PHOTOGRAPHY PETER JOHNSON

NIGHT SCHOOL RACER

Two years of weekly college sessions went into this Egli Vincent replica

Peter Johnson

STANDING over a hot milling machine or surface grinder in well worn overalls, heavy rimmed safety glasses and reinforced boots is a world apart from my daytime occupation. As a photographer, my day could pivot around glistening rivulets of condensation on a freshly opened bottle of Chardonnay, or the number of onion rings peeping seductively out of a juicy hamburger, soon to be on a national billboard. But for the past two years, each Thursday evening, I have made my way to the fitting and machining section deep in the basement of my local technical college.

Here were the beginnings and culmination of a bike I had long dreamed of racing – a mid-sixties' 1000cc Egli Vincent twin.

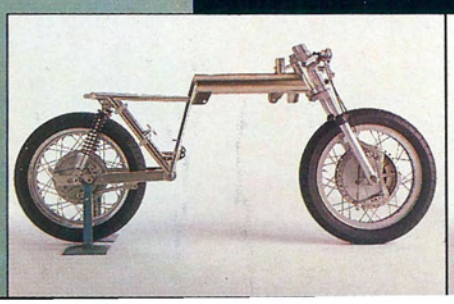
I had already suffered the pains – and ensuing pleasures – of constructing several Tritons, both for road and track, and was well aware of the many problems facing a special builder who wants to avoid the end result looking like an alphabet soup of breakers' bits. Choice of components plays an important part in performance and aesthetics, though this can often be limited by budget or availability. Also, detail and finish contribute enormously to create a machine that is both attractive and efficient.

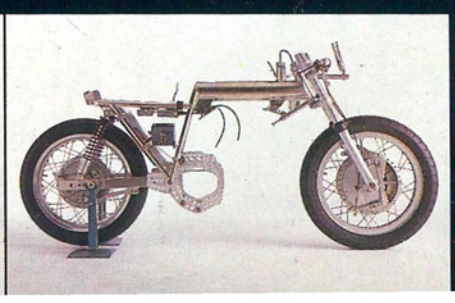
Through a chance meeting in London in 1985, I purchased a chopped Vincent Series D engine: diecast, lighter and so preferable for racing than the earlier sandcast cases. With it was a well-worn Norton gearbox. The pair had propelled a championship winning grass-track three-wheeler, long since broken up, and were much in need of repair.

First I needed a frame, so a visit was paid to Terry Prince, here in Sydney, who restores Vincents and builds his own Egli-style frames with a monoshock rear end for customers around the world. Prince's interest in racing goes back many years to his own involvement in sprinting Stevenage twins, and then working with Fritz Egli through the sixties and early seventies (for a profile of Prince, see *Classic Bike*, March 1987). Only a little gentle persuasion was required for him to construct a replica Egli frame with a twin-shock rear end. It was to suit my build and feature a few minor improvements.

The completed Egli Vincent

Right: stages of chassis construction





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I quickly located a set of 38mm Ceriani forks complete with yokes in a nearby Ducati workshop. Prince constructed the 4in diameter upper frame spine (which doubles as the oil tank) in 1.8mm instead of his normal 2.4mm wall thickness, to reduce weight. The steering head, set to 27.5° for fast steering response, was also waisted far more than on a road version. Wherever possible, brackets and fillets were judiciously and neatly drilled to keep frame mass low.

A Yamaha 10in double twin-leading-shoe brake was brought down from my loft. Purchased some years previously for no particular reason, it seemed the ideal stopper for the front end. Unbelievably, an Oldani 8in twin-leading-shoe rear brake from a 350cc Aermacchi racer was unearthed in distant Queensland. It was bead blasted and laced to an alloy WM3 18in rim to take advantage of the latest Metzler Comp K racing tyres.

Soon there was a raw steel frame, forks, wheels, engine and gearbox, and that's when the problems began. In theory it would all fit together to make an exciting machine, but in practice, the fork stanchions were too long and the sliders had limited movement. The gearbox had a space to fit into, but no means of support, there were no spindles for either wheel, no foot controls, tank or fairing and the engine required many hours of reconstruction work.

I needed machining facilities far beyond the capabilities of my own workshop lathe, and outside my own experience. This is where night school came in. Two years later, I am not, nor ever expect to be, a champion machinist, but I have acquired new skills, enjoying every minute of it. I even made some parts several times, until I was completely satisfied with the finish and constructed a bike that I hope may find its way on to the leaderboard in post-classic racing in Australia.

The first step forward was to strip the crankcase and bolt the empty engine into the frame by its two head lugs, with the forks and wheels in place. From here, basic measurements could be taken. Because the original gearbox castings had been neatly hacksawed off by hand, one side of the crankcase had no true flat surface. So, one evening the crankcase halves were firmly clamped to the bed of a large vertical mill and the drive side casting trued-up so that engine plates could be bolted to both sides.

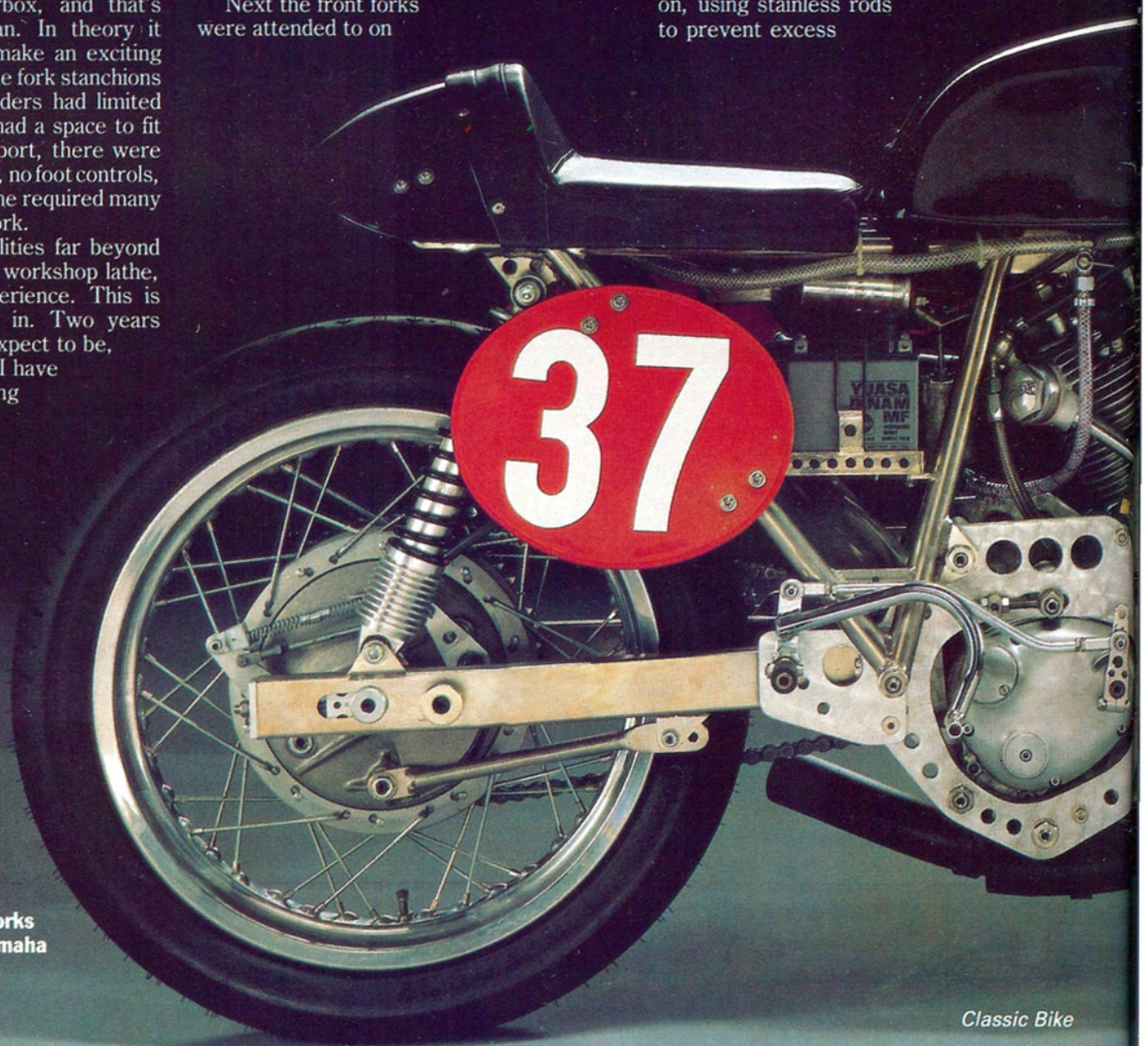
Back into the frame went the engine for what seemed the tenth time, for plates to be made to support the swinging arm and gearbox. Space was limited, adjustment was needed, and it is, of course, preferable to align rear axle, swinging arm pivot and both gearbox and engine mainshafts very carefully. This was achieved after some juggling and balancing on blocks and small packers, and the first template was cut out of heavy card. Eventually I felt confident enough to cut a pair of plates out of plywood and make final adjustments, before taking a precious sheet of 5/16in thick 7075T6 aircraft alloy to college to cut out on a fine-toothed bandsaw.

A big help was the enthusiasm of the evening class instructors. Their daytime task was to teach routine exercises to teenaged students, many of whom seemed to regret their hours spent in any educational institution. But we were all keen to learn, and determined to spend the three-hour sessions productively. There was never any lack of help with any problem my maturing skills couldn't solve.

Next the front forks were attended to on a super-accurate toolmaker's lathe. The stanchions were measured, shortened by 50mm each and the internal diameters and circlip grooves restored as per the original measurements. The sliders, once the stanchions were shortened, had only 80mm of movement, insufficient even for a racer. Ceriani use the internal bores as the finished bearing surface and examination showed a 50mm gap between the upper and lower internal load-bearing areas. The sliders were carefully marked, neatly parted between a four-jaw chuck and a live centre, shortened by 25mm and welded back together.

Don Lovell of Servalloy made an exceptionally fine job of this, and once a minor amount of emery and polish was applied, the join was invisible. All that remained was to mill a pair of blocks out of T6 alloy for torque arm attachment to the twin brake back plates, and, after cardboard patterns were tried, to bandsaw some stainless steel sheet into small stays for the glass-fibre mudguard.

Attending to the rear wheel was relatively simple. New bearings of a larger internal size were used and the centre of the brake back plate was bored out to accept a 20mm spindle instead of the original 17mm. A suitable sprocket carrier was machined from a billet of alloy to utilise the already large collection of alloy sprockets I had for my 500cc Vincent racer. Two more nights were happily occupied at college machining and grinding two suitable lengths of 70 ton steel to form wheel spindles. Bosses and small tommy bars were electric-welded on, using stainless rods to prevent excess



Norton gearbox mounts in aircraft alloy plates, front forks are by Ceriani, brakes by Yamaha (front) and Oldani (rear)

heat destroying the tensile strength of the new axles. After a lesson in thread cutting, these were ready for assembly.

Now I turned to the primary transmission. The decision had already been made to use a belt-drive, mainly to save weight. Having already used a four-speed (all that's necessary for a big Vincent) set of close-ratio gears supplied by RGM Motors, I turned again to Roger Myers for his belt kit. It has a 32mm steel-backed polyurethane belt and hard-anodised alloy clutch housing employing standard Norton Commando components.

RGM's information indicated very little 'give' in the belt, and as the 50° V-twin is quite a 'pulsy' motor, and there could be no provision for a cush-drive in either the clutch or the rear hub, I decided to incorporate the original engine shock absorber system within the engine pulley. Measurements were sent to RGM, and almost by return post I received an oversize hard-anodized pulley exactly as I desired. However, it weighed a monstrous 1½kg.

By recessing the pulley and mounting it onto a flange made from an original Vincent sprocket, I could utilise the cam. This scheme also threw the centre of the pulley back over the double bearings supporting the drive side mainshaft, reducing overhang and a possible tendency to flex under load. That would help drive alignment, a crucial factor in prolonging the life of a racing belt.

Machining the pulley to size required only one evening at college and reduced it to a modest 600gms. But the tough drive sprocket broke three hardened tips on a lathe tool – hardening was obviously good 35 years ago. Specially ground tungsten-tipped tools were needed to drill and tap for the high-tensile drive studs and retaining bolts. A dividing head and mill were used to retain accuracy. More knowledge, and another step closer to completion.

By now the engine had been in and out of the frame several times. As each component was finished, it had to complement its neighbours and be checked for fit. The drive-side engine plate had to be recessed on both sides to accommodate through-bolts and chain lines. Unlike a Norton, with plates well inboard and out of the way, an Egli plate had to run between the clutch and gearbox sprockets, leaving minimum clearances. The half-inch stainless steel shafts supporting the gearbox and stiffening the rear of the engine were carefully hollowed with a long drill to save weight, threaded, nuts welded on, and these reduced on the lathe to sit neatly in the milled recesses under the clutch.

The cylinder heads proved to be another can of worms once closely inspected. Inlet manifolds had been welded on and were of greatly differing lengths and angles. The lower exhaust valve guides had seriously damaged housings. These are deep within the head castings and couldn't be built up with weld and reclaimed. So, I machined special mandrels to fit each guide hole, bolted the heads to a mill with a tilting head, and clocked that to the exact valve angle.

The mandrels were then used to carry small cutters I ground to size, and all the damaged sections were machined out. Instead of using the retaining lock rings peculiar to Vincents, simple top-hat shaped guides could be machined from aluminium bronze, so that Gold Star W & S springs I used could sit directly onto them. The inlet stubs were cut off, and turned to fit a new pair of Honda rubber-mounted, angled manifolds that mated perfectly with my Amal GP2s. Hours of careful shaping and filing of the stubs by hand then allowed the carbs to be tucked in as close as possible. The stubs were welded back on by that magician of the alloy rod, Don Lovell.

Despite an empty crankcase, the physical outlines of the bike were already there. Terry Prince supplied a replica seat, and I ordered a well made Avon racing fairing from Sprint Manufacturing. Don Woodward in Lincolnshire had made a tank for my 500cc racer, so I knew what he would require to build a tank without reference to the actual bike.

Trace overlays with all relevant dimensions were attached to large photographs taken from side on, and directly above. My own business helped me here! I made a dummy tank out of card and by laminating 1in thick sheets of polystyrene together, carving it to shape all the necessary cutaways with a bread knife. These were sent off together with an alloy filler cap made by Newton Equipment of Leytonstone. True to his usual efficiency, when the tank arrived from Don Woodward seven weeks later, it slipped into place with little fuss, clearing the top carburettor's bellmouth superbly.

The last major task was the engine, and while I could surface grind the Stellited cam followers and even thin down the cam wheels and large steel idler on the same piece of machinery, the line boring and sleeving of the main bearing housings with steel and final assembly were entrusted to an expert – Terry Prince. The valves had been machined to accept steel BSA collets and caps and the valve stems were hard chromed to improve wear and oil-tightness. The pistons I supplied ▷

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were from an Alfa Romeo car with bore and stroke measurements identical to the Vincent's. All that had to be done on these was to mill the valve pockets to the correct angle, re-contour the top surface, and supply a slightly different small-end bush. Terry completed the engine in record time, and again the bead-blasted cases were bolted back under the frame, but this time they were complete.

Then I had a rather serious fall from my single-cylinder racer. Although I missed classes for a few weeks, the Egli did not lag too seriously behind schedule. All the major work was behind me, and now I had to make a seemingly endless list of small bits and pieces that complete any working machine. Despite their size, these items seem to take as long as the larger, more visible parts of a bike. The accident prompted me to fabricate and machine the necessary brackets to fit a lightweight hydraulic steering damper. Footrest plates were patterned and cut, pegs machined, and foot levers brazed together from bent steel tubing and chromed. I may replace these with Dural items in due course.

The original Yamaha wiffletree balancer on the front brake cables was replaced with a twin-pull lever I made up using alloy, stainless steel, and Honda cables. As a simple and efficient cable run could not be found at the rear to pull the inner, it was conveniently converted to push the outer cable housing, which required fewer, lighter, parts. A battery carrier was constructed and the necessary small brackets brazed to the frame. Prince gave the machine a final once-over, it was completely dismantled, and the frame sent for extra-fine bead blasting and nickel plating.

Reassembling the parts a few weeks later was, perhaps, the greatest pleasure. Each component was clean and like new, holes were round and correctly sized, shafts and bolts slipped into place with the minimum of force. The time spent machining and fitting each part, often several times over, had been well spent.

The exhaust pipes, bent from lengths of 2in diameter seamed tubing, were one of the last tasks. They were filled with cleaned dry sand to avoid buckling, heated locally with a gas torch until they glowed cherry red and bent to the desired curves. To retain as much front wheel clearance as possible, and because the rear pipe was shaped to clear the timing chest so the cover could be readily removed in the pits if necessary, some cutting and shutting was needed. But this was carefully blended so that the matt blackened pipes maintained their smooth curves.

Vincent engines are often known for their sinus problems, so Ron Kemp 'Elephant's trunk' breather was fitted to the timing cover with the necessary oversize hose led rearward. The petrol tank was attached with its rubber straps, the fairing and seat bolted on, and it was time to fuel and oil the completed bike and push it on to rollers for its first try.

Despite it being common practice to fit Vincent racers with twin-start oil pumps to increase big-end feed, they seem to run dry for long minutes before the first signs show in the oil tank return, so we primed the timing side and crankcase then ran the machine on the rollers until full oiling was confirmed, pulled the ignition on, and dropped the clutch in second gear.

The noise was deafening! The open two-inch pipes and a motor fuelled on alcohol sounded sweet without any fiddling with the carbs. It was a tribute to Prince's careful engine preparation.

All that remains now is to carry out track testing to discover the quirks and bugs that inevitably seem to arise in a new and highly-tuned bike. The pleasures of my nights at college had been many, not the least when Terry Prince fitted oil caps of my design and manufacture to five frames he exported.

The academic year's end came at much the same time as the Egli-Vincent burst into life, but I have enjoyed it so much, I suspect that I will be back to enrol next year□

PARTS AND SERVICES

Egli replica frame, engine preparation: *Terry Prince (02-651-2035 Sydney)*
Gearbox internals, belt primary-drive: *RGM Motors (0946-84517 UK)*
Alloy and stainless steel welding: *Don Lovell, Servalloy (02-829-1460 Sydney)*
Alloy tank fabrication: *Don Woodward (0778-7349 UK)*
Fairing: *Sprint Manufacturing (0985-50821 UK)*
Nickel plating: *Allchrome (02-789-2444 Sydney)*
Wheelbuilding: *Arthur Squires (02-570-3924 Sydney)*
Workstands: *Chris Anderson, CBA Engineering (02-618-1685 Sydney)*
The leather seat cover was made by Harold Johnson, sadly now deceased

Belt primary-drive was supplied by UK Norton specialists RGM