Newsletter of THE PALMERSTON NORTH MODEL ENGINEERING CLUB INC
Managers of the **"MARRINER RESERVE RAILWAY"**
Please address all correspondence to **:- 22b Haydon St, Palmerston North.**

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THE GENERATOR

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TRACK RUNNING

This is held on the FIRST and THIRD Sunday of each month, from 1 pm to 4 pm Summer and 1 pm to 3 pm during the Winter. All club members are welcome to attend and help out with loco coaling, watering and passenger marshalling - none of the tasks being at all onerous.

Visiting club members too, are always welcome at the track, at the monthly meeting, or if just visiting and wishing to make contact with members, please phone one of the above office bearers.

Sender:-
PNMEC
22b Haydon St,

Place stamp here

Coming Events

Coming Events; September Monthly Meeting. This will be held at the Hearing Association Rooms, Church Street, Palmerston North on the 23 rd September at 7. 30 pm. **SHARP.**
See further details on page 2.

Mid Week Run at Marriner Reserve Railway : 28 th September between 10.00 am and 2 pm.
26 th October between 10.00 am and 2 pm

Please contact Doug Chambers beforehand.

Track running at Marriner Reserve Railway: 3 rd October 1 – 3 pm
17 th October 1 – 3 pm

OPEN WEEKENDS

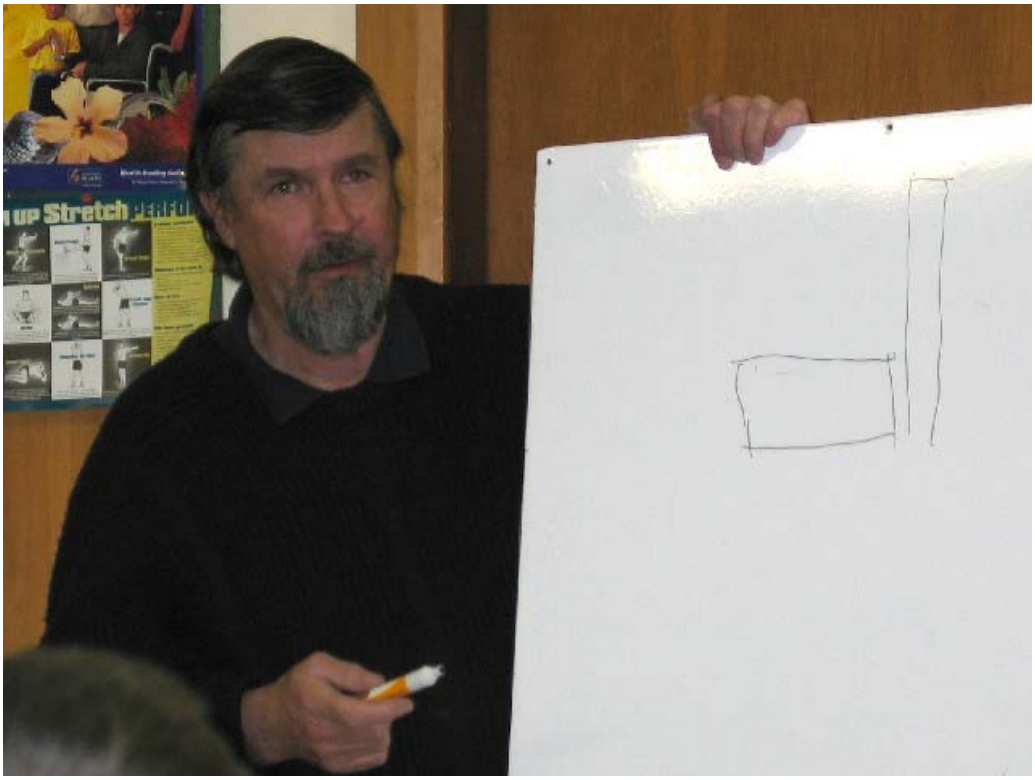
Havelock Live Steamers	23rd – 25th October
New Plymouth Model Engineers	23rd – 25th October
Tauranga Model Engineers	12th – 14th November 25th Anniversary

Murray Bold has registration forms and a copy of the program for the weekend.

The closing date for the next issue of The Generator is Friday 8th October

REPORT of the AUGUST MEETING

Doug Chambers gave a talk on the principles of smoke box draughting. The talk covered the period from the very early days to the last days of steam and the Kylchap Exhaust.
Brian Wiffin displayed two arbors he made for his milling machine.
Richard Lockett told of the trials of making gears to replace the plastic ones on his cousin's woodworking machine.
Fred Kent had an old book on gas producing.
Maurice Brownell had a clamping device for holding small work in a power hacksaw.
Murray Bold had the Gauge 1 railcar (NZR Standard) he has under construction and a station building that was complete with a corrugated roof. The roof had been produced using a paper crimper, and using old 'coke' cans for material.
Jim Curtis had pictures of his 'F7' (too big to bring along) and told of the trial runs at Marriner Reserve and Keirunga Park, less the bodywork at this stage.
John Tweedie had parts of a horizontal steam engine he is making. His first real step into model engineering.
Ken Neilsen showed us the model 1912 Stanley Steam car he has been making. Meth – fired and having more detail than LBSC's original design.



Doug Chambers explains the principles of getting it right inside the smokebox.

Merv George showed us a die he and Richard Lockett made for producing a component for the pasture meters that Merv manufactures.
Ian McLellan had the frames and wheels for his "Maisie". A coupling rod displayed shows this project is getting to the interesting stage.
John Garner brought along his half –size Heinrici Hot –Air engine and this time a small meths burner was set going and after a few minutes the engine was ticking over very sweetly.
Brian Leslie had his nearly completed "Sweet Pea" boiler on display.
Chris Morton showed us a fuel tank sender unit he is repairing.

SEPTEMBER MONTHLY MEETING.

Richard Lockett will give another of his short talks on workshop practice. Members are invited to bring along their current project to add to the 'Bits and Pieces'.

A STANLEY STEAM CAR

For some years Ken Neilsen has been interested in building the Stanley Steam car described in 'Model Engineer' by L.B.S.C. in the late 1950s early 1960s. This year he decided that he would finally get on with the project. The model is meths fired and about 14 inches (350 mm) long.
The model represents a Stanley of 1912, an open roadster two seater. Wheels could be wire spoked or of aluminium dish pattern and
Ken chose to make the latter. Ken used "O" ring material to make the tyres. At first he made a diagonal cut before gluing the ends together. However this didn't work out as when the "O" ring was fitted to the wheel rim the tyre was distorted at the join.

The next attempt saw the "O" ring cut at right angles and then glued. This worked very well and there was no distortion after the tyre was fitted.
Ken has added a lot of extra detail, flutes in the bonnet, toolbox, boot and windscreens.
The two-cylinder engine proved to be a bit fiddly to make. At first the pistons were fitted with soft packing but this was not found satisfactory and it was replaced with "O" rings. The guide bars are long studs and it requires careful drilling with jigs to keep the parallel and prevent the crossheads binding. The 'Stanley' is another example of Ken's craftsmanship.

A HOT AIR ENGINE

This model caught my attention for very different reasons. John Garner comes from an academic background and it is only in the last eight years that he has turned to model engineering. His first model, a Vertical steam engine was produced from a set of Stuart Turner castings, which is a very good way to start.
His next project was a set of castings, purchased from E. J. Winter of Australia, for a 'Heinrici' type hot air engine. John has completed the engine with just a little help and advice from other members. Copper tube of the right diameter could not be procured and another member was asked to roll a tube and Easy-Flo the seam.
The reduction of friction to a minimum and perfectly fitted pistons are vital if the engine is to run. At first the engine refused to run at all. John persisted and now the engine runs very well.

SMOKEBOX DRAUGHTING.

By Doug Chambers

The most critical area of the steam locomotive is the smokebox. If the cylinders, valves and boiler are all in perfect condition but the smokebox draughting details are not right, then the engine will not steam at all well. However if the engine has broken piston rings, leaking and badly set valves, the boiler in less than perfect condition but the smokebox draughting is perfect, then the engine will steam reasonably well.

Now having made a statement like that I had better try and justify it.
In ancient past I am told that our ancestors lived in caves. In the France and Belgium area of Europe caves have been found that have had vertical chimneys dug through to the ground surface. Remains of fires, bones etc. indicate that these early cave dwellers had come to understand the advantage of a chimney for draughting. Perhaps then it is not so surprising that the men who were to take smokebox draughting to its highest level should have come from this area.

The very first locomotives built by Trevethick, Stephenson and Hackworth were all similar in having tall chimneys to promote draught for the fire. Soon the exhaust steam was directed into the chimney to further promote draught which induced more oxygen bearing air up through the grate assisting combustion of the coal.
Tunnels for trains to pass through and bridges for them to pass under effectively created a height limit and when larger locomotives were built it was no longer possible for them to have long chimneys. By the time the chimneys had reduced to just a foot or two long it became obvious that some further design work in the smokebox would be necessary.
It was found that the chimney could be extended down into the smokebox and flared outwards to resemble a lady's petticoat. The exhaust from the cylinders was directed by the blast nozzle up the centre of the petticoat pipe. If the petticoat pipe was closed to a choke and then allowed to continue up a gradually opening taper a temporary vacuum or low pressure area was formed in the smokebox. This caused more air to be drawn in through the ash pan and grate and through the tubes to negate the vacuum.

The Great Western Railway, had a stationary engine testing plant built in their Swindon Workshops and this gave them the means to study locomotive performance under load and under varying conditions.
The GWR engineers came to realise that the maximum diameter of the petticoat, the choke diameter, the taper up the chimney, the diameter of the blast nozzle and the distance of the blast nozzle to the choke were all critical if the engine was to be "free steaming".

The other three Railway Companies LMS, LNER and SR did not have the benefit of being able to test their locomotives on a stationary dynameters. Their designers understood the principles involved but being unable to carry out testing suffered a handicap.
In 1936 the first of Sir Nigel Gresley's V2 class locomotives left the Doncaster Plant. They were very impressive engines , 2 –6 –2 with six wheel tenders. Three cylinders with the Gresley –conjugated valve gear. The last one of the class was not completed until 1944 but during the war years they gave magnificent service. They worked troop trains, freight trains and when the use of the English Channel was denied to the colliers delivering coal from Yorkshire to London, the V2's were seen hauling coal trains to London. On one occasion a V2 hauled a train of twenty –six bogie coaches from Peterborough to Kings Cross Station, a load of 850 tons and about 1300 passengers.

From late 1946 experiments were carried out with self-cleaning plates fitted to the locomotives smokebox. It was accepted that there would be a loss of efficiency but that would be offset by the time labourers spent cleaning smokeboxes while the engines were being serviced. For several reasons these plates had a very bad effect on the V2's steaming. Bad enough that the previously good steaming engines were having to stop for "blow up" between stops. Doncaster engineers replaced the 4 ¼" diameter blast nozzle with one of 3 7/8" but although this improved the steaming, coal consumption increased by about 20% and engines started to run short of coal on some of the longer runs.
By 1952 British Rail had taken over and the management decided that the V2 problem had to be solved.

One of the class No 60845 was sent to Swindon where it was tested on the stationary test plant.
With the self-cleaning plates in position an evaporative rate of 14,000 lbs was achieved.
With the plates removed an evaporative rate of 24,000 lbs was attained.
S. O. Ell and his assistants effected a cure by fitting a larger chimney that allowed a taper upwards from the choke diameter. The blast nozzle was increased in size to 4 5/8" and placed lower under the petticoat.
A further test was carried out with the self –cleaning plates in position and an evaporation rate of 31,000 lbs was recorded. All testing was done using Blidgeworth coal, the V2's normal diet of Yorkshire "hard".
British Rail had steaming problems with one of their designs. The little Class 2, 2 –6 –0 tender engines didn't perform at all well at first. A class member was sent to Swindon for testing. After quite minor alterations to the draughting design an improvement of 120% was recorded and the Class 2s went on to perform good work during what was to be a short life.

What was happening in other countries in the later days of steam.? In America, huge engines were built to haul huge trains over long distances. Mechanical stoking was essential as the size of the fireboxes were so big that hand-firing was impossible. Very little effort seems to have been made to ensure efficiency, and if a given size locomotive could not handle the loads required of it, then a bigger locomotive was made for the job.
In Europe there were several leading designers, all of who were interested in the efficiency attained through smokebox draughting. Among them were, Dr Giesel, a Finnish engineer, Kylala and a Frenchman, Andre Chapelon. Chapelon designed a new exhaust system, which he called the "Kylchap" system.
The design incorporates double chimneys and blastpipes. Each chimney has petticoats at three levels to guide the exhaust, even when the blast is very soft, into the chimney and thus evening out the draught at different levels in the smokebox.
The increased efficiency means that larger blast nozzle diameters, decreased 'back-pressure' in the cylinders and promote greater efficiency in that area as well.

But does full-size practice have any effect on model locomotive design?
Prior to 1990 most designs called for a parallel chimney liner flared out slightly at the bottom to form a petticoat. A notable exception among the designers was the late Don Young, but then he was working at Doncaster when the V2's were having their problems.

The first article I have found on draughting for model locomotives was written by Bert Perryman telling of his friend Lionel Woodhead's smokebox arrangement. The article appeared in Model Engineer May 1978 and gives the formula for working out smokebox proportions for model locomotives. Bert modified his "Maid of Kent" to Lionel's design and was greatly impressed with the improvement to the engines steaming ability. Previously his engine would suffer a loss of steaming ability after two hours. The lower row of tubes would be blocked by the build-up of char in the smokebox. After modification the engine was run continuously for seven hours and the char was found to be built up against the smokebox door with the lower row of tubes clear.

The first model loco I built was a "Simplex". It didn't go very well and I put that down to my lack of expertise. It was followed by "Ashford" and then a "Princess of Wales". The smokebox draughting of the "Princess" was altered to Lionel Woodhead's design principles. This appeared to let the loco steam very freely but as I had never built the loco as designed I had no benchmark to work from.

Another locomotive that I completed was the 7 ¼"gauge Fairlie that was part built by Bob Walters. This one too had smokebox draughting to Lionel Woodhead's formula. It too steams very well but again I had no benchmark to work from.
"Simplex" still resided under the workbench. After talking to other "Simplex" owners I realised that the loco suffered from too small a boiler, something confirmed when the designer produced drawings for a "Super Simplex" which was virtually the same except for a greatly improved boiler. I didn't want to build a new boiler so I set about altering the smokebox design.
First the inverted 'T' exhaust was discarded and replaced with one of an inverted 'Y' layout. A larger diameter chimney was made incorporating a ¾" choke. And a taper up to the top of the chimney. A new

blast nozzle and blower jet arrangement was made, with a range of different size blast nozzles.
On the 23 –7 –97 with a total weight behind the engine of just under 1000 lbs, two laps of the Palmerston North Marriner Reserve track were completed without stopping. This meant ascending a grade of 1 : 60 and completing 1000 yards during which all the water in the side tanks was used.
The following Labour Weekend saw the "Simplex" at New Plymouth where it performed very well but needed constant attention. If pressure dropped below 75 psi it was necessary to immediately stop for a "blow up" which seemed to take longer than it should.
Due to me suffering a severe back injury further improvements and trials did not eventuate until the Autumn of 2004. The maximum diameter of the petticoat pipe was increased to 2" and the choke diameter was increased to 7/8". This had the desired effect. A larger blast nozzle softened the exhaust and reduced back pressure without any loss of steaming ability. Now much easier to fire and capable of useful work.
A further benefit of having a larger diameter blast nozzle is that the tendency of the locomotive to throw sparks is reduced, if not completely removed. Something that is a concern for us when hauling passengers who don't appreciate burn holes in clothing etc.

However I would strongly recommend that anyone wanting to build a "Simplex" that they build the "Super Simplex" version.

My own recommendations for model locomotive builders, read Bert Perryman's article and use Lionel Woodhead's formula for smokebox draughting. If you have a loco and it is not performing as well as you hoped, alter the draughting and see if you have improved your engines performance.

FOR SALE

For health reasons Jan Jager is selling his 5" gauge Deutsche Reichs Bahn BR 64 class engine.
"Regina" is a 2 –6 – 2 tank loco. Jan built the model in 1980 to drawings by Hans Wittmann.
The loco has a steel boiler (current boiler cert) Boiler feed is by axle pump, hand pump or injector.
The loco comes complete with a two bogie driving trolley, suitable for raised or ground level track and fitted with disc brakes. Blower, twelve volt battery, tools, oil cans and night running lights are all included in the asking price of NZ $8500.00 cash or bank cheque.
Contact Jan Jager 06 758 2412 or at jajag@xtra.co.nz