Since coming over to Sweden to work (temporarily!) at Volvo in 1970, my Vincenteering has been largely confined to reading MPH; but back in the "good old days" I rode a road-going Black Prince from 1957 and indulged in the art (?) of sprinting and hill-climbing from 1961 up until 1969. In those days I could put a Vincent engine together as well as most, so in view of the Editor's repeated cries for technical articles, I thought that some of my racing reminiscences - with the accent on the technical side of engine building - could perhaps be of some interest.

Background

Nearly all my working life has been, spent as a mechanical engineering designer, most of it on engines, from Rolls Royce Griffons (37 litre vee-12 supercharged jobs) and various jet engines, to motor-cycles and cars. I believe that a properly trained engineer approaches a problem and its solution in a careful, logical manner, and by this approach he can achieve a high standard in most things, even motor-cycle servicing, sewing, cooking, or mountain climbing. Exceptions include artistic and physical activities, where some sort of flair or natural aptitude are necessary in addition. My own approach to racing was therefore more technical than temperamental, and though this may not be a good thing where riding is concerned, I am sure it had some advantages and was certainly beneficial in machine design and preparation.

Since I cannot suffer fools gladly and I believe that something like 90 per cent of the human race are fools (Vincent owners excepted, of course!), life can be a little trying at times. For instance, what do you tell a fellow who asks how much faster he will go by fitting oversized inlet valves, at the same time admitting that he intends to use them with standard inlet ports and valve seats? In the 1950s and 1960s when I was able to attend Club rallies and dinners, I was always appalled by the tales of woe and mechanical disaster, told by a large percentage of those attending. It seemed that more than half the bikes in the Club could not travel 100 miles without a major breakdown. Nearly all these breakdowns and difficulties were due to finger trouble or faulty servicing. On my Prince I frequently travelled 2,000 miles in two weeks, from Coventry to the north of Scotland for touring and climbing holidays and had only one serious breakdown. This was finger trouble on my part. The M6 had just been opened and I set out to drive right up it at 90 to 95 with new, just run in, 9:1 pistons. I had raised both carb needles to get extra performance and to run the motor a bit cooler during running in. After about 30 miles on the M6, the rear piston seized and I found that I'd had a mental blackout when setting the carbs, I had put the needles down a notch instead of up! Driving gently during running in, I hadn't noticed it.

My Scottish climbing companion was the man who introduced me to Vincenteering. He had a "B" Rapide and was always suffering from an oily clutch. If we were motoring fast on holiday, he usually had to pull his clutch out every two or three days to wash it in petrol. During reassembly on one occasion, I noticed that he tightened the clutch retaining nut and then backed it off half a turn before inserting the wire locking clip. "Why do you do that?" I asked. It turned out that when fully tightened the nut gripped and locked the shoe carrier. Instead of re-shimming or filing to obtain the correct clearance, he just slackened the nut and of course the oil came pouring out! This is the sort of sloppy workmanship which Vincents will not tolerate.

Most Vincent riders seem to suffer from difficult starting. This is a question of correct adjustment and learning not to open the throttle more than one eighth of an inch while kicking. My Prince and the old "B" Rapide which I later built into "The Heap", my hill-climb bike, were always first kick starters. Triumph twins, on the other hand, needed a great fist-full of throttle to start and would not respond to the Vincent closed throttle technique. I remember once when some yobbos tried to steal my Prince from the Coventry Technical College. They yanked out the ignition wires from the switch and joined them up - but I'm sure they were Triumph types who opened the throttle wide and couldn't start it. I came out to find it in this condition, gave it one kick and I was away home to repair the wiring.

I believe that most of the world's problems today are attributable, directly or indirectly, to over-population and I cannot go along with the present hysterical obsession with the sanctity of human life and its preservation. Humans are only another type of animal and there are now so many of them that the world would be a far better place if two or three hundred million of them could be persuaded to kill themselves off. Instead of ludicrous speed limits and regulations to enforce the wearing of crash hats and seat belts in the attempt to save a few lives, governments should be concerning themselves with worldwide schemes to achieve population control to avert the major disasters which lie ahead. Those who have enough sense to be worth saving will wear their crash hats/seat belts anyway, without being regulated into it.

In the animal kingdom nature controls over-population by food shortages, increase in predators and other natural disasters, to a level where animals and plants co-exist in a natural balance. Man, by reducing deaths by disease and other causes, without compensatory attention to population control, has now upset this natural balance to such an extent that the world supplies of food and natural resources are fast running out. Nature struggles to regain the balance by such means as traffic accidents, but man acts to prevent these,- thus adding ever more to the over-crowding. Rats when forced to live at unnaturally high living densities, are overtaken by some kind of madness and start fighting and killing each other. Again this is natures way of re-attaining balance. Man is similarly affected and drop outs, drug taking, gang wars, muggings etc,
are symptoms of the same kind of madness. Note that this type of thing only occurs in over-crowded cities, not in sparsely populated areas. The present terrible drought and famine in Equatorial Africa, is, we are told, due to a change in the weather patterns recently - BUT - a large part of this weather change can be attributed to the destruction of huge areas of vegetation brought about by the world's number one problem - overpopulation. All this is a little beside the point when it comes to the preparation of a racing machine, but I believe it is the single most important issue in the world today and our ludicrous governments must be forced into paying attention to it instead of wasting their time establishing ever more ludicrous speed limits to be inflicted upon sensible, speed loving, Vincent owners. Right, having got that little lot off my chest, let's get down to the serious stuff.

Starting racing
My decision to go racing was made when the arrangements made with a friend to go on a round-the-world motor-cycle tour suddenly broke down. We had two Triumph Speed Twins waiting for us at the factory, so I had to cancel mine and start looking for a Vincent suitable for building into a sprinter. After several months of looking round, I learnt of EUT 966, which lived down in Brighton. It was a "B" Rapide which had the reputation of being a fast one, so I arranged a lift down to Brighton to see the Speed Trials and went prepared to ride it back. When inspected, it looked rather scruffy and the price was rather high, but after a short ride, which indicated that it performed fairly well, we concluded the deal and I set off for Gloucestershire. There was a whine in the primary drive and various small things like sticking throttles etc, made it very poor conditions and nowhere is this truer than in engineering, especially in engine building. Luckily there was plenty of space in my parent's garden and I was able to put up a very nice little workshop of eight feet by fifteen foot. I made big windows to give good daylight and used two five foot strip lights for even artificial lighting, with an angle-poise lamp over the bench for detail jobs. I made a really heavy, solid timber bench which stood across one end and covered the top with a sheet of tough cloth-backed plastic, which could be washed over with petrol to keep it really clean. The floor was good level concrete with some old mats' to make it comfortable to stand on. I put in plenty of shelves for storing parts and built a stand about 18 inches high onto which I could run a bike and have it at the most convenient height to work on. The bench was equipped with a large vice with jaws which closed really parallel and I was then ready to start work. All this took quite a lot of time and money of course, but if you are going racing you can expect to be spending several years of your spare time in the workshop, so if you organise a good one right from the start you get the benefit of it all along in pleasant and better working conditions.

When I first got EUT 966 home I stood back and looked at it and I thought "good grief what a heap!" From that day on it was always known as "The Heap", even though at the end, only the engine unit and rear wheel remained. Anyway The Heap was given a good wash and clean outside, then pushed up on the stand and stripped completely, down to the last nut and bolt. At this time I started a notebook, which always stayed with the bike and in which I recorded lists of parts wanted, calculations such as balancing and compression ratio, non-standard dimensions and all the building particulars, eg valve timing, ignition timing and so on. Later, during the racing season, this book was used to keep a record of every meeting. It included weather, track notes, bike set-up, tyres and pressures, gear ratios, carburation, any special riding notes and any recommendation for the next meeting. When you start you think you can remember it all, but say you visit a hill climb only once, then do 30 or 40 other meetings before going back over a year later, can you remember which sprocket you pulled? - can you heck! If you have a notebook to look in which says "52T sprocket used - try 54T next time", you can immediately set the bike up to give yourself the best chance. After three or four meetings there you will have tried all the most promising combinations and can select the set-up to give you the best times whenever you go there.

At this stage I have to admit that these very valuable note books (for both bikes) have been left back in England, so I am presently forced to work entirely from memory. However, I will state where I am not sure of my facts when I cannot remember exactly.

Crankcases
All parts were thoroughly washed in clean petrol and carefully inspected. Take great care to guard against fire risks when using petrol for cleaning - it's dangerous stuff! When clean the cases were heated to about 150°C in the oven, all pressed in parts were withdrawn together with the old type hollow and middle cylinder studs. The mains had been moving in the crankcase (and on the mainshafts), there were several loose cam spindles, four cylinder studs had been pulled out of the crankcases and replaced by oversize specials and the gearchange camplate spindle boss was cracked.

To check the crankcase halves I then bought a small surface plate, so that I could inspect the various faces for flatness. These were pretty good. The next job was to insert a set of main bearings and make up a special stepped one inch and three quarter inch diameter mandrel to go right through them to check the main bearing alignment. This was also satisfactory, so I
decided that the cases could be salvaged. The first job was to get the camplate spindle boss argon arc welded by an expert who could do it without causing distortion. Then back to the surface plate and using a fine file and engineer's blue I trued up all the crankcase faces and the mating covers until they blued up almost perfectly. After taking this special care with all the faces, I could subsequently assemble without any gaskets, using only a light smear of Wellseal and all my engines remained completely oil-tight. The true face was then used to mount the drive side case on an angle plate and re-machine the camplate spindle hole in a friend's drilling machine.

I had obtained a set of the later type solid cylinder bolts which screw down a very long way into the crankcase (about one and a half inches), but using these meant a lot of extra work to reclaim the threads in the crankcases. The old type studs used a brass insert at the bottom of the hole into which the inner stud screwed. These were very difficult to get out, but by making up a special screwdriver and heating the cases, they were successfully extracted. I then had four very long screwed steel sleeves made up and we ground away a suitable drill to obtain a long thin pilot on it as a guide. The cases were set up on the drilling machine again and each hole was drilled out and re-tapped to take the inserts. The tap had to be started with a centre following it up to make sure the holes ended up straight. One cylinder oil feed hole had to be very carefully re-drilled through one of the inserts.

The bearing housing and cam spindle hole diameters were carefully measured using internal calipers and micrometer (and the results noted in the afore-mentioned notebook!) so that appropriate bearings and spindles could be hard chrome plated up to obtain .0020 inch to .0025 inch interference on the bearings and .0015 inch to .002 inch on the cam and follower spindles to ensure a really tight fit. I prefer hard chrome for this job, as in thickness of up to 0.002 or 0.003 inches it goes on very evenly and smoothly and cannot be damaged during pressing in the parts. It is a good idea to heat hard chrome treated parts to 200°C for two or three hours in the oven afterwards. This it to drive out any hydrogen absorbed during the plating process, which can cause embrittlement and subsequent breakage. Stone any edges smooth and round, so that they do not damage the crankcases during insertion.

Most ball and roller bearings are dot coded to indicate the internal clearance in them. The dots are small polished spots on the edge of one of the races. "One dot" bearings have minimum internal clearance, and should only be used when both inner and outer races are a sliding fit on the shaft and housing. "Two dot" bearings have more clearance and are for applications where one race is a sliding fit and the other an interference fit. "Three dot" bearings have clearance suitable for interference fits on both races. On the Vincent Twins all the gearbox bearings, the drive side ball race and the small timing side roller race are an interference fit in the crankcases and a sliding fit on the shafts, so that two dot bearings should be used. Both the large inner roller races are interference fits in the crankcases and on the mainsshafts, so they should be three dot bearings. If two dot units are used here the flywheels will feel tight and "rumbly" when turned gently by hand and early bearing wear is likely to occur from the resulting overloading. On a racing engine all the bearings could be "three dot" with satisfactory results.

At this time I made up a little gauge to enable me to insert the cam and follower spindles to the correct height above the timing case face, but I subsequently found that it was easier and quicker to use a suitable length spacer (eg an old camshaft) with the correct washers. Before inserting, the spacer washers and a 0.005 inch shim were slipped onto the shaft and a nut tightened on to it. It was then pressed or tapped home solid into the heated crankcase and on assembly of the timing gear I automatically had the 0.005 inch end float I wanted.

A new oil pump sleeve was pressed into the heated timing side crankcase. The sleeve has a 5/16 inch BSF tapped hole in the bottom, so the old one can be extracted by using a long piece of threaded rod and appropriate spacer tubes. When the new oil pump plunger was tried in the sleeve it was tight, so it had to be carefully lapped in with Brasso until it was a smooth sliding fit right down to the bottom of the sleeve. Ensure that all traces of Brasso are washed out before commencing re-assembly. To take advantage of the increased oil circulation I have always used two-start oil pump worms in all my racing engines - but I cannot say for certain that the standard worm would not give satisfactory performance. Perhaps others have tried it and can say whether it is alright? One disadvantage was that the special plunger with the tooth angle altered to suit the two start worm was never obtainable. This meant that the standard plunger had to be used and excessive wear always followed. You can minimise this by carefully stoning all the corners round on the plunger teeth and the worm before fitting, but I still had to renew both parts every three to four seasons, even though they don't run for long in a sprinter.

The final jobs on the crankcases were to turn up a pair of little blanking discs with which to blank off the unused dynamo drive hole, and to extend the oil scraper lip in the bottom of the crankcase with a small aluminium plate to suit the reduced diameter of my lightened flywheels.

The standard method of peening the crankcases to retain the outer races of the inside main roller bearings does not seem to be very reliable for racing engines where the rpm, and hence main bearing loads, are greatly increased. I planned, therefore, to retain each race by screwing three 2BA countersink-headed allen screws into the crankcase. I chose the strongest positions where webs run into the main bearing boss in the crankcase, and then carefully ground a small recess into the outer bearing race at the correct points. The crankcases were then heated and the bearings inserted. The cases were drilled and tapped as close to the bearings as possible and Allen screws were fitted with Loctite and pulled up really tight by using an
extension tube on the Allen key. When fitted correctly the heads are flush with the crankcase and roller race surface. The reason for using Allen screws is that they are hard and very strong. This set-up has never given any trouble on The Heap, but on Jindivik, with the blown motor, I have had main bearing races pulled out in spite of this mod. It is probably better therefore, to use bigger 1/4 inch diameter or equivalent, screws to obtain a better job.

_To be continued next month_