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“Hybrid powered bus”

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The year 1968, apprenticeship papers in one hand, redundancy pay in the other, twenty-one years old, allegedly skilled after four years (late start) training at HALL & Co Ltd and looking for a job. What to do? Well, as a young child whenever my parents took me on a bus, I cried my eyes out, so this should have been a warning, it's an emotion repeated many times in adulthood except that it was more underneath the bus than riding in it. All of this leads me nicely into my next big career move, Southdown Motor Services Ltd Portslade Works (On the eighth day God created the works). Interview with assistant chief engineer for position of skilled fitter goes ok, job offered. Oh by the way I'm still going to technical college on day release which is for another year, that's ok lad, we'll pay for you to continue with your further education on full skilled rate. One of my college mates who worked at Endeavour Ford, Preston Road, their own apprentice, had the same problem as me and they made him work Saturday mornings without pay to compensate. It pays to work for a proper firm.



I started my new job in November 1968 working in the chassis shop on gearbox overhaul, then moving around different sections finally ending up in the engine shop. Being the 60s there was a lot of characters who had many years' service with the company and related interesting tales about the good old days. One day I happened to be in the body shop looking for something when I was approached by one of the craftsmen working on a bus body rebuild. A conversation was soon struck up and he ended up telling me about some old pre-war petrol electric buses that were made by Tilling Stevens and operated by Southdown. He continued by saying that the local kids discovered that by placing a house brick or something similar under one rear wheel of these vehicles, forward progress was impossible until the driver got out and removed the article. How the offenders discovered this characteristic which seemed to be peculiar to the petrol electric type is

unknown. Solid tyres would not have helped but what about the traction motor producing maximum torque at zero rpm?

The company known as WA STEVENS was established in 1897 by William Arthur Stevens and by 1906 had built its first petrol electric vehicle using designs patented by Percival Frost Smith. A bus company started in 1847 by Thomas Tilling who had introduced the first timetable system of operation using fixed stops, and later wanted to produce their own vehicles so purchased the Stevens undertaking. The new company becoming TILLING STEVENS Ltd Maidstone Kent. By 1913 the first prototype bus TTA1 and soon after a 40-horsepower version TTA2 were developed.

The general arrangement of the petrol electric buses consisted of a four-cylinder petrol engine mounted in a conventional longitudinal manner in the front of the chassis connected to a generator. Current is passed to a chassis mounted traction motor and thence to the rear axle of the overhead worm drive design via a cardan shaft. No batteries were used to store electricity and thus the system is not very economical, but was easy to operate and more popular with drivers than conventional crash gearboxes

The lack of batteries may explain the reluctance of the vehicles to overcome obstructions placed in front of the driving wheels.



During WW1 the petrol electric transmission was not considered suitable for use in France for army lorries, as drivers had become more familiar with conventional gearboxes. This led to a decline in this system, except for bus development. An interesting use for the hybrid system during the second world war was in the

form of search-light lorries where its capability of static electrical generation combined with mobility proved invaluable.

The TS company was sold to Rootes Group in 1950 who produced vehicles until this type of vehicle production ceased at Maidstone in 1953 when production of a new engine type for Commer lorries was manufactured there commencing in 1954.

This engine was an opposed-piston, three-cylinder, single crankshaft, two-stroke diesel type of 3.261 litres producing 105bhp @ 2400 rpm and 270ft lbs torque @ 1200 rpm. Designated TS3, the general arrangement of the unit consisted of three horizontal cylinders of 3.25in bore with the crankshaft at right angles and centrally below the cylinders. The opposed pistons in each cylinder were actuated by a rocker arm system, three on each side of the engine, with pistons being coupled to the upper end of the rockers via a connecting rod, and similarly the lower end of each rocker to the crankshaft. A positive displacement blower situated at the front of engine block provided charge air through inlet ports in the cylinder liner and similarly, spent gasses exited from exhaust ports at the opposite side. Outward motion of the pistons opened the exhaust ports first thereby using the residual pressure near the end of the power stroke to help evacuate the cylinders of spent gas.

This closely followed by the opening of the inlet ports producing a blow through effect which provided excellent scavenging of the cylinders. Inward motion of the pistons closed the ports, compressed and heated the fresh charge of air to which a centrally mounted injector introduced atomised fuel oil to initiate combustion.

A four-cylinder version of this engine was tested, designated TS4 and had the potential to capitalise on the success of its predecessor, however, and this may sound familiar, the Rootes Group was taken over by the Chrysler Corporation in 1968 who had an arrangement with the

Cummins engine company effectively killing off this quirky little engine fondly remembered by all that knew it.

My own experience was testing a newly overhauled TS3 out of a Commer Avenger coach at Southdown Works. Running at full power on a test stand coupled to an hydraulic dynamometer was something to behold.

A precaution when removing a hot engine from test was to wire the fuel pump stop lever in the no fuel position to prevent accidental starting should the engine be barred over for any reason. This could be quite exciting especially if it ran backwards.

As a footnote to the TS story, the company closed in the 1970s shortly after the Chrysler deal, but the factory buildings in St Peters St. built in the 1920s in the daylight style, listed as grade 11 in 2011 survive and have not been altered significantly from original.

