Motor Vehicle Enthusiasts Club

Special Edition
May 2024

TRANSMISSION

Shades of Grey.

Some time back I was told of the existence of this vehicle. A reproduction in the style of a very early speed record attempt. That in itself made this a pretty special car, but what really made it special was the engine was made by the same bloke that built the car. That doesn't mean he rebuilt an old worn out and rusty example. Starting with an old Caterpillar crankshaft he actually made the crankcase and cylinders and heads to go around it.
I had to meet Nev, the creator of it, and rang him to see if he was agreeable to me writing a story in these pages and he was keen. His words were that he loves any publicity about his car and he had already published a small book about it. So I was going to visit his place in Qld on my way home from the vet rally in NSW last year. The catch was I found out at the vet rally he had just departed to that big shed in the sky.
So I never got to eyeball the great machine, but I have been loaned a copy of the book he printed, so in the interest of getting the publicity that Nev wanted, this edition of Transmission is a reproduction of Nev's book about his creation "Shades of Grey".

When reading it keep in mind this book is printed on A4 paper and scanned. If you view it on your computer screen larger than A4 it will probably look scruffy.

And the latest news is that the car called Shades of Grey has been bought by Highfields Pioneer Village at Toowoomba in Qld so you may be able to feast your eyes on it there.

By the way, Nev built more than one neat car....

The Birth of Shades of Grey

By

Nev Morris

The Birth of SOG   by Nev Morris

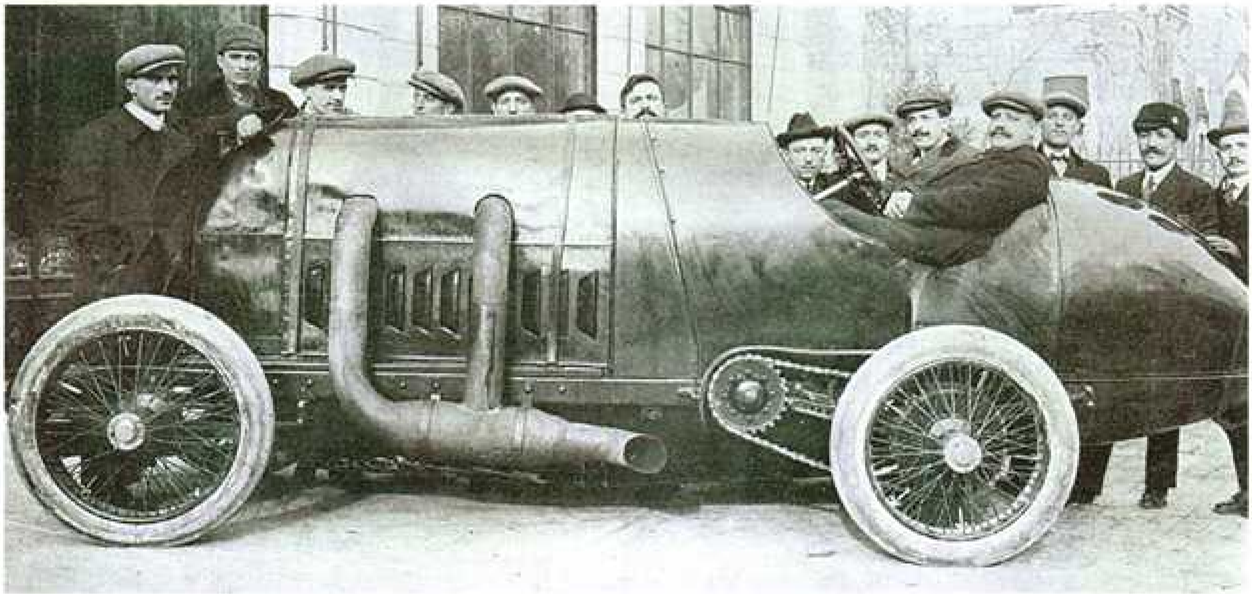
Most of my earliest memories seem to involve rotating wheels – a fascination that I haven't really gotten over. When I was about 3 or 4 years old, I was given a small Meccano set which enabled me to explore a few mechanical possibilities. I remember trying to make extra parts by boring rows of holes in strips of metal I found, using an old hand operated drill. Dad wasn't too pleased when he found most of his small drill bits were broken or missing. Dismantling things to see how they worked also got me into a lot of trouble. Dad had fitted a small Iron Horse engine to our lawn mower and, one day when he was away, I just had to have a look inside it. I was surprised that I could understand how it worked. I got it back together but it was never quite as reliable as it used to be. From then on, internal combustion engines became an endless source of wonderment for me. The idea of lighting a fire on top of a piston in a cylinder, which has to be cooled and lubricated, has seemed to be very interesting to me for as long as I can remember. That this process has been able to operate reliably, and with reasonable efficiency, is almost miraculous.

No sooner had the internal combustion engine been used to power motor vehicles, efforts were made to get these vehicle to go faster and so motor racing was born.

Back then, high speed engines could not even be imagined. The only way to achieve more power and speed was via a bigger engine. This trend resulted in some really bizarre machines like the big Fiat S76 which had a four cylinder engine of over 28 litres and which produced around 300hp at 1200rpm. In top gear, the wheels on this car rotated at the same RPM as the engine, which propelled it at around 140MPH which was the fastest a man had ever moved. (Except maybe for some unfortunate individual who had fallen from a cliff.)

I have been lucky to get my hands on some rare and exotic engines, but the chance of finding one of these big racing engines from the early 1900s is very slim indeed. As I have had a fair bit of experience in metal fabrication, machine repairs, welding, etc...I decided to see if I could fabricate a reasonable replica of an old large racing engine around an available crankshaft, piston, etc.

I had on hand a CAT D7 crankshaft with an 8" stroke and some CAT D9 sleeves and pistons of 6 ¼" bore which would give a capacity of around 16 litres, much smaller than some of the genuine items but big enough to have the high torque at low revs sought.



French-American Arthur Duray took the fearsome, fire-breathing Beast of Turin to Ostende in Belgium (The Fiat S76) to add to his three previous Land Speed Record attempts. "First and second gear were okay, third gear called upon all of his experience as a racing driver, and fourth gear needed the courage of a hundred men!" His attempt failed due to poor weather and then WW1 prevented further attempts.

The dimensions of the engine were arrived at by assembling the pistons, conrods and crankshaft which gave me the crankcase length, the position of the main bearings, the spacing of the cylinders and the height of the cylinders.

So where do we start? Well, the crankshaft, being the largest ready-made part of the proposed engine, would determine the dimensions of the first part to be made which was the upper half of the crankcase. I had a piece of gas pipeline which was the right diameter. This was cut lengthwise into two identical halves, one piece to be the upper crankcase – the other to be the sump. A metal cutting circular saw was used for this operation which made a clean straight cut that required no cleaning up. Next some pieces of 3"x1" flat steel were pressed to form semi circles. These had bolting flanges welded on, which had holes bored so they could be bolted together in pairs to form the main bearing housings. They were then clamped onto the crankshaft with suitable packing between them and the shaft.

Semi-circular webs cut from 3/8" plate were welded to these housings which were welded into the top half of the crankcase. Distortion from welding was minimised by keeping the job cool and by peening the welds with a pneumatic device. The halves of the crankcase were then bolted together by flanges welded to them.

The engine has four separate cylinders which are bolted to a heavy platform welded onto the top half of the crankcase. This platform is a piece of 8"x1" plate and as the attaching welds would be long, large heavy restraints were attached to minimise distortion. The crankcase was tack welded to a heavy R.S.J. Also with distortion in mind, the welds were peened with a pneumatic rattler to relieve any tension these welds created. When the crankcase was cut loose from the restraining R.S.J. a slight end to end twist was evident. By sitting it in the press supported by its diagonal opposite corners and pressing down on the other corner, this distortion was corrected.

Steps involved in forming the main bearing housings. 1. Shaping the 3"x1" flat steel by pressing them to form semi circles. 2. Bolting flanges were fabricated. 3. They were then welded on to the housing bodies. Holes were later bored through the flanges so they could be bolted together in pairs to form the main bearing housings.

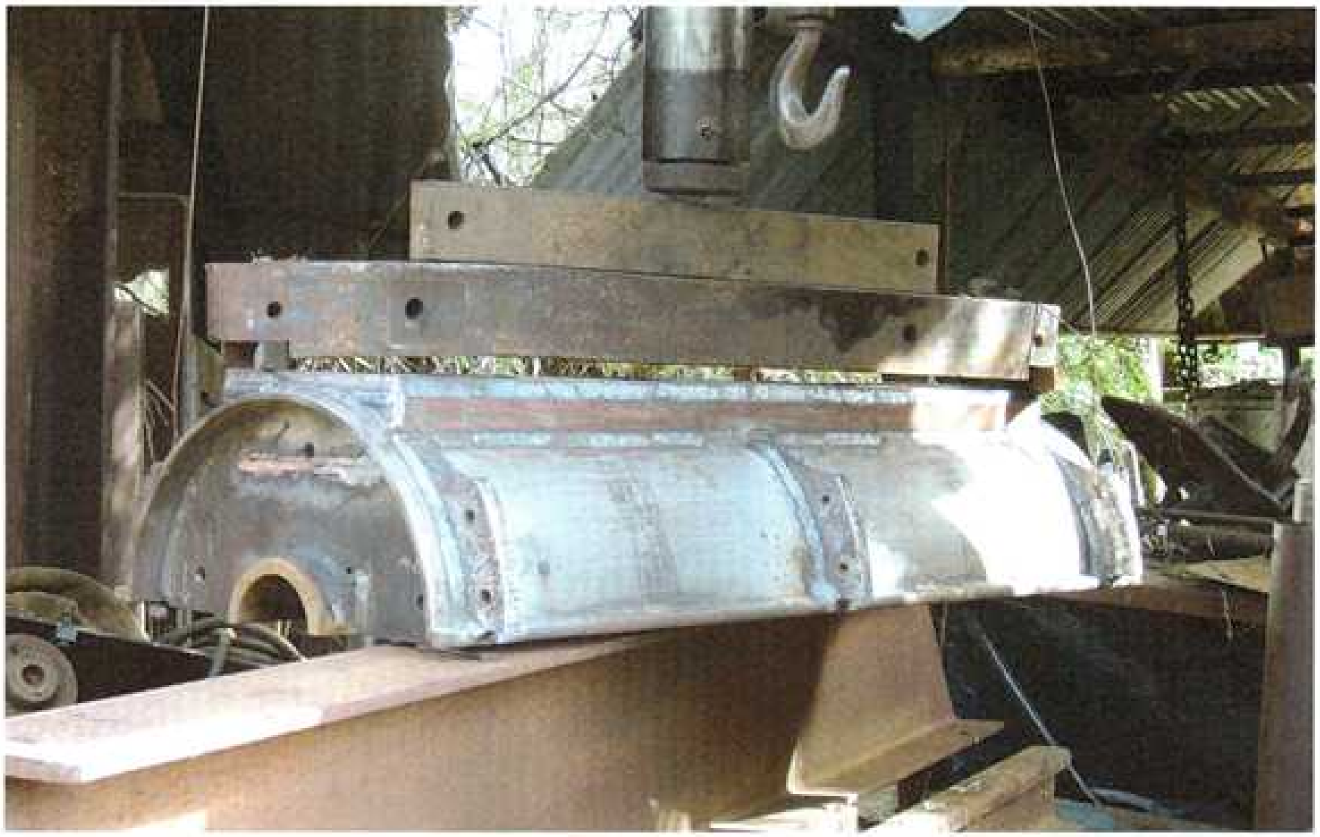
3"x1" flat steel were pressed to form semi circles. These had bolting flanges welded on, which had holes bored so they could be bolted together in pairs to form the main bearings.

Preparing to weld the webs and main bearing housings to the upper crankcase which was made from a piece of gas pipe cut lengthwise into two identical halves.

Fig. 1.3 Close-up of the weld holding the webs and main bearing housings in place.

Fig.1.4

The crankcase was tack welded to a heavy R.S.J. in order to reduce distortion. Peening the welds was also employed to reduce distortion.



When the crankcase was cut loose from the restraining R.S.J. a slight end to end twist was evident. By sitting it in the press supported by its diagonal opposite corners and pressing down on the other corner, this distortion was corrected. Crankcase shown here with the cylinder mounting platform already welded in place.

The position of the holes in the cylinder mounting platform were directly above the crankshaft big end journals. These holes were oxy cut undersize leaving a margin to be bored out to the correct size. This operation was carried out with the vertical head of the old Cincinatte milling machine. While the crankcase was on the mill, it was a convenient time to face its surface but I found that the mill table didn't have quite enough travel to do this without repositioning the job. This shortcoming had been a problem on other jobs and as I could see no reason why that with an extended lead screw and support bearing bracket, this travel couldn't be extended. This modification was carried out and has caused no problems.

Holes cut by oxy in the upper half of the crankcase .

Cylinder mounting platform taking shape.

Cylinder mounting platform completed and ready to be machined.

A Cincinatte milling machine was used to face the cylinder mounting platform and bore the holes to their correct size to accommodate the CAT D9 sleeves.

Cincinatte milling machine completing the facing of the cylinder mounting platform.

Close-up of the Cincinatte milling machine boring the holes to their correct size to accommodate the CAT D9 cylinder sleeves.

(Later) Checking the fit of the cylinders, conrods and pistons.

The crankshaft runs in babbitt metal bearings so the next job was to "tin" the bearing housings. I stood the crankcase on its end, positions a piece of shafting which was smaller in diameter than the main bearing housing and sealed up the "gap" between this shaft and the housing. The molten babbitt was then poured into this gap. Pouring babbitt metal bearings is quite a simple process but to ensure good results a few simple rules have to be adhered to. There is literature available which covers the subject very well. The end thrust on the D7 crankshaft used is taken care of via a large bronze washer on its front end so the added complication of arranging thrust faces on the main bearings was avoided.

The next job on the build was to bore out the poured bearings to fit the crankshaft journals. This line boring operation was carried out with improvised equipment consisting of a piece of 2" diameter bright shafting with holes to carry tool steel cutters in the appropriate places and two bronze bearings to support it. The crankcase was attached to a heavy steel bench and the boring bar support bearings set up to locate the bar in the centre of the main bearings using the previously mentioned machined register surfaces as a reference. A suspension ball joint was welded to the end of the boring bar and a piece of threaded rod was welded to this joint to provide means of feeding the cutter through the bearings. The other end of the boring bar was attached to a motor cum reduction gearbox via two universals.

The boring operation took some time with the old motto "Measure twice – cut once" constantly on my mind. The finish achieved on the bearings was surprisingly good but I still had to devise a way of cutting an oil distribution groove in them. Eventually I found a way of doing this to complete the line boring operation.

The crankshaft journals were lightly rusted so it was set up in the lathe and cleaned up with a split wooden lap lined with emery cloth. Now it was lowered into the bearings for the first time and the bearing caps were bolted on. Before the boring operation, shims were fitted between the bearing halves to allow clearance adjustment if needed. Hand scrapping bearings is something I don't enjoy and I do very little of it. I have found that babbitt bearings fitted with very little clearance will run themselves in very nicely and the resulting "burnished" surface makes for a durable bearing. Lubrication to the crankshaft was provided by an external pipe with connections to five smaller pipes – one to each main bearing. To complete the crankcase, two breathers were fitted in a position where it was hoped they would let out fumes without allowing oil to escape.

The mould used to pour the main bearings.

The molten babbitt after being poured into the mould.

(Above) **Nev's improvised motor and reduction gearbox used to drive the line boring apparatus via two universals.**

(Left) **Crankcase in position for the line boring process.**

Close-up of boring process.

The four separate cylinders were constructed around the 6 ¼" bore CAT sleeves. These sleeves are very robust with a wall thickness of around ½" and a section around their top end about ¾" thick. Lots of engines have been built with non-removable cylinder heads and it was decided that this design would be appropriate for this project.

Different types of combustion chambers were considered and the design chosen was similar to that used in the Twin City tractor engines. These engines are sweet running and economical and the combustion chamber shape wasn't difficult to fabricate. As the size of the chamber would determine the compression ratio, some mathematical calculations were called for. If I got the figures right this specification is 6:1.

The heads started out as round pieces of ⅝" steel to which a flange was welded. A thread was cut inside this flange so that the head could be screwed onto a thread cut around the top of the cylinder sleeves. Elbows were welded over holes cut in the head to create inlet and exhaust ports. These holes were then machined to form the valve seats and at the same setting, holes were bored out through the port elbows to locate the valve guides. To make the valve seats more durable, a recess was machined in them which was then built back up using stainless steel welding rods before the final machining.

The bottom of the sleeves were machined to be a light press fit into a flanged collar which bolted to the crankcase. To retain the sleeve in its collar, I used an idea often seen to hold the head of hydraulic rams in place. A semicircular groove is machined in the sleeve and also inside the collar so that when the two grooves line up a circular groove results. Next a hole is bored at an angle from the outside of the collar into this groove so that a steel wire "circlip" can be inserted. This idea permanently attaches the sleeve to its collar as it would be very difficult, if not impossible, to remove the circlip. To complete the cylinders a sheet steel water jacket was constructed to enclose the whole affair. As the heads can't be removed from the cylinders, any valve seat work or valve lapping requires the cylinders to be removed from the engine so that the work can be done from the open end of the cylinders with extension tools.

(Above) **Five pipes feed oil to the main bearings from a larger external oil line.**

The stages of fabricating the heads with inlet and exhaust ports.

The pistons chosen were from a 6 ¼" bore Caterpillar diesel. They had a concave top which would have originally formed part of the combustion chamber. For my purpose a flat top was required and it was found that the original shaped top could be machined off without weakening the piston. The connecting rods were also Caterpillar but the gudgeon pin holes weren't the same size as those in the pistons. Modifications were made to make these parts compatible and non-standard gudgeon pins were made to suit. These pins were made from induction hardened chrome bar which I thought would be ideal for this purpose as it has a hard skin over a softer centre.

Piston rings were the next thing to be considered. The rings originally used in the diesel engine were hard chromed for durability but I thought that for my purpose they would not be subject to the pressure necessary to run them in. Given that suitable material was available, I thought that home- made rings would work well. I have found that good rings can be made from cylinder sleeves which are generally made of good quality hard cast iron. Some sleeves have a hardened "skin" inside to improve their life which makes them difficult to machine but if they are heated to a dull red, this skin can be softened.

There are several recipes for producing rings but the method I prefer produces "eccentric" rings – in other words, the hole in the rings is off centre so that the ring is thinner and more flexible on either side of the gap. If all goes well, a ring which is slightly bigger in diameter than required when the gap is closed is produced. The ring is then compressed to close the gap and clamped between two circular plates with its outer surface protruding. This surface is then machined to size which produces a ring which is truly round when compressed.

The pistons were then fitted with their rings and attached to the conrods so they could be inserted into the cylinders. With the cylinders bolted to the crankcase and conrods connected to the crankshaft it was time to see if it would turn over without any problems. Apart from being tight to turn, everything seemed to be OK but I decided to set it up with an oil supply so it could be belt driven to run it in. This process continued for an hour or so and had the desired effect as the engine now turned over more freely.

To simplify the crankcase, I decided not to have the camshaft enclosed in it. The alternative was to construct a tubular housing incorporating the cam followers to enclose the camshaft and its bearings. This housing is half filled with oil to lubricate these components. This assembly was bolted to brackets on the side of the crankcase. The camshaft was originally gear driven when in the tractor engine but in its new location a chain drive was more convenient. With the gear drive the camshaft rotated in the opposite direction to the crankshaft. To keep the camshaft in its original anti-clockwise rotation with the chain drive, I decided that there was no reason why the engine could not rotate in the opposite direction to normal – after all, for particular applications reverse rotation engines are available from some manufacturers.

(Top left) A cylinder sleeve on the lathe so piston rings can be cut to the required size. (Top right) The cam shaft and its housing beginning to take shape. (Bottom left) Closing the ring gap before clamping between two plates for final machining.

With the camshaft and followers in place, pushrods and rockers were the next items to be considered. As these parts were to be exposed, I decided to model them on some I had admired on an early aero engine. To achieve this look, the polished tubular pushrods were fitted with a forked upper end where they connected with the rocker arms. Before the rocker arms were designed, the lift of the cam followers was measured and it was about the same as what I considered to be the correct valve opening – a ratio of 1:1 was chosen for these items. To get the look I wanted, the rockers were fabricated from seven pieces assembled in a jig and welded together – I was very pleased to see the last one completed. In common with lots of early engines, the valve operating gear doesn't have automatic lubrication, so regular attention from and oil can is called for.

Stages involved in making the rockers which were modelled on some early aero engine rockers Nev had seen and admired.

A simple log type intake manifold was made from ex-tailshaft tubing which is flange mounted to the intact ports. I wasn't sure how well this would work but I thought it should at least be good enough to get the engine running. I was pleasantly surprised to find that after I arranged a warm air supply to the carby the whole setup works quite well.

As the engine is quite tall, I wanted to mount it low down between the chassis rails which meant there wasn't room for a sump, so I had to devise a dry sump system. This system needs two oil pumps – one to supply oil under pressure to the crankshaft bearings and another scavenge pump to return oil to the reservoir. The scavenge pump is a bit bigger than the pressure pump to make sure that there can be no build -up of oil in the crankcase. To keep things compact, the drive shafts of the pumps were coupled together so that one chain could drive them both.

The two oil pumps coupled together.

Oil pumps in place outside the crankcase.

Camshafts, pushrods and rockers in place. Water jackets have now been fabricated around the CAT sleeves. The engine is starting to take shape.

To drive these pumps along with a coolant pump, a magneto and a cooling fan, an accessory drive shaft was fitted below the camshaft with a chain drive from an extension on the rear of the camshaft.

The next thing to consider was the flywheel. The Caterpillar item was far too big and heavy for my purpose so I decided to look for something more suitable which could be modified to fit. The one chosen was from a large truck diesel engine (possible Cummins) and it was easily made to bolt up to the Caterpillar crankshaft. Also it still had a ring gear which luckily was the correct pitch to mesh with the pinion of the starter motor I had intended to use. Finding a starter suitable for use on a reverse rotation engine could have been a problem but the solution proved to be simple. The starter I chose was originally fitted in front of the flywheel. By mounting it behind the flywheel, it turned the engine anti clockwise. The ring gear was removed and turned over to get the lead in on the teeth facing the starter. After a bit of head scratching, room was made to allow this installation with everything meshing correctly and so far it has worked well.

Before the flywheel was fitted permanently, a rear crankshaft oil seal needed to be arranged. As the crankshaft has a large diameter flywheel mounting flange, the oil seal and its housing had to be a two piece affair to fit in behind this flange. The seal itself is made from graphite impregnated gland packing pressed into a groove and has so far proved to be effective.

The project was now close to the exciting first run stage so a start was made to provide the necessary oil, fuel, ignition and cooling. As yet no water distribution tubes had been fitted as I didn't know how to go about forming the long tapered main tube. Eventually I came up with the idea of making a tapered wooden mandrel to which I attached, with counter sunk screws, the edge of a piece of annealed copper sheet of the size necessary. This assembly was laid between heavy steel plates. Extra weight was added onto the top plate then dragged along which caused the wooden mandrel to rotate and cover itself with the copper sheet. This operation took hours to set up but only a few minutes to complete – I was very happy with the results. The curved outlet pipes to the individual cylinders were formed by filling the copper pipes with lead and bending around a former.

Tapered wooden mandrel with annealed copper sheet screwed to it.

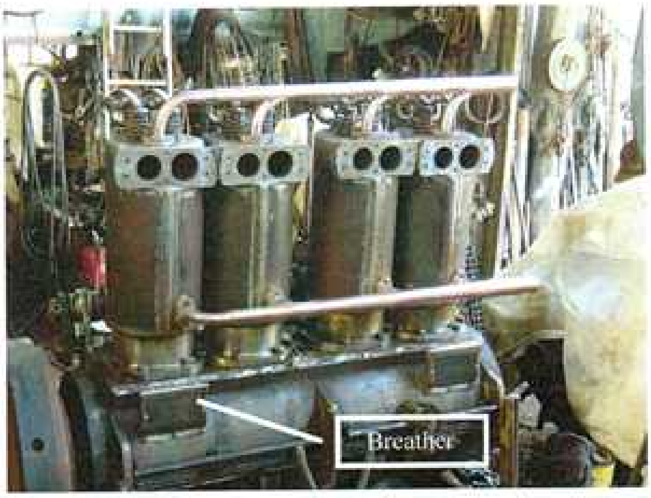
With extra weight in place the top sheet is dragged along.

Copper sheet rolled around the wooden mandrel.

Curved outlet pipes filled with lead being bent.

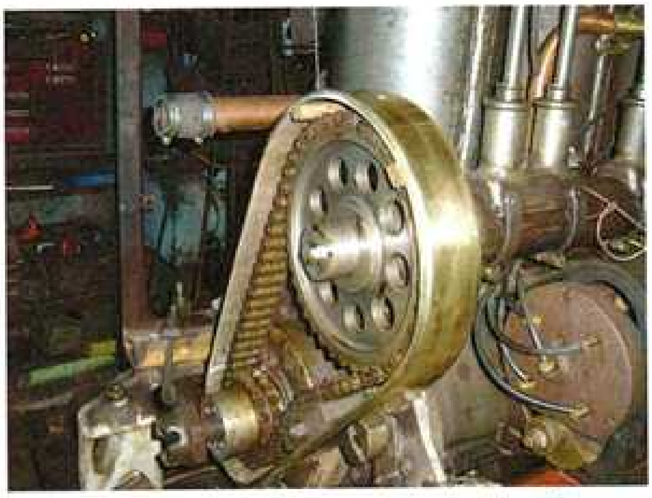
Finished outlet pipe.

Engine being belt driven to run in the rings, sleeves and bearings. Note the oil feed (funnel) used to supply the main bearings with oil. The valves were also held open during the operation.



Coolant pipes have now been fitted and polished.

The intake manifold and carburettor are now in place and the engine is close to being ready for its first test run.



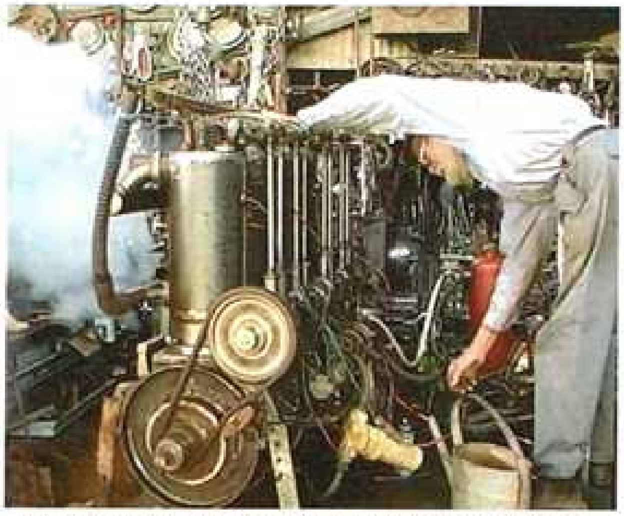
Close-up of the timing chain driving the camshaft.

The first run of the engine was bound to be interesting but I felt that if I methodically considered all the essentials, a successful outcome would result. To avoid carby problems, I fitted one from a reliable tractor which I often use. Even though I intended to fit the engine with magneto ignition, I opted to use a battery and coil set up for the first run. To arrange this an ex-car distributor was chain driven from the accessory drive shaft and carefully adjusted to give the correct ignition timing.

During the construction of the engine, I had quite a few callers who were interested in the process and some of these wanted to be present when the fires were lit in the cylinders for the first time. The temptation of course was to give the engine a little run before the big day but I decided the occasion would be more memorable if it was indeed its first run.

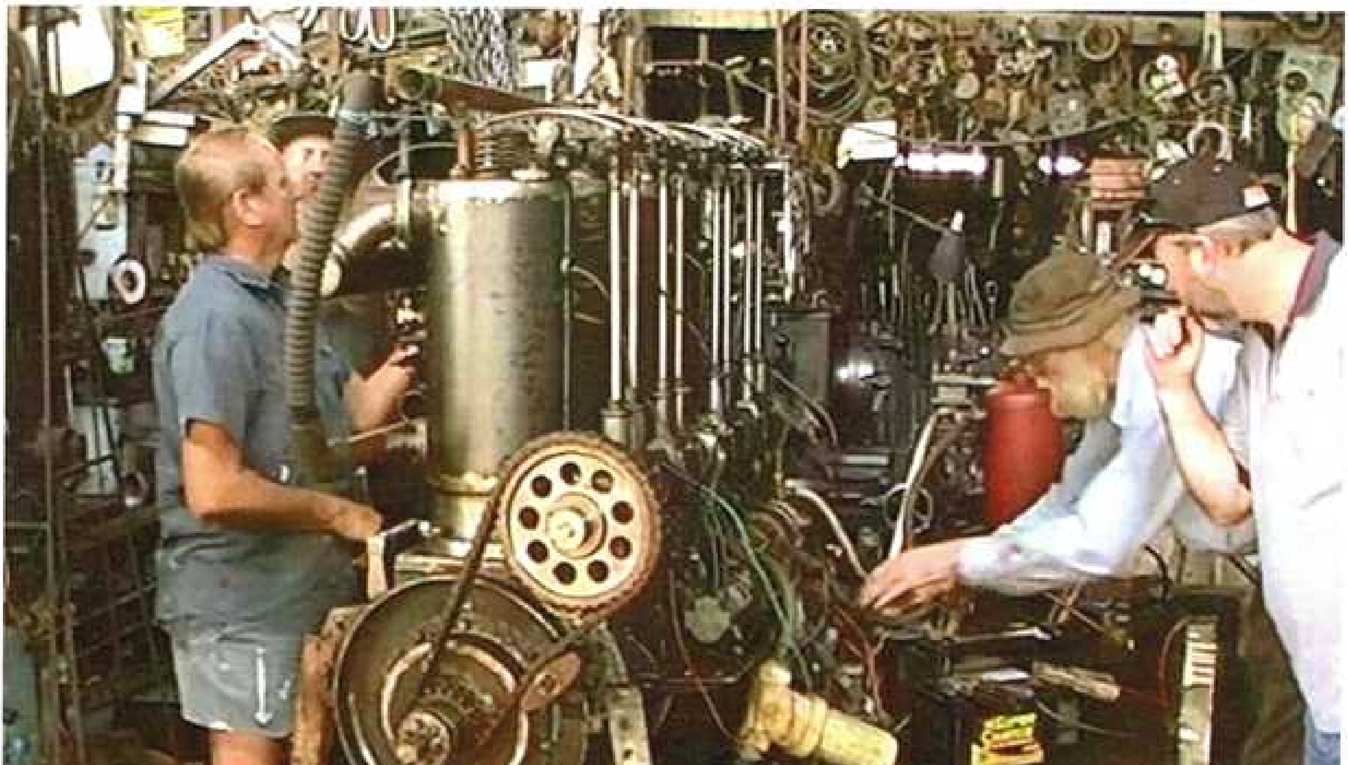
With the engine attached to the heavy steel bench, on which it was built, everything (fuel, ignition, lubrication etc) was checked and re-checked. A few phone calls were made to arrange a date for the big event. I don't know what it is about the sound of an engine running well that so intrigues me. If I had been told 30 years ago that piston engines would still be in use today, I would have not thought this likely but improvements are still being made to the same old basic design which will see them in use for some time yet.

On the afternoon of the set date, everything was in place for the big event. A small group of interested friends had arrived with cameras at the ready. With some trepidation, I pressed the starter button which spun the engine over a couple of revs with a choke on but no ignition. A quick check showed that the engine was primed with fuel so, with choke off, and ignition on, another touch of the starter had the desired effect – an explosion of smoke, fire, sparks and noise from the exhaust stubs. As the engine had no cooling system at this stage, only a short run was possible but I had proved my point and I was treated to a round of applause. After we checked out the videos of the event I gave the engine another short run. The observers departed and I was left to contemplate what my next move should be.



The engine fires up almost immediately with a roar and a cloud of smoke from the excess fuel after priming and any oil used to ensure adequate lubrication for its initial start up.

The smoke quickly disappeared and the engine settled down to a steady beat, the exhaust stubs now emitting an impressive red flame. (Note the position of the temporary fuel tank suspended by the chains just left of the exhaust stubs.



While Nev makes a few adjustments after the first start up (watched by Kieran on the right), the Work Place Health and Safety team (Paul and Johnno) discuss the position of the fuel tank and have a chuckle about its location.

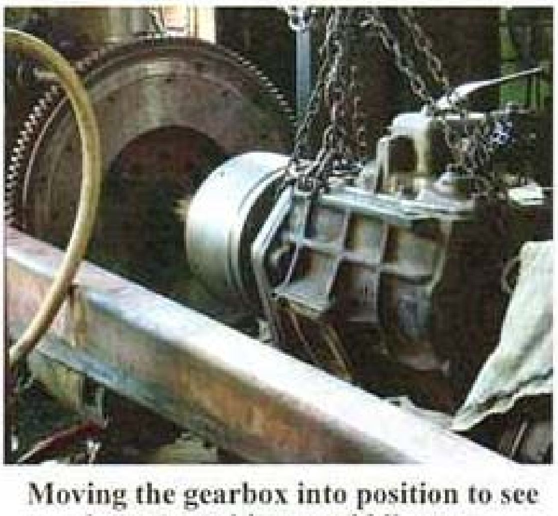
To use this engine to effectively power a vehicle, a special transmission would be required to have the drive wheel revolve at about the same RPM as the engine with the gearbox in top gear. What I needed was an overdrive to fit between the engine and the gearbox to enable the use of readily available components to achieve this high gearing. I had on hand a reduction hub from an Albion truck and I found that it was possible to use it as a compact unit to multiply the RPM of the engine's output by 3. This overdrive unit was grafted onto the front of a 5 speed gearbox from a light truck. To keep the vehicle's wheel base from becoming too long, there was wasn't room to use universal couplings between the engine and gearbox and diff, so I decided to mount the engine and transmission components in a rigid sub frame made from heavy RHS which would hopefully maintain the alignment within limits.

I was quite happy with the behaviour of the engine during its first "awakening" but it became apparent that a heavier flywheel would be beneficial. I had on hand a heavy 14" twin plate clutch and, with some modification to the flywheel, it provided the extra rotating weight required.

Facing the flywheel and preparing the heavy duty clutch.

Albion truck reduction hub disassembled on the workbench.

Assembling the Albion reduction drive and fitting it to the five speed gearbox. In its new role, the reduction hub multiplies the engine RPM by 3 to achieve the desired overall gearing.



Moving the gearbox into position to see how everything would line up.

Whilst I was looking for a suitable diff, I was offered one from a 37 Ford. It had been in the weather for many years and didn't look promising but luckily no water had gotten into it and the thick black oil in it had protected it well. This model Ford used mechanical brakes which suited my purpose better than a hydraulic setup.

As I wanted to use a chain drive to the wheels, the diff had to be narrowed so that the chain and sprockets would line up with the rear wheel hubs. This worked out well as the tapered axle ends on the diff were a bit knocked about and the narrowing allowed the ends to be cut off and a new taper, keyway and thread were formed. The brakes also needed attention so the drums were skimmed out and new linings fitted. Chain drive was preferred in most of the high torque slow revving cars as with a high ratio diff the torque transmitted by the drive shaft to a direct drive diff tended to lift one rear wheel off the road. With chain drive, this torque reaction was locked up in the chassis.

The 37 Ford diff housing after it has been shortened and welded.

The two piece rear axle has bolting flanges in the middle.

The sprockets needed for this setup were about 10" diameter and these were made from ⅝" plate by the old time honoured method of boring holes correctly spaced to suit the pitch of the chain. Some hand work was needed for the final shaping of the teeth. When I tried wrapping a new chain around the finished sprockets, I found that I had the tooth pitch slightly too coarse (better than having it too fine) and it seemed some more hand finishing would be required. Before starting this tedious operation, it occurred to me that the longer pitch of a worn chain might suit the sprockets as they were. I was much relieved when this proved to be so.

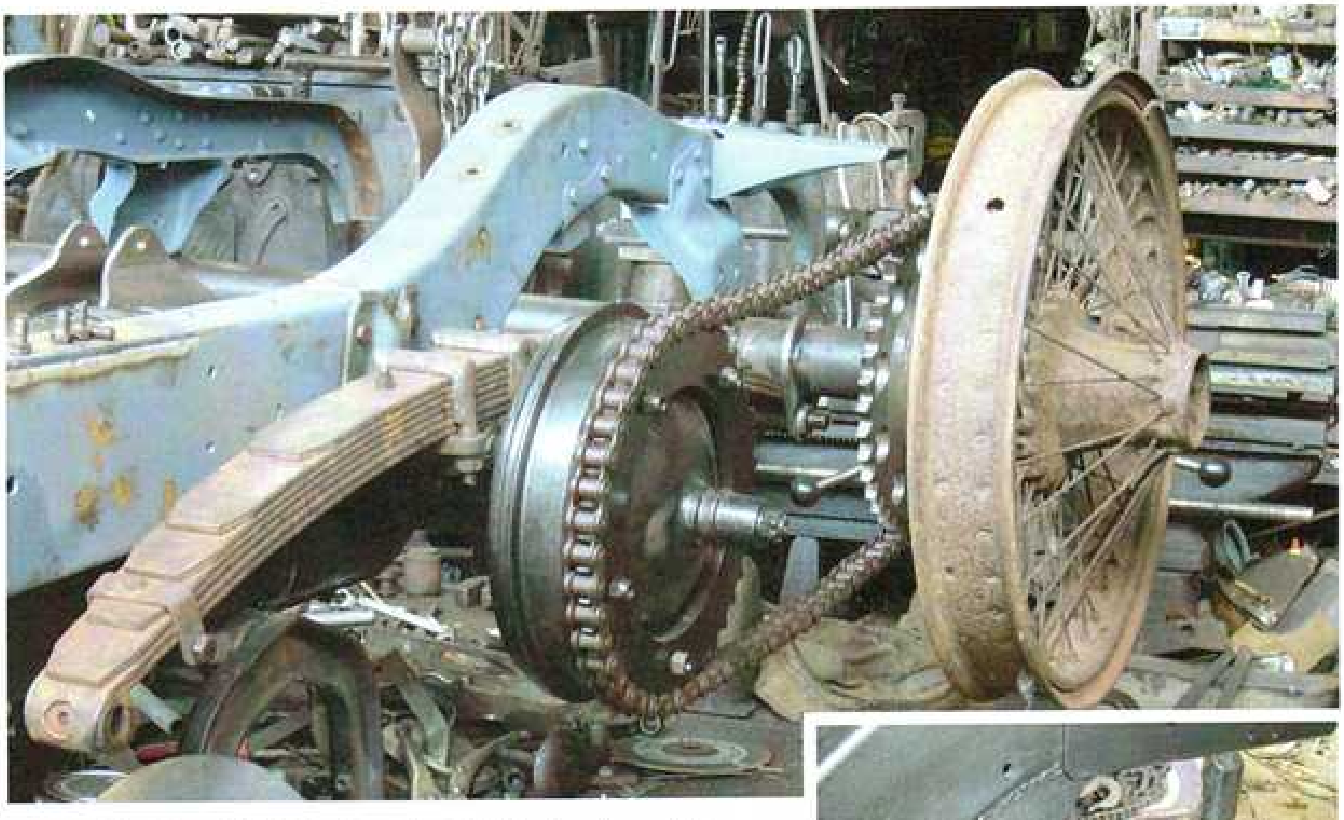
The rear sprockets in various stages of manufacture - small guide holes were drilled at first, then larger holes were drilled and then the apex of the teeth were cut out with a milling cutter. Some hand finishing was required to tidy up the sprockets.

While wondering what wheels I would use, I had the unbelievable good fortune to be offered 4x24" Budd wire wheels complete with hub, caps and lockrings – exactly the type of wheel I wanted. I had on hand the front axle from a 1925 model Willys Knight which originally had Budd wheels, so no modifications were required here. The Willys axle had a feature I had not seen before – wide angle tapered roller bearing king-pins, which probably contributes to the light steering on the finished vehicle.

One of the 24" Budd wire wheels with a finished sprocket fitted. Nev later sandblasted the wheels and painted them before fitting new tyres.

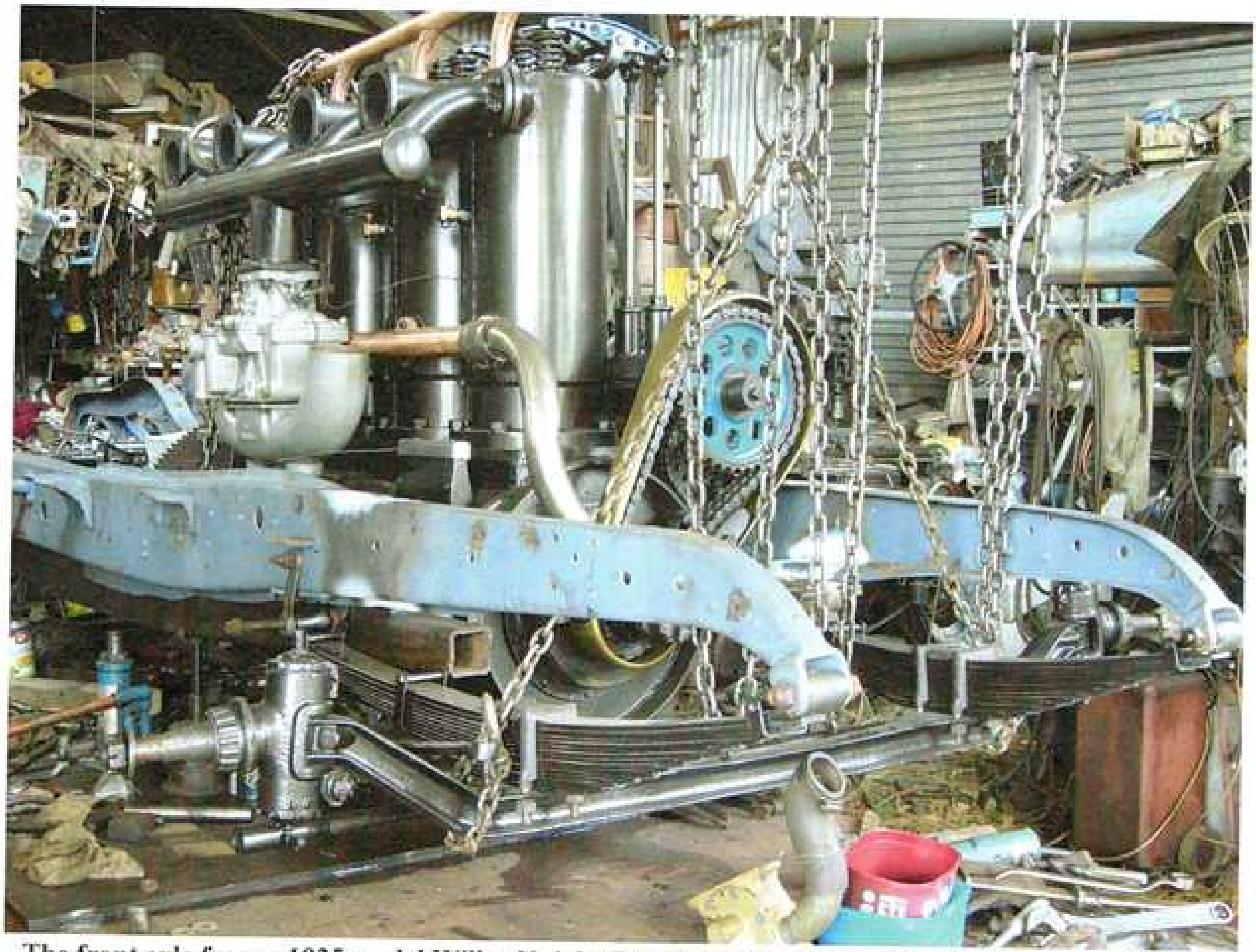
The rear wheel hubs are fitted to something akin to a trailer axle with provision for it to be moved fore and aft to provide chain adjustment. When constructing this axle, I allowed room to fit brake bands on the hubs even though the diff had its original brakes in place.

When fitting my 24" wheels, I was disappointed to find that one was 23". Through another unlikely series of events, I acquired 2 more 24" wheels which are identical to the other three I had. The cost of the five 24" tyres was a bit of a shock but I didn't mind too much as the rest of the project had cost very little.



(Above) The Ford diff fitted to the Buick chassis and the rear axle and chain in place. Note the original brake drum fitted to the diff which would provide some stopping power.

(Right) A close-up of the rear axle showing the mechanism for adjusting the tension on the chain. Room has been left for additional brakes to be added later if the Ford brakes prove inadequate.



The front axle from a 1925 model Willys Knight fitted to the Buick chassis. The axle originally had Budd wheels fitted, so no modifications were necessary to fit the front wheels. Note that no brakes are fitted to the front axle so it seems that SOG would probably have something in common with early chain racers - not a lot of stopping power!

A rear wheel freshly painted with tyre fitted and brass polished.

Nev fabricated an authentic looking fuel tank by rolling a galvanized skin and then he made brass ends which were polished and riveted into place. The tank was later painted and a hand-pump was used to pressurize the tank and supply fuel to the carburettor.

The exhaust system nearing completion. (Not designed to conform to modern noise legislation.)

Many hours went into painting and polishing all the engine components before SOG was ready to emerge from the shed. Nev made brass guards to cover the chains driving the magneto and twin oil pumps.

It seemed to be incredible to me that this project had gotten to this stage – many years have passed since I first thought of attempting to build something similar to the old race cars which are so interesting to me.

My workshop is of the dirt floor variety and would be called "untidy" by some better organised folk. However, it does have one or more useful features – a large, low heavy steel bench which is reasonable flat and level and it was on this bench that SOG was constructed. The workshop is serviced by an overhead gantry crane which is a very handy device. To manoeuvre the vehicle from the workshop into the open, where it could be fitted with its wheels, took some time but eventually it was eased out past the obstacles.

With the vehicle sitting on its wheels out in the open I could stand back and appraise what I had created – it certainly had the look of most of the early record breakers, where every part was there for one reason – to make the car go faster.

At this stage I didn't have a full set of 24" wheels but I managed to attach an old 24" split rim to the 23" wheel to make up the 4th wheel.

I wanted to record SOG moving under its own power for the first time emerging from among the heaps of bits and pieces from which it was created. The video camera was checked over – yes it did have its card inserted – its battery was charged and after discussion with my wife Bev regarding the best position for filming, I felt that the big moment had arrived. After a final check that all was well with the car, the starter button was pressed and the engine vibrated and bellowed into life. With the clutch engaged the high gearing was immediately obvious and the slow speed high torque delivered by the engine seemed capable of handling the situation. After a few circuits of the track around the sheds, the need for a few adjustments became apparent but overall I was very pleased and surprised that the first run went so well.

SOG emerges from the shed on its wheels for the first time. Note that the right-hand rear wheel has the 24" rim welded onto the 23" wheel. A 24" wheel was fitted later.

The first test run proved that the engine seemed capable of delivering the slow speed high torque Nev had hoped for.

While still not finished, SOG was certainly starting to look like a fire-breathing pre WW1 speed machine.

Further test drives have shown only one major problem – the brakes are remarkably inefficient. Seems I expected too much from the old Ford setup. I don't know the weight of the vehicle but it would be much heavier than most of the original chain driven racers. Mind you, some of them weren't noted for their stopping ability either.

When top gear is engaged at around 30mph, the engine speed drops to about 300 RPM but it is still able to accelerate away quite strongly and smoothly.

The old expression of "one pop per telephone pole" used to describe the sound of high geared cars doesn't seem so exaggerated after hearing SOG drive by.

When I made the rear wheel hubs, I lefts room to fit external brake bands to them. This would no doubt improve the situation somewhat. Also Mr Bugatti, when confronted by a customer complaining about the poor brakes on his car, is reported to have said, "I make my cars to go, not stop!" But that may well be the only feature that SOG has in common with the revered Bugatti.

I have no record of the hours spent constructing SOG but it certainly kept my mind occupied for quite a while. To fill the gap left by its completion I have other projects in mind –ummm.

And the name SOG – there seems to be few black and white answers to lots of "the big questions". Detailed investigations of these questions often come up with explanations that are "*Shades of Grey*". It seemed an appropriate name for this replica.

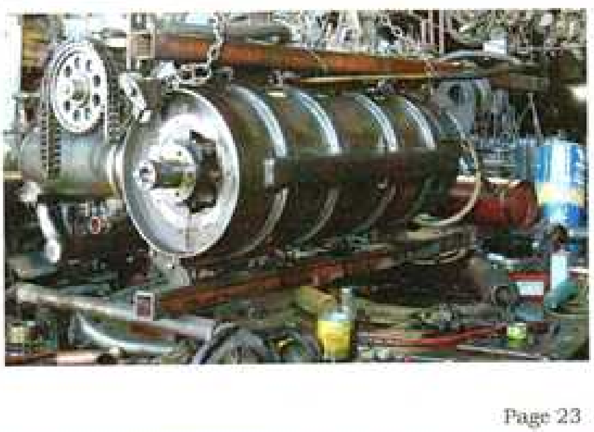
Written by Nev Morris (2016)

SOG finally finished, complete with leather seats. (Probably just as comfortable as those found on the original race cars.) When running, the 16 litre engine sounds awesome and provides the sensation that one would have experienced standing next to the original Beast of Turin (The Fiat S76).

The rear of Shades of Grey with the 5th spare wheel providing a little more old world charm. Note the fuel tank now is complete with polished brass SOG panels on each side.

Nev's attention to detail is further demonstrated by his inclusion of SOG's polished brass ID plate.

The Buick chassis that later became the backbone of SOG. Only the chassis was used for the SOG project. The other bites and pieces were donated to friends to complete other projects.



Earlier while building the engine, Nev discovered that the main bearing bolts were fouling the sump housing. So he had to cut out sections and build up enclosures for each section. This would have tested anyone's patience. (Top right) **A big end bearing nut can be seen in one of the slits.** (Bottom right) **The engine on its side. Note the oil scavenging section running along the base of the sump from front to rear to connect to the scavenge pump.**

Nev taking a visitor (Ron Formella from the Jaguar Drivers' Club of Qld) for a joy ride in SOG around the farm track. Ron didn't keep his hat on too long!

"What next?" I hear you ask. Never happy to sit still too long, Nev is always dreaming up the next project. Nev is currently putting the finishing touches on a rather interesting looking motorcycle and sidecar that uses a Holden grey motor as its power source. The radiator is built into the nose of the sidecar.

Bibliography

https://www.goodwood.com/grrc/race/historic/2014/12/video-the-28.5-litre-fiat-s76-attempting-the-land-speed-record-/

When this third edition went to press, Nev had already begun his next project. He had recently acquired a 1922 J Model Harley Davidson engine in remarkable condition (not one broken fin on the cylinders or any corrosion). And, not having the remains of the bike, Nev decided to make something along the lines of an early model Morgan 3 wheeler. He fitted a flywheel, clutch and ring gear so it could be fitted with an electric starter. He also made a bevel box ,come two speed chain drive, to drive the rear wheel.

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Editing and Layout by

Kieran Lillis

Fancy travelling to Europe and UK to check out some motoring events?

- Auto e Moto de Epoca 24-27 Oct 2024
- Visit Ferrari and Lamborghini museums. Drive a Ferrari for around $165.
- Lancaster Insurance Classic Motor Show 8-10 Nov 2024. Birmingham UK
- British Motor Museum-Jaguar Heritage Centre.
- And more. Check out these events on the net.

Dave Kelso is working with a travel agent on this and you can do all this as part of the group or just do the bits you like.

21 Oct to 12 Nov flexible dates

If just one person does the trip the cost is about $7000, for airfares and accommodation. If a bunch travel and the accommodation becomes twin share, the cost will drop significantly.

For more info contact Dave Kelso 0490246781 or dakel9014@gmail.com

I recently spent $6,500 on this registered Black Angus bull. I put him out with the herd but he just ate grass and wouldn't even look at a cow. I was beginning to think I had paid more for that bull than he was worth. Anyway......I had the Vet come and take a look at him. He said,, the bull was very healthy, but possibly just a little young, so he gave me some pills to feed him once per day. The bull started to service the cows within two days……. all my cows! He even broke through the fence and bred with all of my neighbour's cows! He's like a machine! I don't know what was in the pills the Vet gave him ... but they kind of taste like peppermint.

DARWIN AVIATION MUSEUM OPEN COCKPIT DAY SUN 19TH MAY 2024

9am – 3pm

MVEC has been ask to display motor vehicles (bikes & cars) at the Aviation Museum Open Cockpit Day this is a huge Dry season event & MVEC would like a big showing of vehicles

(Bikes & Cars) for the day.

MVEC will also be running a sausage sizzle to raise $$$ for Legacy, volunteers are required, club shirts are to be worn. Please inform the club if you are interested in having a vehicle on display or helping with the BBQ.

Free admission to the museum for all members taking part.