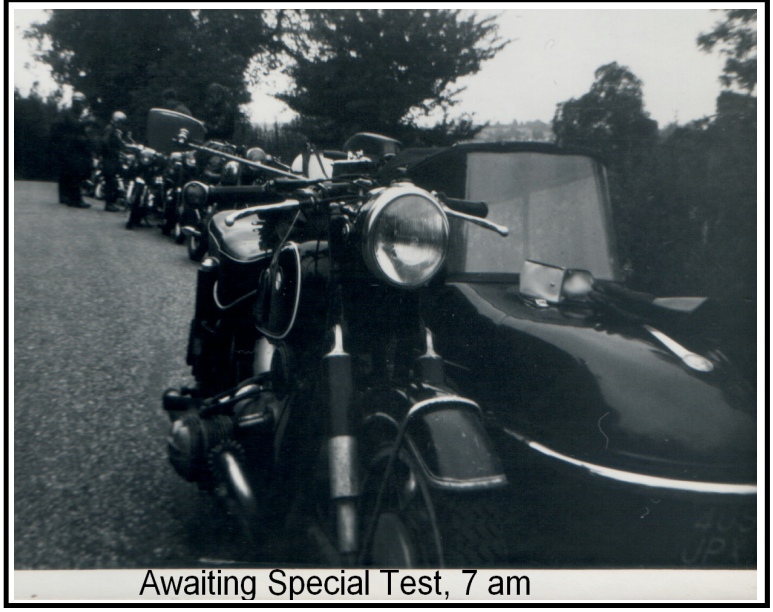
We now jump forward to 1969 and I, after riding a 'gaggle' of British motorcycles, BSA, Triumph, Norton, Matchless, Excelsior Manxman, some owned some loaned, had been the owner for 6 years of a 1963 500cc BMW. I had also been married for two years and Rene, still my beautiful wife 41 years on, was, and is, a motor cycle enthusiast. We had been to the T.T. Races in 1966, the year of the ‘Seaman's Strike’ when the T.T. was put back till September. The result was that the sea was very rough from Liverpool to Douglas, and back!

What was special about 1969, well I had joined the St Albans Motorcycle Club. They were a 'sporting' club; Grass Track predominated so did Trials, Road Race, several ¼ mile Sprints. I decided to enter the ACU National Rally in the solo 500 cc Class. I was told by those 'in the know', but I don't think they had actually taken part, that the secret was in planning the route. For anyone not actually familiar with the Rally the idea is this: You start at 10am on the Saturday and finish by 10am on the Sunday. You aim to travel exactly 600 miles, not exceeding 30 mph overall, and visiting as many different checkpoints around England as one can. That equates to circa 34 towns. The ACU provide you with details of the checkpoints, and rounded up or down, mileage between each to exact numbers, 10, 15, 20, etc. You may start where ever you wish and all competitors finish at the same location.

I entered, under the BMW Club banner, solo number 62, to finish at Trentham Gardens, Stoke-On-Trent. The 12th & 13th July 1969 was the date. My 'cunning plan' worked out that the best place to start was Boston, Lincs, only a 100 miles from home, and that was before I started. Idiot!

Travelling via such diverse locations as, Littleport, Chelmsford, Slough, Salisbury, Frome, Ross-on-Wye, Birmingham. I finally arrive at Stoke, with time to spare, and have covered, in the Rally, 600 miles and 33 Control Points. Joy of joys, the maximum was 34! The return journey was just short of 150 miles, so I managed 850 miles over all, in about 34 hours. The BMW went well and the rider's left hand had seized up. But it didn't put me off.

The next year, same weekend, things were a little different. My wife and I now had our 1st daughter who had been born that June. In preparation I had done what seemed sensible, and suited our pocket, had a Watsonian Palma Child/Adult sidecar fitted. It came from Mundays, in Brixton. They were specialists in sidecars. Altering the bike was just a case of changing the rear bevels and speedo, fitting a heavier set of springs, and moving the Earles Forks to sidecar setting. This was the start of something like a 6 year relationship



Awaiting Special Test, 7 am

with an extra wheel and I can honestly say it was a time of great enjoyment. On leaving Mundays and proceeding down Brixton Hill towards Central London I had doubts that I was going to get around the first bend but I did and took to the outfit like a duck to water. The BMW, albeit only 500cc, but the sports engine, would lift the front wheel, one could 'drift' though corners.

For 1970 I had a navigator, John Flitney. We had the benefit of being able to take extra clothing for either colder or wetter weather plus food, drinks and toiletries. This time I entered under the Banner of the St Alban's MCC as I was their Social Secretary. Again the finish was Trentham Gardens and we worked out a route starting at Ipswich, going across the Midlands via Cambridge, Bedford, Swindon, Sheppton Mallet, Bristol, and then up towards Cirencester, Hereford, Birmingham, and Trentham.

Success at last, we won the 500cc Sidecar Class doing 600 miles and taking in 34 controls, but to be fair there may have been only a dozen entries in our class as most chairs were fitted to 650 + engines including 700cc Royal Enfield's and quite a few Vincents and Square Four Ariels. Memories of that year were, it was hot, seeing the sun rise over Malvern Link, being given pork pies at a control somewhere in the Salisbury Plain area and catching a Cock Pheasant near Farnham. Well, we didn't actually catch it, 'road kill' is the term now, but having spotted the 'game' in the verge we did a 'U' turn, popped it in the back, and onwards. When I arrived home I gave it to my wife and placed it on the kitchen table but to my surprise it took off!!



A Young Robert (on left) & Navigator John Flitney

Our 1st Class award, and win of the class, spurred us on to the event in 1971 which was to be the Zenith of my sporting career. 1971 the 10th/11th July and again Trentham Gardens was the location for the finish. This time we had a route starting at Cheshunt 16 miles from home. Though the Rally finished at the same venue the Control Points varied some dropping out, new ones being set up so one could not just follow the same route as previous years. There were of course no such thing as Sat Nav, the pre planning was with maps spread out on the floor, then the directions written out on sheets from town to town. If one was following part of a previous years route then those direction could be used but you had to be prepared for local changes. One-way systems were popular and if you missed the turn it was all around the houses again. Again where perhaps local traffic made things difficult the club running the check point might provide assistance in the shape of a member who would guide a group of competitors out of town. This proved to be a mixed blessing. An incident that I vividly recall was in Wolverhampton. The 'guide' had a Norton Commando, and was determined to show us just how well it went, which he did in no uncertain manner. It had just got daylight and we had already covered 545 miles, while 'Derek Minter' was fresh out of bed, so to speak. Off we went at a brisk pace and after the second corner we never saw him again!! Others

were more considerate and would provide a guide and tail end Charlie to help you on your way. It was not unknown for assistance to be given in the form of goggles, windscreens and head lamps cleaned as well as tyres checked for the odd nail. Some even went as far as chaps running a spanner over the machine while the rider took a drink, tea, coffee, hot soup, BBQ's. The backup around the whole of the course was generally superb and I think perhaps the various clubs vied with each other to be that little bit better. The BSA Factory at Birmingham had as I remember toilets and even camp beds, though the beds may have been elsewhere.

Often there was only one route out of town to the next logical check point. By following a competitor who left just prior, it helped with the navigation. This we did, somewhere in the Midlands, with laughable results. The solo rider in front knew his way and where he was going, over the lights, turn left, 3rd exit at the round about, and so on. After a couple of miles on the edge of town he turned again, 'must be a short cut'; we, and several other followed. Some way up the street he stopped, and went into a house!!. He obviously lived there, or knew a friend and had gone in for a rest stop. A group of riders then had to 'find' themselves again. He didn't seem to have noticed us!.

That I think is enough to have give you a feel for the event, so for those with nothing better to do here is a list of the Controls for 1971 that we visited on our way to winning, and no one was more suprised than us, the National Rally Sidecar Class outright. Find out a map of England and join up the names. Start at Cheshunt, Bishops Stortford, Chelmsford, Braintree, Colchester, Ipswich, Stowmarket, Bury St Edmunds, Newmarket, Cambridge, Huntingdon, Bedford, Rugby, Banbury, Oxford, Abingdon, Swindon, Cirencester, Chippenhan, Warminster, Frome, Bath, Bristol, Old Sodbury, Stroud, Cheltenham, Malvern, Worcester, Kings Norton B/Ham, BSA B/Ham, Wolverhampton, Wrekin, Waterhouses, Trentham.

There was however a Special Test at Waterhouses. As I recall, those with maximum marks took part. It was in three sections. First, ride an undisclosed distance at an average speed given at the start, might have been 26 mph. On entering the second section another undisclosed distance continued at that speed and then on entering the third section ride at slightly higher average speed over yet another undisclosed distance. This speed was given at the start of section one. The sections may have totaled about 3 miles. Our error overall was 2 seconds! We had won, but we didn't know this until the Motor Cycle Magazine came out the following week.

In 1972 John and I had one more bash, this time starting at Markyate on the A5 just out of St Albans and finishing at Cheltenham Race Course. We managed to win the 500cc Sidecar Class for the third year running after which we retired and I went into the organisational side. The St Albans MCC, of which I was still Social Secretary, had its H.Q. at Westminster Lodge, the bottom of Holywell Hill in St Albans so for the next, I think 3 years, the club ran a Control Point there. Due to our distance from the finish, we did not have to keep open later than about 02.30 on Sunday morning. After that time no competitor could reach the end without exceeding the overall average speed limit of 30 mph. We arranged with a Garage across the road to stay open for fuel and we provided all that could be needed in refreshments etc. Maybe as many as 150 riders came though between 10am Saturday and closing time Sunday. Truth is often stranger than fiction and we had a classic example.

Very late on the Saturday evening a competitor with pillion passenger came in. They were riding a BSA M20 the big side valve bike with girder forks. As they came down Holywell Hill the rear wheel punctured so they coasted and pushed the last few yards. While they were resting the bike was manhandled into the clubroom, the wheel removed by willing hands, a new tube fitted and they were on their way. Just part of the service.

The next year; now re-read above; 'Very late on Saturday etc.'. Exactly the same thing had happened, same riders and BSA, coming down Holywell Hill.!!

Thus ended my involvement in the ACU National Rally. There were wet ones and very hot and dry ones and I enjoyed them all, so did The Pheasant!

Miscellaneous from Technical Officer Mike Fishwick

I came across this WW vintage stationary engine at the Sinsheim Auto and Technics museum in September. As you will see, it has a certain resemblance to the BMW MB215 type of engine but I couldn't see any maker's plate on it. The engine has a redundant dynamo strap on top of the magneto, and has alloy barrels and heads. It's obviously a side valve engine with the inlet pipes facing the camera, being fed from a plenum chamber on top of the carburettor.
If it was a BMW product, the new front casing for the starting handle etc would have been a special bit. It looks nice, with alloy cooling ducts rather than pressed steel. I couldn't find anyone at the museum who knew anything about it, and it seems to be a new exhibit. *Can anyone identify this engine. Is it German? Possibly Russian? Any suggestions most welcome although Mike will be visiting the museum again so they may have more info by then.*



A torsional vibration damper operates by absorbing any torsional vibrations - that is, erratic, rotational surges in crankshaft speed - by causing them to partially rotate a weight, the motion of which is retarded.

This retardation is usually provided by enclosing a circular weight within a light steel enclosure fixed to the crankshaft, and filling the space between the two components with a thick silicone fluid. In the case of an R69S the free-running weight takes the form of a disc, and the retardation a fibre (similar to brake lining) disc sandwiched between the moving disc and another clamped to the crankshaft.

When no torsional vibrations are present, the fixed and free components of the damper rotate with the crankshaft, but when erratic accelerations (ie torsional vibrations) are present, the crankshaft mounted component will tend to move at an increased speed relative to the free-running component.

In either case, energy causing movement of the free disc/weight against the friction medium (silicone fluid or fibre) is absorbed by converting the motion energy into heat energy.

By removing the damper from a BMW engine, this damping is obviously lost, as the new alternator cannot absorb torsional vibrations. The answer of course is simply not to ride in the vibration period, which on any engine with a built-up crankshaft, causes very slight movement between the components. This basic flexibility however, makes a built-up crank less susceptible to structural failure due to torsional vibration, such as used to cause the crankshaft of an old 850 cc Mini engine to break across the centre main bearing journal.

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FLYWHEELS - WHY DO ENGINES NEED THEM?

A Question Raised by Rod Knight of the Cossack Owners Club.

If one thinks about it long enough, that's a strange name for a wheel! I've often wondered how the word actually came into being, but that's not really important. What we do need to know is what they are, where they are found, why they're necessary and the effect they have on the machinery to which they're attached.

A flywheel is a wheel which, when affixed to a rotating shaft, stores inertia which then helps to maintain a set speed. My Collin's Australian Pocket Dictionary describes "flywheel" as being... a heavy wheel attached to a machine so as to regulate its speed and motion. "Inertia" is... the tendency of matter to keep moving in the same direction unless affected by an outside force, whilst another relevant word is "kinetics" - which refers to the motions of material bodies under the action of forces.

Viewed another way, a flywheel is similar to an electrical storage battery, the sole purpose of which is to store chemical energy and release it on demand. A flywheel stores energy through its rotation. In effect it absorbs some energy during each power stroke of an engine and feeds energy back into the drive to part fill the "troughs" between them. The larger and heavier the flywheel, the better it will do this.

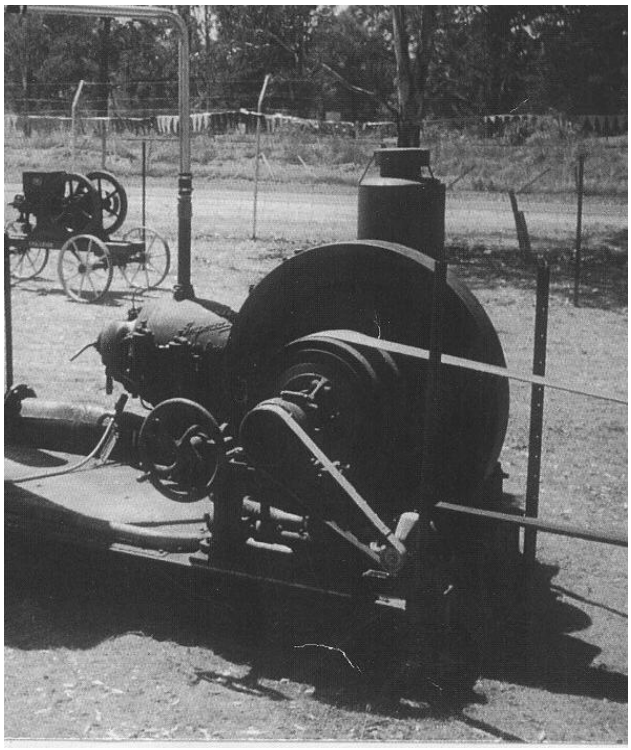
One of my earliest recollections of flywheels was during my primary school years. My mother occasionally let me ride my bicycle down to where two old ferries carried passengers across the Brisbane river, so I could meet my father on his way home from work and ride home with him. Dad drove a truck for a small carrying firm. He worked long hours and was never sure of when he would finish, so it wasn't long before I became friendly with one of the ferry drivers. Only one ferry was used during the quiet part of the day, with the second one being brought into service for peak periods. I was eventually allowed on board to watch him start the engine (very exciting for an inquisitive boy fascinated with mechanical things) and I found it to be an interesting procedure. The engine was a large six cylinder unit, painted a very dark green, and it was characterised by a lovely warm oily smell I remember to this day.

The starting procedure involved setting the hand throttle, moving a solid brass lever - I later realized this to be a valve lifter - to the starting position, removing a heavy panel from the floor behind the open engine bay, climbing down into the available space, engaging a crank handle and laboriously turning the engine over. This action produced a soft, intermittent wheezing sound which gradually increased in frequency until the driver felt that sufficient rotational speed was gained (or before he became too puffed!) at which point he leapt back on deck and swung the brass lever back to its original position!

If everything went to plan (and it usually did) a distant cough would be heard, followed by a plume of black smoke from the exhaust as the engine slowly came to life, after which the throttle was returned to the idle position. "Idle" was probably in the vicinity of 400 rpm, with the engine running contentedly at this speed thanks to the huge external flywheel mounted on the front of the crankshaft. If Dad hadn't turned up by the time this ferry was put into service I used to be allowed to ride to and fro across the river in it, earning my free passage by tying the craft to the pontoons on either side when it berthed. During the crossings I would stand proudly alongside the driver as "First Mate" (a boy's typically-wild imagination) watching the flywheel spinning contentedly as it maintained inertia. To me it never seemed to rotate much faster than it did at idle, so the engine probably ran at about 1,500 rpm or so as it propelled the ferry across the water.

What I didn't know at the time was that, had that big heavy flywheel not been there it would have been impossible to start the engine because, obviously, there was no electric starter!

Upon leaving high school I worked for a year or so in a large machine shop, with one of my tasks being to operate a stamping machine which punched holes in precut lengths of thick steel plate. It was powered by a 5 HP electric motor equipped with a pulley which drove a row of five V-belts which, in turn, drove a huge flywheel at much reduced revs. Pressing down on a pedal engaged a mechanism which connected the flywheel to a sliding carriage containing the stamping dies, which then descended to stamp the required holes before disengaging again at the top of its stroke. There was no way - *no way* - that the motor could have done this by itself! It was the inertia



stored in the flywheel which actually made it possible, with the electric motor simply keeping it "topped up" so to speak.

Of course, many different machines in that machine shop worked on the same principle.

Early stationary engines - almost all of which had just one cylinder - required heavy flywheels in order to run at all because their power output was not only low, they ran at just a few hundred rpm. In fact, a stationary engine of this period would probably have been regarded a screamer if it could spin its crankshaft at more than 500 rpm!

I've long been fascinated by these old engines, particularly by the sounds they make, so I've attended a number of machinery displays over the years. One of the most memorable power units was on display at the Stanthorpe Showgrounds, some years ago now. It was a single cylinder McDonald two-stroke diesel which had served for many, many years as the principal source of power in a sawmill before being replaced with something more modern, after which it was purchased by its present owner and restored to its original working condition.

For the technically-minded, this particular Mc Donald is a model NL, built around 1955. Bore and stroke dimensions are 11.5 x 12 inches (292 x 305 mm), it weighs somewhere in the vicinity of three tons and produces 65-70 HP at 450 rpm.

To me, it was the star of the show. It had been set up to power a large water pump, which circulated water from a raised rainwater tank in order to present an easy-to-see illustration of its capabilities. The flywheel measured around four feet in diameter and approximately six inches wide at the rim, so was very substantial. I stood and watched as the owner and a close friend prepared the engine for starting, which included the preheating of the cylinder head (the cylinder lay horizontally) with a blowtorch! They then carefully turned the flywheel in the direction of rotation until the point of compression was reached before spinning it in the reverse direction with their combined - and not inconsiderable - force. Upon reaching the point of compression again the huge piston reversed the flywheel's direction of rotation, imparting sufficient inertia to take it over compression, upon which the engine fired with an accompanying chuff - and cloud of black smoke - from its suitably large-diameter vertical exhaust. It then settled into its stride and chuffed away at 200 rpm or so, circulating a surprising volume of water through the plumbing system and back to the tank.

Of course, there were many, much smaller stationary engines running happily in the McDonald's immediate vicinity that day, including my friend's own three examples plus his beautifully-restored early Victa lawnmower (these now being eagerly sought after by collectors) but above them all the old McDonald diesel could be distinctly heard, adding its pleasant bass chuffing beat to the combined melodies of the other machines. It was, indeed, music to my ears!

And - it was the inertia stored in that huge flywheel which actually started the engine! Remember, it was initially spun backwards, not in the direction of rotation!

Moving on from stationary engines to those employed for traction purposes - in our case, motorcycles - the flywheel has again played a significant role in years past. Due to their different design requirements most of the early engines featured two internal flywheels to support the crank-pin and to smooth out the power pulses by providing inertia. However, some engines followed stationary engine practice by employing a single external flywheel - Douglas fore-and-aft flat twins and Moto Guzzi horizontal singles being two well-known examples - which allowed the engineers to employ small, stiff crankcases in which to support the crankshaft assembly. Early Villiers two-stroke singles, which powered a plethora of small utility bikes such as James and Francis Barnett, also featured outside flywheels. Scott two-stroke twins featured a central flywheel assembly, with two overhung crank-pins pressed into its outer sides and disposed at 180 degrees to one another.

So the decades passed. The popular side-valve design gradually gave way to the much more efficient overhead valve layout, this in turn being superseded by the almost universal overhead cam and double overhead cam designs of the present day. And, with engines becoming more capable of higher rotational speeds due to advancements in metallurgy, more efficient breathing (due to the valves being in the cylinder heads and therefore providing a far less tortuous path for the intake and exhaust gases) plus the quest for greater power outputs, the flywheel mass needed to be reduced in the interests of more snappy pick-up and faster gear changes. Engines intended for more mundane duties, however - such as general day to day use or for pulling a large and/or heavy sidecar - continued with their heavy flywheels. Consequently, they retained their much-desired docility, flexibility and tractability at the lower revs at which they operated for much of their lives. Excellent examples of this type of bike (apart from Russian flat twins) are Panther 600cc and 650cc OHV singles, those iconic - and much loved - British sidecar haulers of decades past.

Let's dispel one or two myths about flywheels. Some people (including myself many years ago) simply think that the weight of the wheel is the only thing that determines its effectiveness in storing inertia forces, but that's not strictly true. While weight (or, more correctly, mass) is necessary, it's where the mass actually is that really makes the difference. A large-diameter wheel of relatively narrow cross section near its centre, and with most of its mass being in the outer rim has a far greater "flywheel effect" than one which is much smaller in diameter and has most of its mass close to its axis, even though it may weigh the same. In the former example then, skimming a relatively small amount of metal from the outer rim makes quite a difference to its effectiveness in storing inertia forces, whereas depriving a much smaller diameter wheel

of the same weight of material would make little difference.

An excellent example of this can be found in Dnepr engines, with the later MT10/36 and MT11 - MT16 units having less "meat" on their flywheels' outer rim than the earlier K650 and MT9 power plants. I've never been able to understand why the engineers did this as the Dnepr - as distinct from the Ural which, incidentally, has retained its heavy flywheel to this day - was designed specifically for heavy pulling, with sidecar. In fact, the KMZ factory built only outfits (either single or two wheel drive) and didn't officially list a solo model. I actually have in my possession an Avtoexport-produced brochure to prove this! Bikes which left the factory without sidecars attached were supplied to special order, either as police "escort" bikes in the USSR or to Western markets.

Cast iron was once almost universally used for flywheels but as rotational speeds rose it was superseded by steel, which was drop-forged to shape before machining. Steel has over double the tensile strength of good quality cast iron for approximately the same weight per cubic centimetre. This enables steel flywheels to stay in one piece at the higher rotational speeds which sometimes caused cast iron flywheels to explode into fragments - steel wheels also being less likely to contain hidden weak spots such as may easily exist in cast iron. Another reason is that the centrifugal forces acting upon rotating flywheels increase as the square of the speed, meaning a multiplication of their rpm by two increases these forces fourfold.

In our present age of modern, high-revving sports motorcycles (in actual fact, practically all motorcycles) heavy flywheels are undesirable. Riders dislike them as they take away the instant engine response they demand nowadays, plus they adversely affect the time it takes to effect smooth, silent gear changes. Bad, bad news to people who like to "get along" - as well as giving a few headaches to gearbox designers! Many of my friends of years past actually regarded my bikes as being stodgy, boring, unexciting, low-powered plodders which they could never like for any reason, and they couldn't understand why I was so attracted to them.

Fortunately we've always had a choice, and still do. There are motorcycle engines with relatively heavy flywheels still in production today, with Harley Davidson, Moto Guzzi, Royal Enfield and, of course, Ural being a few that come to mind. And it's interesting to note that all of these bikes tend to use less fuel compared to light-flywheeled machines of similar design, as well as being easier - and therefore more relaxing - to ride. Disadvantages include severe twisting forces imparted to the crankshaft during mismatched gear changes when a single flywheel is mounted on one end (as it is in fore-and-aft V-twin and flat-twin engines with a "car" engine/transmission layout) and the sluggish feel these engines possess because the flywheel doesn't allow rapid changes in speed - as mentioned previously.

A lack of flywheel mass has disadvantages too. As well as the considerable extra stress imposed upon reciprocating parts (and the balls/rollers of antifriction bearings if employed) during rapid acceleration and deceleration of the crankshaft the engine loses some of its tractability at low rpm and therefore much of its gentle, forgiving nature. This is not too problematic in multi-cylinder power plants with their more frequent power pulses, but it certainly is in single and twin cylinder designs! This became immediately apparent to me some years ago when my son bought a 1983 Yamaha XT250 trail bike as his personal transport. I used to ride it occasionally after we'd sorted it out and tidied it up, but I never got to like it as it was distinctly cranky and bad tempered once engine speed dropped below 3,500 revs or thereabouts - particularly in the higher gears. This in turn necessitated frequent gear changes to keep the engine happy and in its preferred rev range, something quite alien to someone preferring the power/torque characteristics of a slow revving, heavy-flywheeled Russian flat twin!

I came upon this undesirable characteristic again more recently, when I was offered a ride on a BMW R65. I'd never before ridden one of these, but had read various road test articles and owner's reports on them over the years. The R65 appeared to have gained a somewhat tarnished reputation so I was excited at the prospect of either proving, or disproving, some of the negative comments which had been directed at it. Did I like the bike? Well, not particularly. The flywheel effect was minimal and it was far too low geared, with fifth gear being virtually the same as the "solo" top gear ratio in Urals and Dneprs! The reduced flywheel inertia did make the gearbox very pleasant to use, but this positive feature was offset by the engine's buzzing away at a very busy 4,200 rpm at 100 km/h when it could easily have pulled higher gearing. BMW marketed the R65 as a mid-sized roadster eminently suited to comfortable, long distance highway cruising. Sorry, but I much prefer the relaxed gait of a slow revving, high-geared bike when out on the highway, and they need heavy flywheels!

In contrast to the BMW I was given the opportunity, some months ago, to ride a friend's newly-acquired 500cc Royal Enfield Bullet. It was one of the later "Classic" models with electric start (in addition to the standard kick-starter) and highly-acclaimed 5 speed gearbox. Unlike the R65 (which is, admittedly, very different to the old, pre-1969 BMW models) the Enfield engine has remained essentially the same as it's always been, with a compression ratio of just 6.5:1 and a pair of heavy steel flywheels supporting the crank-pin. What a lovely, gentle, forgiving bike to ride! The engine was torquey and tractable, forgiving of a sometimes-lazy left boot, and it idled at a speed so low I was sure it would stall - yet it never did. The gearbox was a revelation, with excellently-chosen ratios which offered a good, practical first gear and a pleasantly-high fifth gear for open road cruising. I fell in love with the Enfield at once (always having been an admirer of

slogging 4-stroke singles) and would be tempted to buy one if I didn't already have three excellent Russian machines vying for my attentions.

Interestingly, in spite of its having twice the displacement of my son's Yamaha XT250 the Enfield's rated power output isn't really much greater, so my comparing these two single-cylinder bikes is not being unfair. The big difference to the way the Enfield runs is largely accreditable to its greater flywheel mass, although the engine's lower compression and milder state of tune would also be contributing factors. It's for this reason that I've oft times wondered why riders have gone to considerable lengths to "modernise" heavy-flywheeled motorcycle engines - such as early Moto Guzzis and, of course, Urals and Dneprs - by either buying very light aftermarket wheels or having much of the metal machined off the rim of the standard flywheel. They certainly get the snappy response they need in order to ride their bikes in a more sporting manner, but they also end up with an engine which has lost much of its sweet-running characteristics, demands to be run at much higher revs, and therefore requires more frequent gear changes.

Back in 1967 I bought a new BMW R60, after working at two jobs for close to a year in order to save the necessary funds. It was the standard Roadster model, with its mildly-tuned 593cc engine producing 30 hp at 5,800 rpm. At the same time one of my friends owned a Suzuki T20 250cc two-stroke twin which also produced 30 hp, albeit at a much higher 7,500 rpm. The T20 was a real rocket in its day and, with its 6 speed close-ratio gearbox and a determined rider on board was the first 250cc road bike to be capable of attaining the magic pre-metric "ton" - or 100 mph. These two engines couldn't have been more different! One was a gentle, heavy-flywheeled four-stroke flat twin, with the other being a highly-strung parallel twin two-stroke easily capable of blowing the bigger-engined BMW into the weeds from a standing start! On one particular day ride we cruised side by side at 60 mph for much of the time. The countryside was undulating, with most hills requiring up to two down changes on the Suzuki while the much heavier BMW was quite capable of climbing every hill in top gear with little loss of momentum, thanks in no small part to the inertia stored in its flywheel. I've always remembered this ride as being a very pleasant one for both of us as I revelled in my bike's top gear cruising ability while Keith delighted in changing gears on his Suzuki as often as he deemed necessary!

Two very different bikes - two very different riders!

So why hasn't someone designed a variable mass flywheel for motorcycles? Well, Suzuki did just that back in the 1980s when they produced their GR650 parallel twin road bike, which featured a mild 'chopper' styling. The manufacturer's advertising material promoted its 4-stroke engine's 180 degree crankshaft (pistons rising and falling alternately) as offering the best of both worlds as it featured variable-mass technology which provided greater inertia at low rpm, this being disconnected above 3,000 revs to allow more spirited performance at higher rpm - when a heavy flywheel isn't necessary. A colleague of mine bought one of these bikes secondhand and I was asked to look after it for him during the period he was to be attached to RAAF Base Amberley on a police course. I was "instructed" to take it out for a run now and then, and apart from its rather strange (to me) handling I quite liked the bike. I never did actually feel the flywheel's extra mass engage or disengage but I do remember the engine as being a very nice unit, as well as its having been beautifully made in typical Japanese fashion. Sadly, the GR650 didn't catch on in Australia so they're rarely seen today.

"I'd like a modern heavy-flywheeled bike, but one that's made in Japan. Should I buy a big V-twin cruiser"?

This is not an easy question to answer. True, they're specifically designed to produce lots of torque at low revs, but the designers don't appear to have endowed them with the flywheel mass so evident in "work" engines of years gone by. One example which comes to mind is the Yamaha XV1600 of a few years ago, on which a friend (who owns a Dnepr MT10/36 outfit) was given a ride. To his surprise this huge engine possessed nothing like the flywheel effect he was expecting, and he remarked to me afterwards that it didn't like trickling along at very low rpm in the higher gears at all. He also made the comment that the bike would most definitely not be a good tractor to pull a sidecar, in spite of its engine's displacement!

The only experience I've ever had with a big Japanese cruiser was a test ride on a Kawasaki VN15 back in 1994. It was the last of the VNs equipped with the 4 speed gearbox, and to be absolutely frank its 1500cc V-twin produced so much grunt compared to my docile Russian 650 my mind wasn't able to focus upon anything else!

To illustrate, beyond any shadow of doubt, the merits of heavy flywheels I'd like to conclude this article with an excerpt from one written 24 years ago, and which appeared in the May 1984 edition of the English publication "Motorcycle Sport". It was penned by a former engineer at the Vincent motorcycle factory in Stevenage, England, and he states... *it was during development of a range of agricultural devices in the diversification days at Vincents that I really appreciated what flywheels could do, both in and out of control.*

We were asked to supply a county council with a quantity of scrub cutters, to clear sites of scrub and saplings up to 4" in diameter. We only had available the little Vincent 75cc industrial two-stroke engine, which produced a meagre 1.2 hp at 2,200 rpm. We made the horizontal rotating cutter blade from three-eighth inch steel plate, at some 24 inches diameter, with three hooked cutters ground into the outside rim not unlike Boedicea's chariot, only horizontal - with the power unit being mounted on a pair of large diameter pram wheels.



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When we demonstrated it to the council buyers, its built-up flywheel inertia, topped up by the little two-stroke, sliced through 4" saplings and tough scrub with an ease that would have put a 10 hp-powered device to shame. The little engine, carried on by the huge flywheel, buzzed way above its power peak of 2,200 rpm.

Then, without warning the cutter blade dropped off the vertical engine crankshaft, which had lost its retainer nut, and took off on its own, semi-airborne, from the front of the machine, scattering council officials and scything through shrubs and trees, finally stopping 200 yards away in a field of, thankfully, still four-legged cows, after finally slicing its way clean through a dense blackthorn hedge.

That was one occasion when I was very thankful it was rotating the "right" way, as I was standing behind operating the damn thing!

Rod Knight - Toowoomba, Queensland.