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A NEWSLETTER FOR ENTHUSIASTS OF AUSTIN PRE-1955

Can the mists of time obscure Hayes?

The editor concludes his examination of Hayes infinitely variable transmission



One of the few. A surviving 'Hayes' Sixteen. Photo courtesy Tony Osborne.

To understand the magic of infinitely variable transmission you must now think back to the earlier observation that the so-called races at the ends of the gearbox are of a smaller diameter than the one in the centre.

It follows that if the spheres with their rings are tilted from the horizontal - a manual function in the first instance, but more on that later - the circumferences described in the cavities of the inner and outer races will have a different value from that at the centre. In other words, the rings can be made to bear at different diameters.

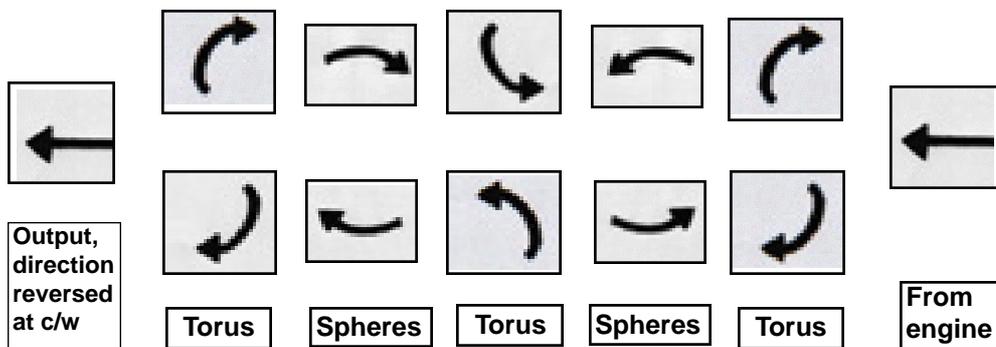
Using the same principle, the centre race can be rotated at a different speed and, because it is connected to the transmission shaft, so can the final drive. Furthermore,

because the inclination of the spheres in their fixed carriers is infinitely variable, so will be the speed differential, or ratio, between the engine-driven outer races and that at the centre.

'OVERDRIVE'

Overall ratios for the design ranged from 3.6 to 18.4:1 but in the unit itself can be as high as 1:1.7 constituting what would be termed an 'overdrive top' in a normal gearbox. (The 'Overdrive' Bentleys of the late 30s, for example, had a value of 0.85:1 on the highest gear).

In service the user of a Hayes 'box in an Austin needed to declutch, choose forward or reverse with a selector looking similar to, and placed in



To remind you of the mechanical principles, here's last time's diagram

the same position as, a normal gear lever. He or she then used two further controls, not unlike indicator switches and also located on the steering wheel boss, but at approximately the five and seven o'clock positions.

The one to the right set the minimum engine speed, firstly for starting off, and subsequently for motoring, in much the same way as would a hand throttle. The left hand control dealt with gearing. That is, it tilted the spheres to the optimum position for a high or low ratio, these settings being engraved on the steering wheel boss with notched gradations provided for selections in between.

It is important to note there was no physical connexion between the little knob at the steering wheel and the gearbox innards. Its linkage simply 'relayed' instructions to an engine driven pump on the right hand side off the casing whose plungers, under pressure of some 60 lbs from a special fluid called Drivex, actually performed the functions.

The driver had to decide what was the most suitable settings for different situations. For example, once on the move a modest engine speed and high ratio would provide

maximum economy; a higher engine speed and lower ratio, livelier performance.

Now consider again how these conditions can be made 'infinitely variable'.

As the car climbs a hill with its engine speed set (by the control on the steering wheel boss) it is quite obviously going to be slowed by the resistance of the gradient. This will also slow the transmission and as a consequence the central race in the gearbox. As this happens, the spheres tilt on their carriers and the diameter described on the outer races and the inner one change.

That is, the ratio is reduced, or, put another way, there is greater 'leverage' on the centre race and thus the transmission. Which is precisely what happens when you change down on a normal gearbox, only of course, the lowering of the ratio is within prescribed limits set by the number of teeth on the pinions.

If the driver of the 'Hayes Austin' supplements this process by opening the throttle with the foot pedal, so over-riding the setting, the engine driven members will speed up.

Consequently the spheres and rings will automatically

change their track, again altering the diameters on which they bear, and so the transmission ratio will change upwards. Again precisely what a motorist might implement with a manual gearbox as the vehicle started to get the better of

a climb.

The Hayes transmission though is flawed. Apart from any mechanical considerations, one needs to consider the marketing.

A customer for an early to mid 1930s Austin Sixteen or Eighteen which would have been broadly in a price range from £300-500 would have been sophisticated in terms of their private life. The cars appealed to lawyers, successful businessmen, affluent maiden ladies and the more conservative members of the minor aristocracy. But it is not a class of motorist, in the main, who would have very much mechanical interest or understanding.

It was all very well for the *The Autocar* writer at the 1933 London Motor Show to say: 'the car appears to the

It is not a class of motorist, in the main, who would have very much mechanical interest or understanding



As well as the steering boss control (early cars had two) the Hayes transmission required a full set of pedals and a fore/aft lever.

driver to do absolutely everything on its top gear'; and for the tester in *The Austin Magazine* of two years later to boast of a run from Birmingham, through the heart of Wales, to Machynlleth, without touching the transmission controls.

In reality, a clientele preoccupied with unspectacular, down-to-earth Austin durability, steeped in sentiments as reserved as their own, discovered, that in addition to most of the controls of an ordinary car they had some strange newcomers with which to contend. While the man from *The Autocar* may have curiously described these as 'merely trimming valves' that 'may not be regularly used', and Longbridge's own publicity declared, 'All You Have To Do Is Steer', this patently was not the case.

The company's instruction book required the steering column controls to be set in one position for cold-starting, then progressively adjusted as the car got underway and the engine warmed up. The solo switch of 1935 still needed adjustment for particular conditions and required the driver to have some understanding of the relationship

between 'gear' ratios and engine speed. This single control also had two new positions 'traffic' or 'high' marked at the top, 'start' or 'low' at the bottom.

So in essence, Hayes transmission was far from a 'Selfselector' as billed and not an 'automatic' as we would understand it - the forward/reverse lever had to be used, the clutch operated for starting and stopping and the other devices manipulated according to circumstance.

However, there is no question that it was virtually silent, effective and beautifully smooth. Its engineering shortcomings are, when the steering column controls were left permanently at one setting, and you can understand the temptation, the rings, described in

detail earlier, wore grooves in the races. After about 10,000 miles they became permanently trapped in these self-imposed tracks and the resulting ratio was 'infinitely invariable'.

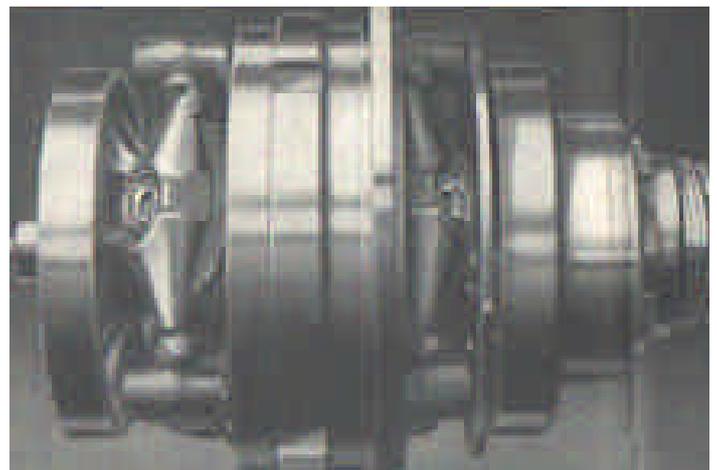
In addition, there is no foolproof means of ensuring low 'gearing' for a restart. The design relies on the torque of the Sixteen or Eighteen engine being adequate to pull away in situations where the ratio would most probably be set for normal cruising.

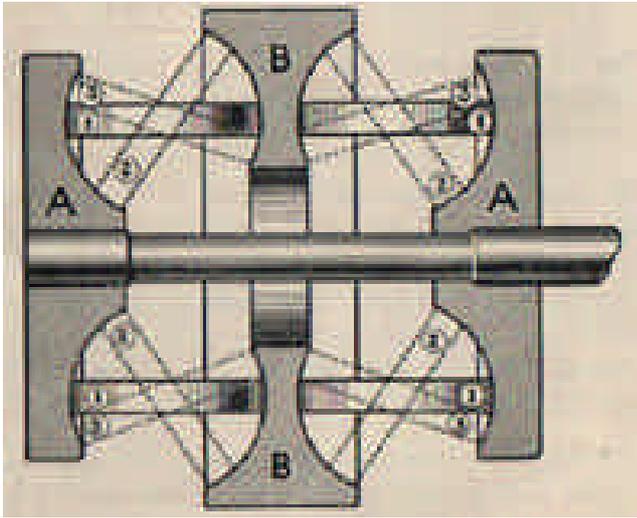
Admittedly, big side valve six cylinder Austins would have been well suited to this and also 'low' could be positively selected by moving the floor lever to neutral then re-engaging 'forward'. But a system of over-riding the setting at the steering wheel automatically, as the car was braked to a halt, or governing the ratio below a certain speed, would have been better.

New Zealander Bob Hayes - no relation - but Selfselect devotee and operator of a delectable Eighteen believes one simple modification would have assured the original system's long-term success.

He has recognized that a 'regulator' atuned to road and not engine speed would overcome that bane, the

This illustration clearly shows the 'rings' in their carriers and the concave track on the torus to the left.





This diagram supplements the one on the previous page by indicating how the 'rings' change position to provide a variable ratio.

entrapped spheres.

Say an insensitive driver positions the ratio lever at 'high' irrespective of engine or road speed; the control pump will provide the pressure (by progressively reducing oil by-pass) to maintain the 'top gear' setting. Clearly this strains the transmission and induces channelling of the 'tori' since the spheres cannot move naturally.

Bob suggests that a 'regulator' driven from the transmission shaft, the rotation of which, of course, relates to the speed of the driving wheels, should be connected to the control pump. The linkage would be arranged so that as road speed fell, by-pass would be increased causing pump pressure to fall. This in turn would over-ride the driver's setting of the ratio lever and allow the spheres to take up position for a more sympathetic ratio.

Further technical issues relate to great difficulty in making and repairing the gearboxes, and where the aforementioned grooving of the tori had occurred the only feasible, but not very cost effective remedy, was to supply a new unit.

By 1936 Austin had given up

on the Hayes Selfselector, probably, for no better reason than all of the above, although it has been suggested the company may have been paid by General Motors to cease development.

This is more likely to be a woolly reference to a deal struck between Longbridge and the American company whereby Detroit acquired an option on the manufacturing rights.

However, this was not pursued, which again, is not surprising as GM were soon committed to Hydra-Matic, an epicyclic gear-based automatic system which appeared on the 1940 Oldsmobile. This 'contribution to simpler, safer, more efficient driving' with 'no gears to shift; no clutch to press', may not have been as technically advanced on paper as the Hayes, but it was better on the road.

But this is not the end of the story.

Throughout the 1950s and 60s research continued into infinitely variable transmission, now referred to simply as 'IVT', but of the type brought to Austin by Hayes and Cloudsley. Such important organisations as the UK's National Research

Development Corporation, which had given its support to other significant inventions like the Hovercraft, became involved.

Subsequently, the technology was licensed to Lucas Aerospace and used in an alternator drive for the Harrier Vertical Take-Off and Land fighter aircraft.

With the oil crisis of the early 70s the possible fuel economy benefits of IVT came under the spotlight and British Leyland considered the system for a wide range of vehicles.

These included the famous Leyland National bus, the unloved Terrier light commercial chassis and the 16 tonne Freighter.

However, it is unlikely that at this stage the engineers at Leyland Vehicles had any idea that the concepts they were developing harked back to Hayes and far beyond.

Indeed, the story goes it was only when one of the machinists remarked he had just reconditioned some 'races' for a Hayes gearbox in his spare time, senior management realized that perhaps their ideas were not unique!

The relationship with Leyland

More likely to be a woolly reference to a deal struck between Longbridge and the American company

eventually proved the catalyst for future IVT development. In 1988 BL merged its commercial vehicle activities with those of the Dutch company DAF and infinitely variable transmission was dropped. However, NRDC now called British Technology Group but always referred to as simply BTG, bought back the licences, and with those it already held, formed a subsidiary named Torotrak.

The objective was to develop an IVT which could be passed to volume manufacturers in return for a royalty on output. The project gathered momentum in 1993 when Ford joined forces to develop a pre-production 'box' for the Mondeo. A year later they became Torotrak's first major licensee and a fleet of this model using the transmission was built. A prototype was also produced for the Rover 820.

To provide greater financial flexibility Torotrak split from BTG in the late 1990s and floated on the stock exchange in 1998. This could eventually mean low volume in-house production of transmissions in addition to the licensing function.

Currently licencees include Toyota, Gertrag of Germany who supply BMW, Korea's L G Cable, F F D Ricardo and a number of other companies whose interest is commercially confidential, but the fields span everything from agricultural vehicles to racing cars.

It is easy to see why IVT is hailed as the transmission of the future. Fuel savings of up to 20% have been achieved in some situations plus reductions in carbon dioxide emission. There are also all the

Desperately seeking Frank

by Aida Maurice

It was unquestionably one of the most ingenious inventions of the motoring century. So much so, the Hayes concept of an infinitely variable transmission is still under development.

The more remarkable, then, that virtually nothing would appear to be known about Frank Anderson Hayes. And while this article makes no claims as to incisive investigative journalism, it at least speculates on the course a remarkable engineer's life may have taken. Perhaps the suppositions made will prompt someone to reveal the nature of Hayes, correct an historical aberration and enrich our fund of motoring lore.

Single half-paragraph

I first became seriously interested in Frank Anderson Hayes, the man, when writing about his self-select gearbox fitted, as an option, to Austin Sixteen and Eighteens from about 1934 until 1936 and a feature which put Longbridge within a pedal-press of automatic transmission. Never did I believe, though, the search for information on the system's designer would lead me across America, to New Zealand and along many a UK byway.

The story, for me, began a long time ago. When I read that single half paragraph in R J Wyatt's *The Austin 1905-1952* (David and Charles 1981) :

Frank Anderson Hayes, an American inventor, had been working on automatic transmission systems for a number of years. During World War I he had met Captain J L Cloudsley of the Cloudsley Engineering Company of London and, a chance meeting on a railway station having brought them together again, they worked on Hayes's transmission together for five or six years. Cloudsley introduced Hayes to Austin and the three of them worked on perfecting the idea, which was by then protected by US and British patents, and a prototype was ready by 1932....

Appeal to the great man

A neat summary. Perhaps just a little too neat. Because it doesn't quite accord with references attributed to Freddie Henry, who joined Austin in 1926, and was later closely involved with the variable transmission project.

Contained in an article in a 1999 issue (1999C) of the Austin Seven Clubs' Association's excellent magazine, they set the time of the 'chance' meeting as 1927 and the location as Waterloo.

'Hayes had been hawking his transmission around the US and English motor firms,' says Henry. 'Cloudsley recognised him (at the station - my insertion) and asked his old First World War friend what he was doing in England.' Henry adds that Cloudsley told Hayes that the only man who would be interested 'in the scheme' was Herbert Austin, that it would 'appeal' to the great man and that he knew him and would

performance and driving refinements Austin never fully achieved.

Torotrak aim for 80% penetration of the automatic 'gearbox' market by 2010 which by then could be well over 50 million units a year providing an annual revenue which has been estimated at \$800m (US).

All that of course would be beyond Frank Hayes's wildest dreams.

Today, very few Selfselector Austins are known to survive. A 1934 York, with the later single control at the steering wheel, still functions perfectly with an owner in the north of England.

MORE ACCLAIM

But for an earlier car with two column 'switches' we must look to Bob Hayes's beautiful 1933 two door coupé with coachwork by British builder Salmons. The car was built for HRH the Prince of Wales and used on the Royal Tour of New Zealand in 1935. In recent times it has enjoyed even more acclaim. Bob's total rebuild has earned a number of prestigious awards at vehicle shows in its adopted country. Interestingly, the original registration mark is BMC 307, but again - no relation!

When Bob first put his restoration on the road he had no Hayes transmission and was forced to use the 'less smooth and noisier' Borg Warner 65 epicyclic-based gearbox.

Subsequently, he was fortunate enough to obtain a genuine Selfselector from Leicester in the UK, and

arrange to take Hayes to see Austin.

All this prompts the inquisitive to search for other references. Most obviously, in the first instance, on one's own bookshelves.

There is an obscure reference to Hayes in the 1960 Batsford book *The Motor Car 1765 – 1914* by that doyen of motoring journalism of the day, Anthony Bird, when he writes:

The ingenuity of Amédée (Bollée) père did not stop short at the steam engine as his inventions include an hydraulically controlled clutch and change speed mechanism in 1876 and, in 1898, a progressively-variable change speed mechanism of the type re-invented (or copied) by Hayes

and adopted by the Austin company in 1933.

Much, much later *Men and Motors of inside story of a making at* (Haynes 2000) reference at all gearbox.

So where should information on Frank tented to Norman knows more about automatic gearboxes than and has done priceless



Barney Sharratt in *The Austin - the century of car Longbridge* makes no to Hayes or the

one go for info-Hayes? I resorted to Norman Geeson who conventional auto-anyone else I know research into the Hyd-

ra-Matics fitted by and Bentley in the

Who were you, Frank and what became of you?

Rolls-Royce immediate post-war years.

Norman had no information on Hayes but instigated an Internet search; something I had been about to try.

Unfortunately 'Hayes' is not a particularly unusual name and by a strange coincidence one of the finest surviving examples in the world of an Austin with Self-Select is the example meticulously restored by the unrelated Bob Hayes of New Zealand ! (See story alongside)

Between us, Norman and I concluded the most likely candidate for 'the real Frank' was the Frank Anderson Hayes born at Deep Creek Falls, Washington, USA, on October 17, 1883.

By the time this Frank Hayes was approaching his teens the Duryea brothers would already have put the first petrol engined car on the streets of America in nearby Springfield, Massachusetts. If he was already of a mechanical bent he may have been aware it had an epicyclic transmission operating in a 'power drum'. And he would certainly have been conscious that steam powered vehicles continued to be as popular in his native land as the new internal combustion challengers. And this may actually have significance in *our* story.

having stripped and reassembled it five times must now be the world's leading authority on Austin's version of infinitely variable transmission.

The mechanical deficiencies were attributable to wear and Bob renewed the bearings and seals and reground the tori.

Three of the five rebuilds stemmed from the oil used to replace the unobtainable Drivex prescription, as on dismantling to investigate slipping, Bob found the lubricant was the cause and not component failure.

Eventually, guided by engineer Mervyn Patterson at none other than Torotrak, Bob obtained a suitable oil from the Findett Corporation of Missouri, specialists in traction lubricants.

METAL-TO-METAL

Very simply the product obtained for the Selfselector is a synthetic, as opposed to petroleum-based, oil which forms a plastic film about 10 micro inches thick at a point of high pressure metal-to-metal contact, while remaining liquid over the rest of a surface. Thus, in the Hayes transmission the 'skin', sometimes described as a 'glassy solid cushion', would form between ring and torus allowing the drive to be imparted without slip and minimising wear or fatigue cracking.

The two rebuilds for reasons other than fluid were attributable to failure of the rings - or rollers - which rotate in the pivoting spheres, and to a localized break down of the hardening on the centre torus. In both cases the parts were

But come 1911 the young man had other things on his mind. On April 29 that year he married Effie Knox Huntington in New York City. The records of the Huntington Family Association show that she was the 23-year-old daughter of what sounds like a lady of Dutch, Lutheran, origin – Marie Robertina van Vechen - and her husband Samuel Huntington. Efforts to develop this theme have drawn no response from the Association.

The account in Wyatt suggests that it was around this period that Frank Hayes first met Cloudsley – through a mutual connection to the Royal Flying Corps.

Earned their 'wings'

The Royal Air Force Museum at Hendon in the UK have no record of Hayes or, for that matter Captain Cloudsley. However, we know that at the beginning of the First World War there were many Americans and Canadians who wanted to fly with the RFC and Royal Naval Air Service and civilian training establishments were set up, principally at Toronto Island and Long Branch in Canada.

These were soon overwhelmed by the demand for tuition and in the summer of 1917 the RFC itself established training camps at Borden, North Toronto and Deseronto the operation being moved to Texas for the winter. Several thousand aviators earned their wings under this scheme and it seems likely it was responsible for the first meeting between Hayes and Cloudsley.

When Hayes moved to England, and how and precisely why, is unclear. And we don't know whether he kept in touch with Cloudsley after the Armistice.

We do know though, that in 1925 he was living in Keyport, Monmouth County, New Jersey, and it was from there he applied for the patents covering his invention of 'variable speed transmission mechanism of the friction type.'

Very loosely speaking

They were filed in the UK in 1926 and all the paperwork seems to have been done and dusted by the end of 1927.

At this stage it is convenient to lay the Bollée contention to rest. The innovative and popular Leon Bollée tricars of the mid -1890s which, if Bird was alluding to petrol vehicles at all, he must have had in mind, had a conventional sliding pinion gearbox.

However, they did have an unconventional change speed mechanism that involved moving a lever in one plane, and very, very, loosely speaking Hayes Austins have a control lever which moves in one plane to influence the transmission.

Dave Pittuck, the courageous international campaigner of an 1895 Bollée, helped me unravel this and by one of those

remade which is a measure of Bob's considerable engineering skill.

As we have seen a development of Hayes's ideas may yet come spectacularly into its own. So what caused its limited success at Austin?

It is misleading to dismiss matters by saying the concept was just ahead of its time and the market was not ready. A sizeable selection of customers welcomed the pre-selector and, no doubt, those same people would have delighted in an automatic transmission that was genuinely that, and worked well.

UNACCUSTOMED

The first problem Longbridge may have had was that manipulating a Selfselector was really too complicated for the type of motorist they were targeting. It was also expensive and in some cases is reputed to have imposed an unaccustomed, and not particularly attractive, sound on the car - that of the engine racing.

Another problem must be the extreme skill needed to make the parts. That is not to criticise for a moment the machinists at Austin. They were among the very best in the country, if not the world.

NOT SPECIALISTS

Don't forget, that some years later their counterparts at Rolls-Royce had the greatest difficulty making the components for the Hydra-Matic gearbox being built under licence from General Motors. It is simply the men at Austin were not specialists in this field, as, for example, would



Bob Hayes's magnificent Eighteen with some of the trophies it richly deserves. Few accolades came to Frank Hayes though. Photo Bob Hayes

strange coincidences has a friend who once declined the offer of a Hayes gearbox on the grounds it would be too 'troublesome'. However, he did acquire the comprehensive accompanying literature.

I have yet to discover whether there is anything of relevance to Hayes in Amédée Bollée senior's steam practices.

Frank Hayes was now very much the family man. His son, Francis, had been born as early as 1912 and daughters Marie and Effie Lucretia followed in 1913 and 1915 respectively.

It seems likely, therefore, that the encounter with Cloudsley at Waterloo Station would have occurred when Hayes was visiting England.

'Hawking his transmission around the motor firms' does not seem to stack up. One would have thought that the home of the Model T Ford and the electric transmission Crown Magnetic would have been more responsive to an advanced gearbox than Europe. While the Wall Street Crash was yet to put a temporary stop to innovation and speculative gadgetry in the motor industry.

Which 'motor firms' received a visit from Frank Hayes is not known. AC were at Thames Ditton, Aston Martin in Feltham and Lagonda not far away at Staines. All could have been reached by train from Waterloo.

The most likely contender seems to be Lagonda, a company that was founded by the American Gunn brothers and which is known to have been looking at easy-change gearboxes around the relevant time. However, the Lagonda Club have no specific knowledge of a meeting with Hayes although the company maintained an enthusiasm for semi-automatic transmission and subsequently toyed with various systems.

Frank and Effie Hayes's last child, Cara, was born in 1928. They may have marked the occasion by moving house and celebrated by taking a fresh look at the gearbox.



Lagonda may have been interested but backed another loser, from Maybach! Photo Luc Wynen

have been the operators at gear makers ENV. In addition the work would have been totally unfamiliar and it must have been uneconomically time-consuming.

Finally, the technology of the day was inevitably going to fail Longbridge. The lubricants were not available, the fluid flywheel which would have made so much difference belonged to someone else, while the centrifugal clutch, which could also have done the trick, had a reputation for inducing rough starts which would have been very un-Austin Eighteen.

Furthermore, it is easy to imagine that the skills at Longbridge would have been quite capable of devising and manufacturing the kind of hydro-mechanical control unit a gearbox like the epicyclic Hydra-Matic would soon need.

SHORTCOMINGS

But it is not so simple to envisage the wisdom of the day coming up with something to overcome the accepted shortcomings of the Selfselector.

Brilliant as the adaptation by Torotrak has been, and deserving as it is of every commercial success, the process has been aided by today's lubricant, electronics and some quite radical re-working.

But let not any of that detract from the brilliance of Frank Anderson Hayes or Herbert Austin's vision in trying to achieve something the average motorist would wait another 30 years to enjoy.

By 1929 their address was Middle Town, also in Monmouth County, and Frank patented refinements to the transmission. These were also filed in London and the processes were completed by the Spring of 1931.

It may have been around this time the family moved across the Atlantic. Cara at three years old would have been at a reasonably convenient age to travel and Wyatt refers to a 'prototype' being ready by 1932. This is probably of a gearbox rather than a car, but in any event it seems unlikely Austin, or Austin and Cloudsley together could have achieved this without Hayes physically present.

Austin himself patented modifications

Quite how the Captain got his finger in the pie is difficult to fathom. What is clear is there was now a period of intense activity.

The gearbox is modified several times over, it becomes known in some quarters as the Austin-Hayes system, and ultimately it is revealed as having daunting manufacturing problems and to be unsuccessful in the marketplace.

Significantly, both Cloudsley and Austin himself patented modifications in 1934, which coupled with the terminology 'Austin-Hayes' suggests that by now they may have had a financial interest in the system.

This is intriguing. Sharrett in *Men and Motors of the Austin* reveals that Herbert Austin received a two guinea royalty on every Seven built as a consequence of taking out patents on the ideas it incorporated.

That author goes on to quote Stanley Edge, the talented young draughtsman Austin picked to help him draw the car, as saying : 'Many of those patents were for my ideas. Whether he engaged me because I was under 21 or not, I don't know, but in those days being under 21 meant you had no rights at all....So I couldn't have patented anything myself. Whether that entered his head I don't know, but he was pretty shrewd.'

The trail goes cold

This of course is as disingenuous to Austin as it is deprecating of Edge's own obvious qualities and skills.

But if Austin was that sharp one has to wonder whether Frank Anderson Hayes caught a severe financial cold in the climes of Longbridge.

Nothing is heard of Hayes after production of the Self Select Sixteens and Eighteens stopped around 1935. But Wyatt steps in to dismiss a rumour that General Motors paid Austin - personally(?) - to cease development. And it seems GM paid £20,000 for the US manufacturing rights but never proceeded.

Hayes appears not to have figured in any of this and the trail goes cold, bar for one tragic footnote.

ROSENGART RARITY AT RETRO MOBILE

THE EDITOR has often been hard-pressed to find much more of specific Austin interest than a scruffy Dinky at Paris's prestigious Retro Mobile old car show.

However, this year proved an exception when a beautifully restored Rosengart put in an appearance.

The LR4R1 of June 1940 was from a period when that innovative French entrepreneur, Lucien Rosengart, was increasingly moving away from the Austin Seven concept on which he based his motor manufacturing activity.

This was amply evidenced by the car at Retro Mobile which displayed a flamboyance and brashness that would not be to the average Austin enthusiast's taste.

And talking of the gauche - it shared stand space with A Bugatti 'Royale'. This one of the seven produced designed by Ettore's son, Jean, and not pleasing to the eye.

That said, 'Retro' goes from strength to strength and now

Francis, the first born who had married Georgette Anderson, in England, on July 11, 1936, and had a son with her – John Peter Huntington Hayes, born on September 3, 1937 - was lost at sea on October 16, 1942.

Remarkably the prestigious Antique Automobile Club of America have no information at all on Frank Anderson Hayes, neither do those libraries and institutions famed the world over for their records of automobile history. Their polite letters which have borne no fruit pile high on my desk.

Where might we go from here? I continue to search for information on a young Frank Hayes, to establish who exactly was Cloudsley and to trace just one of those relatives whose intriguing middle name, like Frank Anderson McKenney and Caroline Hayes Davenport are virtually the only memorial to the life of this inventive American.

There have been false leads aplenty. John P Hayes the Professor of Electrical Engineering and Computer Science at the University of Michigan seemed promising – right location, engineering background. Sadly, the learned gentleman had no connexion with Frank but the charming and rewarding correspondence which ensued turned, I like to think, Professor Hayes into an admirer of Frank.

Yet somewhere, just as a Hayes infinitely variable gearbox lay forgotten under the bench at the Austin agency in the town where I grew up, there is a dusty file, a clip of yellowing newspaper cuttings, a now old man or woman with a fading recollection.

Some people deserve their place in history more than others. Frank Anderson Hayes certainly warrants his due.

in its 30th year must be one of the finest classic car shows in the world. The place to come every February if you want to see anything from an Isotta-Fraschini to a Burney and much, much more that's genuinely unique.



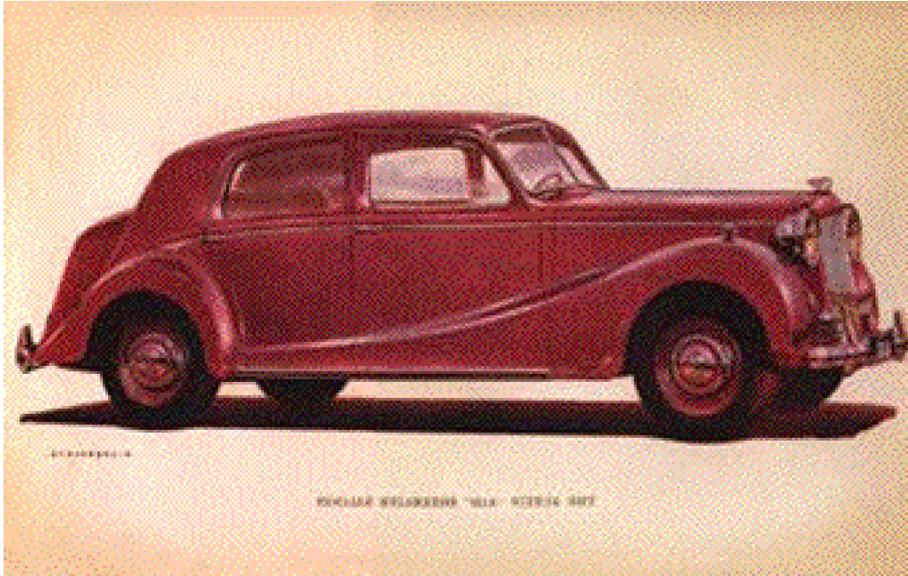
Rosengart represented Austin interest at Paris Retro Mobile

SCOOP!

Here at *Austin Times* we always need your stories, theories, accounts of your restorations or simply of the Austins you have spotted. Please get in touch with the editor, *Martyn Nutland*, at
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CALLS**

A line that just sheered off course



Better from some angles than others, but giant headlamps were just one of the styling mistakes.

THE AUSTIN SHEERLINE has been described - along with the P4 Rover and Daimler Consort range - as the 'poor man's Bentley', and also as the best-appointed lorry in the world.

The latter is as snide as it is inaccurate. The former redolent of a society still classist and *demimonde* even after the social upheavals of the Second World War.

Certainly, Austin always had the luxury car market in its sights. Affluent maiden ladies equipped their chauffeurs with Eighteens and the highest in the land - administratively at any rate - rode in Twenties and Twenty Eights. But the Sheerline was something else. And it did look like a Bentley Mark VI the day before someone got hold of the drawings and made a job of them.

But was it ever really a contender in the super-saloon sector? The ultimate 'bargain Bentley'.

At face value, for your £1270-worth of Sheerline, you got a car very similar to the Bentley. The engine started out as a version of the 'three-and-a-half' from Longbridge's familiar commercial range, but just 12 cars on was changed for the very similar 3993 cc (87 x 111 mm) unit that was

also destined for the lorries.

Both engines were six cylinders with pushrod-operated overhead valves and a single Stromberg DBVA carburettor. This Zenith-built instrument had all the 'bells and whistles' such as automatic choke, throttle pump and by-pass economy jet.

Longbridge had gone to considerable trouble to make the whole unit ultra smooth and silent. This went far beyond

by
**BENT
HORSINGTON**

the synthetic rubber tensioner/silencer ring fitted between the rows of teeth on the camshaft chain wheel and all-round rubber mounting, but extended to a felt pad pressed against the timing cover to damp out resonance, and felt in-fill between the double walls of the aluminium rocker-box for the same purpose.

There was also an anti-surge cam profile, designed for the four cylinder ohv engine used in the post-war Sixteen, oil-cushioned interfaces between



Perfect poise. The Bentley Mark VI not only looked right from every angle but has a timeless elegance.

pushrod and rocker, also fitted to that car, and a bonded rubber Metalastik vibration damper bolted to the crankshaft pulley.

In its May 1948 road test *Autocar* magazine described the motor as 'giving real power without fuss' and at about the same time the *Automobile Engineer* credited it with both 'sweet and silent running'.

There is no question that the Sheerline engine was one of Austin's best and a fine piece of work by any standards. Quite apart from all the attributes just mentioned it had considerable reserves of power and when 'tweaked' by higher compression and three SU carburettors could provide about a 10 per cent increase in power for the Princess (135 bhp as opposed to 125).

One might even be justified in saying it was a superior design to that which Crewe created for the Bentley Mark VI and mechanically similar Rolls-Royce Silver Wraith. Predictably the approach was more complicated. At 4257 cc (88.9 x 114.3 mm) it was another straight six but with side exhaust and overhead inlet valves (an F head). In Bentley guise it used two of the superlative SU H4 (later

H6) carburettors with manual choke. The Silver Wraith preferred different versions - first an AAV-26M then DBVC-42 - of a Zenith/Stromberg.

Apart from that, the general arrangement of the Bentley engine was broadly the same, although it had an aluminium as opposed to alloy iron cylinder head, seven main bearings instead of four and stuck with Henry Royce's individualistic, overly complex and potentially troublesome, crankshaft vibration damper.

It has to be said, the aluminium head was the devil for corroding to its studs and on the anti-freeze of the day, Bentleys filled their water passages with bucket-fulls of scale. But the crankshaft was not prone to breakage as on previous Derby-built models.

Leading post-war Rolls-Royce expert, Norman Geeson writing recently about

this engine said '...it should be remembered that these were, without doubt, the finest engines available at the time'. (1945-52)*

This is a fair point, but it does not stop us acknowledging that the more basic and rugged Austin unit ran it a close second.

Indeed, in conversation with the author, Norman recognized the four litre Austin's build quality and its amazing resilience to abuse. He remembers one, in a lorry, which had overheated and been down on power for the whole of its 250,000-mile life. On test, after a cylinder head rebuild had failed to effect a cure, the exhaust manifold and head itself were found to be glowing red to such an extent that the moving shadows of the exhaust valves could be seen! Wild maladjustment of the timing was the explanation and when this was corrected the Austin was well-behaved for many thousands more miles.

Both Mark VI and Sheerline used cruciform braced channel steel chassis frames that
*This author's insertion



Bentley engine (right) was not as rugged as Austin's four litre

were remarkably similar. The Austin though, had its cross members disposed slightly differently and was not quite so substantially braced at the front. However, both manufacturers were trying to achieve an unflinchingly rigid backbone for their car and Austin had slightly lengthier experience with full cruciform bracing.

Suspension and steering clearly play a vital part in overall handling and again, the two cars had much in common.

The Bentley accommodated its rear semi-elliptic leaf springs outside the frame and having encased them in leather gaiters, provided lubrication from a pedal operated one-shot system.

CONVENTIONALLY

Meanwhile, the double acting hydraulic shock absorbers could be adjusted for rate from a 'ride control' knob on the steering wheel boss.

Front suspension was independent and although the upper arms which formed the 'wishbone' were of equal length and conventionally attached to either end of the shock absorber, the lower were arranged at a very wide angle, the rear strut forming what was virtually a brake torque arm. The coil spring fitted between the forward, lower wishbone arm, and a housing in the chassis frame above.

And mounted between the extreme ends of both wishbones were the vertical yolks on which the swivel axles pivoted. There was also a transverse torsion bar.

The Sheerline's rear, under-slung, semi-elliptics were also worn outside the frame and

used Silentbloc bushes, zinc interleaving and a spring steel anti-roll bar between the Armstrong hydraulic shock absorbers - all Austin custom.

But there was no automatic lubrication for this, or any other part, of the chassis.

LONGITUDINAL

The springs were only 'half gaitered' but overall the rear suspension was simple, practical and well-designed for relieving stress on the springs.

At the front, double wishbones, which unlike the Bentley's were similar in shape, were angled 25 degrees backwards from the longitudinal line of the chassis - the opposite to the arrangement on the Mark VI, where they were given 'lead'.

Otherwise the layout was broadly the same. The coil spring seated on the lower wishbone and in the chassis frame above. The stub axles were carried on yolks.

Metalastik bushes were used for the inner bearings of the lower wishbones and for the outer ones at the top. There was no anti-roll bar.

'SICKLE' PIECE

Steering on both cars was by cam and roller and both firms, had problems connecting to the wheels. Rolls-Royce changed their arrangement in March 1950. By simplifying the lever work they improved both lightness and accuracy. Austin's set-up was less complex to begin with - a connexion from steering box to a 'sickle' piece and slave lever which worked cross tubes

angled rearwards and attached to the swivel axles by short arms.

In any event the Mark VI handled superbly. Whether or not the Sheerline did - at least by the time it reached the public - is open to conjecture.

However, there may be some insight in an article about a trip to the Belgian Grand Prix, written for *Autocar* in 1948 by acclaimed motor-journalist SCH Davis.

Using heavily laden Works car HON 56, Davis reveals that on breasting hills at speed the tail bounced then grounded with such abandon that the GB plate was flattened and an over-rider scraped the road!

'INTRIGUING'

The phenomenon is dismissed as the fault of weakly set shock absorbers. But it makes the case for 'ride control' and perhaps lots more.

The prototype Sheerlines are said to have been heavy to steer at low speed and to vibrate through the column on poor surfaces. The author remembers similar criticisms of the production cars, but it was usually put down to tyre type or wheel balance.

The brakes on the Austin were Lockheed hydraulic with twin leading shoe mechanism at the front. The two inch wide linings operated in 12 inch drums but almost unbelievably there was no servo assistance on this 39 cwt car.

So are we back to Longbridge's time-honoured *bête noir* of 'intriguing' brakes? It would seem so. The *Autocar* road test is *blasé* on this, describing the system

as dealing with the 'quite heavy car successfully'.

The commentators in Barney Sharratt's book *Men and Motors of 'The Austin'* (Haynes 2000) are rather more critical.

We learn test cars, if braked heavily from speed, suffered fade and pedal sponginess and hubs became so hot that the jacked wheels could barely be turned manually.

Automobile Engineer applauds the choice of ball instead of taper bearings in this location as 'ingenious' but in reality, given the heat the brakes could generate, it was clearly an error.

IDIOSYNCRATIC

It is of passing interest, Austin went down the same path on post 1926 Sevens when they changed from taper roller to cheaper ball bearing hubs. But on a vehicle weighing well under half a ton they could get away with it.

The Bentley's brakes, on the other hand, were fantastic, and even today a Mark VI can hold its own with many modern cars. The front shoes were operated by a Girling hydraulic system and the rear mechanically by wedge and roller.

Application was assisted by the rather idiosyncratic gearbox-driven mechanical servo Rolls-Royce bought from Renault in 1927. Around 50lbs foot pressure was all that was needed for an emergency stop from speed and *The Motor* magazine described the pedal as requiring 'little more effort than the accelerator' in normal driving.

Transmission on both cars

was from a four speed gearbox to a hypoid bevel semi-floating rear axle made, in Austin's case, by Salisbury. The drive got there on the Sheerline via a one-piece transmission shaft coupled by Hardy Spicer needle roller universal joints. The Bentley used a two piece shaft supported at the mid-way break by a pivoted bearing.

The Bentley's gearbox was controlled from a vintage-style right hand lever and, quite apart from providing almost perfect gear ratios, is arguably one of the most pleasant and foolproof devices ever fitted to a car.

Sadly, Longbridge equipped the Sheerline with a wishy-washy column mounted porridge stirrer of the type now justifiably condemned to the dustbin of history.

However, it should be pointed out that Austin went to considerable lengths to make it otherwise, with springs,

graphited bushes, rubber rings and rods and bell cranks going hither and thither. But Davis was probably being kind when he reported in his account of the Spa joy-ride that the earliness of his example rendered inevitable the gear lever being 'much too stiff to move out of second', the knob unscrewing and synchromesh being imprecise.

Even with the car's great flexibility, at the expense of a little top speed 'busyness' born of too low gearing, and its ability to do almost everything on second or fourth speed, it is hard to envisage the all-important American market, already accustomed to automatic transmission, taking to this gear change.

In fairness though, one needs to add that Bentleys for the US also often had column change but just looking at it you sense it is rather more nicely engineered than the Longbridge version.



Sheerline interior was attractive but column change a horror.

BENT WILL CONCLUDE HIS ASSESSMENT OF THE AUSTIN SHEERLINE NEXT TIME

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