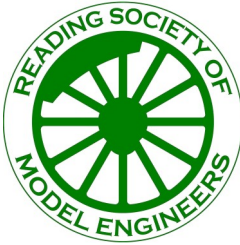


Reading Society of Model
Engineers
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Charity Number 1163244

The Prospectus

March 2021



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GWR Class 57 604 Pendennis Castle passing Twyford on 26 February 2021. This is one of the very few loco hauled passenger trains through the station and is daily empty stock bound for Reading depot. Photo J.Billard

REVERSION TO BOYHOOD.....0 GAUGE AMBITION.....

SAFETY DAYS.....VERGE AND FOLIO....

MRN IN 1954.....BLUES....

PLASMA CUTTER AT HOME....

ANALYTICS.....WHILING AWAY...

Free to members

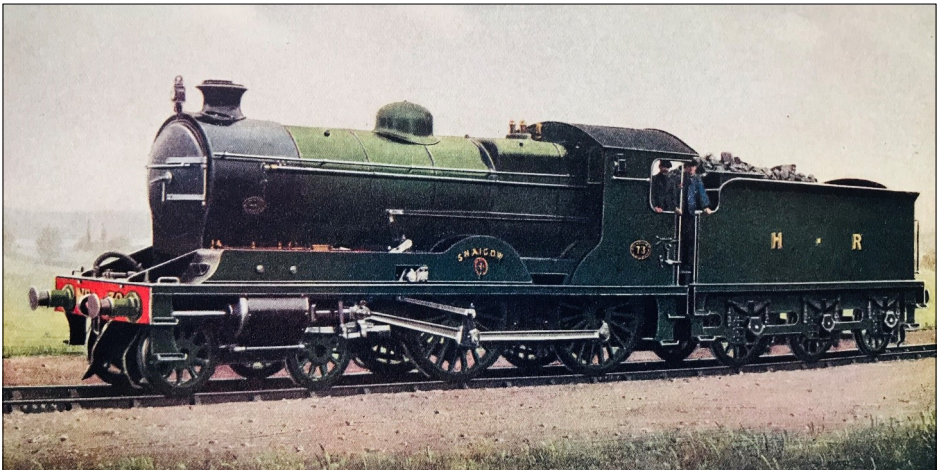
A VIEW FROM THE CHAIR

John Billard

I will not risk predicting when the club will be reopening for normal business. Members can watch and listen to government announcements and make their own judgements. You can be assured that the trustees will be ready to start activities as soon as possible. They meet next week.

Like many members I have lost a large part of my boiler ticket availability and we will have to make sure that boiler tests are done in the most practical way bearing in mind that nearly all engines will require a steam test as a minimum. We are sure that Les and Nigel, our testers will be fully up to the task and we will help them however we can.

We now have had a series of Thursday virtual “pub night” sessions on Zoom for members that are turning out very successfully. Peter Harrison is able to send out joining links. This is not confined to the larger scales and we welcome anyone who wishes to take part and to contribute if they wish. This is accompanied by a monthly formal presentation. I would particularly like to thank Alasdair Milne for assisting with these arrangements.

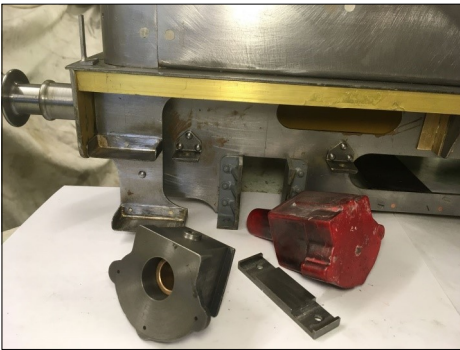


IN SHOPS THIS MONTH Scottish Locos and a Reversion to Boyhood by Alasdair Milne

Quite naturally I have a particular liking of Scottish Locomotives and especially 4-4-0s, which were the predominant express type on many railways in the decades around 1900. Some years ago, I built a 5” Dunalastair II, painted in dark Caledonian Blue livery and completed in 2019 a 7¼” gauge model of the GNSR’s *Gordon Highlander*. My latest foray into Scottish steam is *Snaigow* (see Photo A), one of a pair of Highland Railway locomotives, de-

signed by CME Charles Cumming and built in 1917 by Hawthorn Leslie in Newcastle upon Tyne. *Snaigow* was the name of Highland Railway's Chairman's estate and its sister *Durn* was named after the residence of his Deputy. This tradition follows from *Dunalastair* being the name of the earlier Caledonian chairman's estate) Their principal use was hauling expresses on the lines north of Inverness and were unusual 4-4-0s - they had outside cylinders with Walschaerts valve gear. This will be a first for me, as will be steam distribution using piston valves.

My usual practice is to obtain a GA drawing of the engine from the NRM, have this printed with 7.25" between the wheels giving the scale of 7.78 to 1



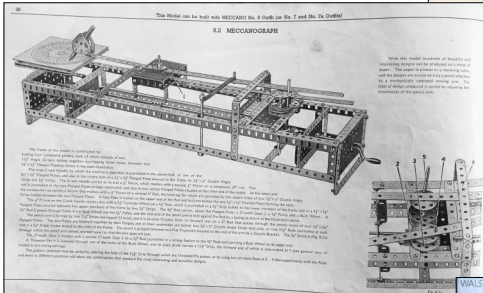
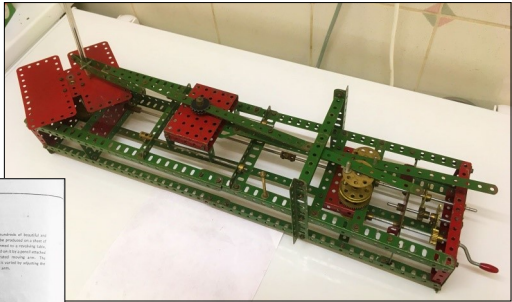
and from it developed the detail design. Apart from the wheels, where the castings are on order, I have completed the tender. Fortunately, the prototype had flush, countersunk rivets, but the biggest challenges were, firstly, the rounded ends at the rear, which I bent in the vice between a bar of the correct diameter and the inside of an angle bar angle and then, secondly, mating these with the complex curves of the coping, which runs around the

sides and rear of the tender (*Above*) I originally tried cutting the coping corners from sheet using cardboard templates, but this was not successful and, ultimately, I developed the shape using isometric projection. Photos (*above and right*) show, respectively, the details of the standard Highland Railway axle box pattern and casting and the completed tender front view.

Although I have begun the design of the engine, this level of concentration and activity needs some intermittent relief, and unfortunately, as Lockdown Tiers reached new heights, flying my Europa plane did not – I was grounded. The catalyst for a diversion was the receipt at Christmas of a book on Transporter Bridges and I was reminded of the transporter bridge model included in the Instruction Manuals of

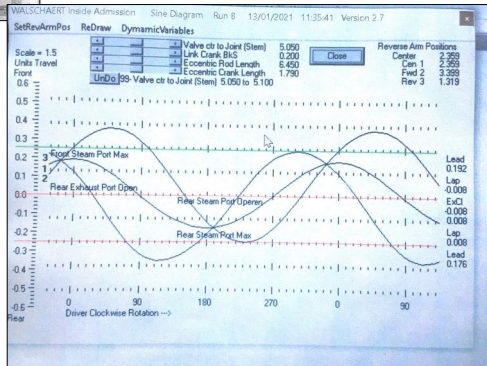


the larger Meccano sets. One thing leads to another, as they say; from my loft I extracted my No. 9 set, dusted it down and began construction of a device entitled A



Meccanograph (*right*). This works via a series of shafts and gears to produce a drawing of varying harmonic shapes. Readers may recol-

lect a similar device, called a Harmonograph, which produced harmonic motion using two pendulums instead of the gear train. Photo (*above*) shows the instruction page from my Meccano instructions.



On the subject of harmonics, and as part of the design work on *Snaigow*, I have been using a piece of software introduced to me by fellow-member, Alec Bray, and developed by a man called Charlie Dockstader, to evaluate the valve events and the dimensions of the various parts of the Walschaerts valve gear. Photo (*above*) shows a typical output from the simulator. I hope to say more about my experience with this and more manual methods of valve gear design in a future *Prospectus*.

0 Gauge Ambition

by Steve Harland

I hope some members will remember me, a long-time enthusiastic supporter of RSME, especially Public Running, with my 5" B1 and latterly 5" Britannia. In 2014 I was offered early retirement from my job at Didcot B Power Station and moved back to "God's Own Country", Snaith East Yorkshire to be exact, which is approximately 7 miles from the coal fired Eggborough Power Station, which at the time was the home of Leeds SMEE. In early 2018 when Eggborough finally shutdown, the Leeds track was lifted, a great shame as it was very secure within the station boundary. I maintained my interest in live steam, but apart from a part-built Highlander with a leaky boiler stay, I sold my locomotives and machine tools and concentrated on

smaller scales such as N and 00. More recently I have sold my N gauge to finance my efforts on O Gauge, modelling the late-crest era of British Railways (1955 to 1965).

This crystallised during the first lockdown as I had been pondering what to do afterwards. I had been debating for a while whether I should build a garden railway and if so, what scale should it be. I have the space, and this guided my decision to O gauge. It would be “roundy-roundy”, knee high, approximately 140’ in length with 3 tracks (2 main lines and a branch line). I had been speaking to a friend who thought it would be a good Monday project for some of us from the Leeds SMEE Monday Maintenance Gang. I agreed and so the seed was set. There are four of us on the project. A plan was drawn up and tweaked here and there and building began.

Parts were sourced from different areas, angle brackets for the walls, plywood, timber for bracing the numerous sections, bitumen for sealing the plywood (the cost of marine plywood was prohibitive) and roofing felt for protection. The brackets were screwed to the walls, laser levelled to ensure they were all at the correct height. Plywood sections were built, including the felt, and screwed in place. A removable bridge section was constructed, as



there was a section where there is no wall. The main station side is 57’ long and 26” wide, the opposite side is 57’ long and 14” wide. Track is Peco bull-head, which I chose as it is ready-built, but also realistic for my chosen period. Track laying took a considerable time and used “a lot” of track pins.

The layout has 22 points and a double slip, all powered by Cobalt Ip Digital motors, which are operated from the same controller as the locos. The main station when completed will have 2 14’ feet long platforms and each will have a main and bypass line. The branch line will terminate at either end.



Locomotives are mainly Dapol and Heljan, all but one with sound. Rolling stock is a mixture of freight and passenger sourced from various manufacturers: Dapol, Accurascale, Heljan and from kits produced by Slaters and Parkside and some beautiful MK1 coaches produced by Darstaed; works of art. The branch line will have suburban stock. Freight stock includes 5/7/8 plank coal wagons (plain and private owners),



HAA coal hoppers (as used on the merry-go-round trains to carry coal to Didcot A), salt wagons, box vans and tank wagons.

As readers can see from a small selection of my photos it is still very much work in progress. The pictures show a pair of newly constructed corner base units and the base construction (designed to outlast the

Yorkshire weather), my two favourite locos, in particular the Class 37 – Loch Lomond, and finally an overview of the complete felt-covered baseboard – note the strategically placed table and swingseat in anticipation of those balmy summer days, out of Lockdown, relaxing over a cool beer and playing trains, which are bound to come!

(Thanks Steve. Keep us posted! Ed.)



THE GOOD OLD DAYS of Safety

by John Spokes

The Good Old Days – “Beer was a penny a pint.”.....”Aye, and nobody ‘ad a penny!”

One facet of those Good Old Days was the absence of HSE. It was then only ever referred to as **Safety** and E (for Environment), was in the days of steam, never a real concern, except for some smoky sheds in built-up areas, where inspectors were employed to warn and occasionally fine aberrant loco crews. Safety was a consideration in workplaces, where accidents were relatively frequent, but not so much in the home – DIY had yet to catch-on – and of course part of the working sphere was the railways, where accidents either to individuals (a shunter was a particularly hazardous occupation) or collectively, e.g., Harrow and Wealdstone October 1952, were commonplace. And of course, in the late 50s and early 60s, air travel was beginning to take-off (groan!), which would prove to be effective in reducing the population at a stroke.

As my one of my bosses was wont to remark – “Just where is this going, John?” Well, below is one of the photographs from my collection. Not taken by me, but one of many purchased over the years for a variety of reasons: places I knew or just for aesthetics.

This particular photo caught my eye, although it is of no great photographic merit and it's not very sharp. Reading General is the location and to be more specific it shows 1020, County of Monmouth, at Platform 4, probably on a Bristol-bound train circa 1960 - it then had shed code 82F (St Philips Marsh). My first thought on seeing this picture was of the large number of spotters sitting on or close to the edge of Platform 5. (I presume they stood-up when a train for Paddington arrived.) I have enlarged that area and perhaps I shouldn't be amazed, but several of the spotters are girls.

Is it possible to imagine such a scene today (when beer is 500 new pennies a pint)?



The editor has consulted our expert WP and he writes:

Interesting pictures. The Bristol end of platform 5 had a safe gap between the extended platform and the platform line 4 foot. So, the spotters could safely sit there. It's an odd shape. I suppose the worst that could have happened back then was to be wreathed in hot steam from the cylinders of an arriving up train. They would not be allowed to sit there these days.

As for the County. According to P B Hands 1020 was based at 87H Neyland until October 1962 when it went to 82B St Phillips Marsh. From the Summer Timetable 1960 the Western Region became the first Region to adopt the 4-character head code system of train numbering. Under this scheme steam locos relied on the headlamp code to describe the class of train, in this case two lamps for a class 1. The second letter denotes the division or region and the third and fourth the destination. In this case A denotes London Division which is odd for a west bound train unless it was for Oxford or Newbury. I haven't been able to find out what 18 denotes. *Can anyone advise? Ed*

For space reasons I have had to hold over articles to next month from our esteemed writers Mike Manners, and David and Lily Scott. Apologies to them. Also the next episode of Building a Claud may appear next month. Ed.

Ken Morris writes

Just a line to say that I got all excited when I read about Mike Manners pendulum clock. I too share a weakness for all matters horological and built one many years ago.

I believe that the principle was at the heart of most time clocks where people were required to 'clock in' and have seen some fine examples in museums/pumping stations etc. Mine runs for about a year on a pair of U2 batteries and keeps a very constant time. My congratulations to Mike on his success.

My first attempt at clock making was of a 16TH century clock using what must have been the first escapement ever i.e. the verge and folio escapement, Foolishly I opted to make it using only hand tools such as I imagined they would have then. The contrate wheel was a challenge but eventually it was made and ran appallingly! A quiet word with John Wilding whose book I was following helped but with the clock hung on the wall its tick use to keep us awake at night! It has hung for the last 18 years out in the conservatory silent where it can do no harm.

Graham Bilbe writes

As a gentle 'bed-time' occupation I have a habit of trawling through back issues of old magazines - it's amazing what interesting 'snippets' one comes across! A recent look through some 1950s/60s 'Model Railway News' magazines threw up a couple of vintage references to the RSME which I thought may be of interest to present-day readers some 60-years on!

First was the front cover, no less, of the July 1954 issue of MRN, with a view showing 'Wallis-under-Neath' station on a RSME 'collective' layout, at the time "working in a Reading Department store as part of the pre-Christmas attractions", and photographed there by well-known local cameraman Maurice W Earley. It doesn't specify the gauge but as there are classic Dinky buses in the background it appears to be OO gauge, but is possibly O: the train in the foreground is hauled by an unidentified GW 4-6-0, and there is a 'preserved' loco mounted on the nearest platform which looks like a Furness Railway 'Coppernob' - probably a repainted 'River Series' diecast model which was available around that time (and now very rare!)

The second reference I found came 5 years later in July '59, in the 'With the Clubs' section of the magazine - I always look here for any RSME references, but they are extremely infrequent! However, on this occasion the RSMEE (as it was then) were publicising a Diesel Railcar tour on 19th July, leaving Reading General at 1.30pm for Basingstoke (shed visit), then to Eastleigh (another shed), then to the Winchester - Alton branch with a stop for tea! From Alton the tour returned to Reading via Aldershot and Ash and the 'SECR line', for approximately 7.30pm - quite an ambitious itinerary in

six hours! The fare was to be approximately 21 shillings (one guinea!) and bookings to the Hon Sec Mr Shayler - a name which I recall hearing in the dim and distant past - and I believe is still commemorated in the clubhouse.

A couple of interesting snippets of the club's history - do any of our 'elder statesmen' still remember these events, or even whether the railtour actually happened? It is hard to imagine setting up such an afternoon tour in this day and age, even if all the necessary connections still existed - I'm sure the cost, after all of the special pathing issues, risk assessments and other paperwork were completed would be quite prohibitive! Far from being inflexible and intransigent as the old nationalised railway was often claimed to be, it seems to me that, at least back in the '50's, they had a remarkable accommodating attitude!

I will try scanning the relevant pages and forwarding to you - whilst probably still technically 'copyright', I don't believe the publisher as such still exists and after all these years I can't see that they would have any serious objection to it being reproduced.



The editor adds:
I believe that the diesel rail tour did run and I think I covered it in a Prospectus some time ago.

Crossway, West Easing, W.13, to whom all other enquiries should also be addressed.

READING SOCIETY OF MODEL AND EXPERIMENTAL ENGINEERS

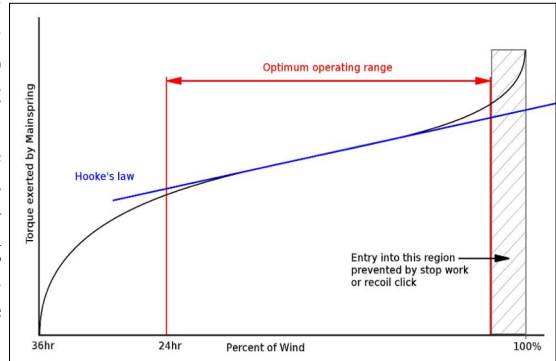
The society is arranging with British Railways to run a diesel rail car tour and the details are as follows: Depart Reading General 1.30 p.m., thence to Basingstoke and stop to look over the sheds. At Eastleigh there will be a visit to the sheds then back to Winchester to take the Alton branch, along which arrangements are being made to stop for tea. The tour will then go on to Alton, Aldershot, Ash, before returning to Reading via S.E.C.R. at approximately 7.30 p.m. The date, July 19th, and the fare approx. 21s.; bookings from the club Hon. Secretary: MR SHAYLER, 14, Westwood Road, Tilehurst, Reading.

COVID BLUES

by Mike Manners

I mentioned in my earlier article that I occasionally purchase non-working old clocks and repair them.

One of these was a carriage clock that I bought from a local auction. When I got it home it would only run for one day and the minute hand was badly bent. I suspect someone who did not know what they were doing had been fiddling with it. A little investigation showed that the Geneva Stop Work was set up wrong. Fortunately, this fault was easily rectified. The Geneva Stop is a part of the winding and spring mechanism which ensures that only the optimum part of the spring (the part that obeys Hooke's Law) is used for driving the clock. The diagram (right) illustrates this. The other advantage of the Stop Work is that it avoids over-winding.



A more difficult issue was the bent minute hand. A closer investigation revealed that the hand had previously been snapped at the point where it joined its ferrule and an attempt had been made at soldering it back in place. Any further attempt at straightening was going to break the joint. I looked online for a replacement hand but could find nothing suitable, so I bit the bullet and had a go at making one myself. This was really difficult work. I had never made anything so small and fiddly. It was a whole afternoon's work but done eventually. It's not quite as fine as the original, but I am happy with it. I also had to turn and silver solder a new ferrule and then *BLUE* the hand. This clock now sits on my office desk and is working well. *BLUEING* was always a feature of high-quality clock work. The practice continues to this day. Anyone working on antique clocks or constructing a clock will probably need to understand and use the process.

There are several methods for achieving the required blue colour, but more importantly to achieve an even blue colour on a large item, such as the minute hand on a long case clock. This is not easy and requires a great deal of skill and careful control of temperature. The temperature must be even over the item, or the blue colour will be patchy and variable. There were two traditional ways of doing this. For small items such as screws, they would be inserted into holes in a thick piece of brass or copper strip and then gently heated over a spirit flame until the desired blue colour was obtained. The mass of brass or copper would act as heat sink and its high thermal conductivity would mean that the mass would heat up evenly with no local areas of heat to give a variable colour. The second method, for larger items, would be

to make a copper tray and fill it with brass filings and lay the item to be blued on top. It would again heat be heated slowly over a spirit lamp and the mass and thermal conductivity of the tray and brass filings would give the required even results.

More recently methods have become more sophisticated. One can purchase blueing salts that are crystals that are designed to melt at a particular temperature. The item is immersed in the salts and achieves the appropriate blue colour. This, however, can be a dangerous process as the liquid will be at several hundred degrees Centigrade. If it were to get spilled it could cause a fire and the thought of getting any on your hands does not bear thinking about. Another method I have used in the past is to lay the item to be blued on a piece of copper on a heat proof material and then to gently use a heat gun. With care this can give acceptable results if you don't try to do things too fast and get the heat gun



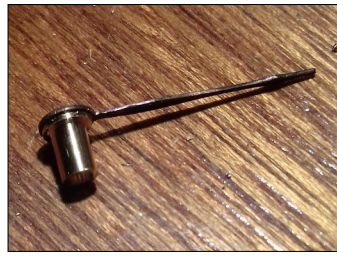
too close. If you do, you get local heating and an uneven colour.

One good thing about blueing is that if it all goes wrong, it's not too difficult to re-polish the item and start all over again. By far the easiest and most controllable method of blueing is to use a temperature-controlled oven or blueing box (*above*). This is what I now use. It is basically an MDF box lined

with an insulating material containing a ceramic heating element, a temperature sensor, and a large thick slab of aluminium to act as the heat sink. The ceramic heating element (*below*) is almost the same size as the aluminium slab so heats it evenly all over and because aluminium has a high thermal conductivity the temperature is very even all over the slab. The heat sensor is deep in the aluminium and thus gives a true indication of the heat of the slab. The heating element is controlled by an industrial 3-term temperature controller. The beauty of this system is that you can put your part in the box on the aluminium slab, close the lid, turn it on, set the temperature and then just walk away and leave it. The slab will come up to temperature and remain at that temperature so long as the box is turned on. You can leave the part in the box for 10 minutes or 10 hours. The part will never get any hotter than the set temperature so the blue colour can be very precisely controlled. (*see top photo*).



Photos (*overleaf*) show the completed blued hand and the ferrule fitted.



CUTTING AT 30,000 DEGREES

by Alan Thatcher

Many RSME members, and particularly those who come to Thursday evening meetings (before lockdown that is), will know that I have built a Plasma Cutting Machine. This has involved a fair amount of experimentation and experience built up by actual operation and watching YouTube videos.

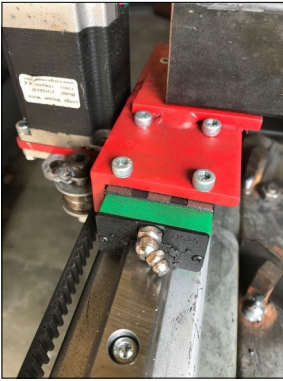
I started off by buying a suitable galvanised steel table, which I shortened slightly and added castors to make it manoeuvrable. On this I placed supports for the material to be cut and the mechanism for controlling the direction of the plasma cutting head. The cutting head moves in 3 axes. The X and Y define the shape and the Z adjusts the head to workpiece gap. All axis adjustments are made by individual Stepper Motors; the X and Y motors controlled by G-code.

Originally the beams that make up the X and Y axes were 50mm box sections with brackets guided by bearings, external to each side of the beam. However, any dust or dirt that got on this beam during the cutting operation caused the bearings to move unevenly and this was reflected in the cut. To overcome this, I have replaced the Y axis beams with two precision runners over which run new brackets, free to move, running on circulating ball bearings. I plan to change the X axis beam in this way in the near future. The Z axis controls the gap between the head and the workpiece. This gap is 1/16" (1.5mm) and the control unit that monitors the cutting head measures the resistance of the plasma flame, which is a function of the gap, and if it is not correct then the gap is automatically corrected. The curved plates which support the workpiece have all been set level, but this auto gap correction

feature is important as it can make corrections if the workpiece distorts under the heat of the cutter.

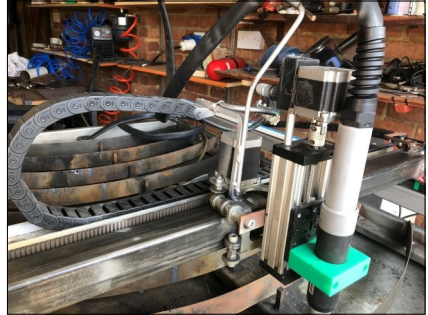
The photo (*left*) shows the top of the table with the curved "leaves" for supporting the work. Left and right are the runners, circulating bearing assemblies and stepper motors for the Y axis. The photo (*left*) shows more detail of the support-drive assembly including the toothed belt which engages with the stepper motor.





The photo (*below*) shows the head and my original bearing assembly, using external bearings, and the two stepper motors: one for driving the X axis and the other for adjusting the plasma head gap, and the cable carriage for supporting the cables to these two stepper motors.

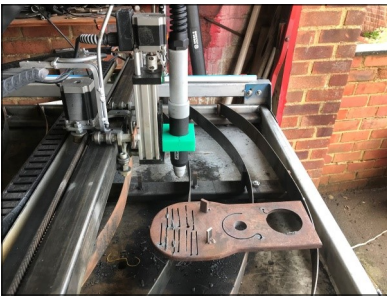
Although the machine will run off 16A, I have installed a dedicated 32A supply. Recently I upgraded the cutting



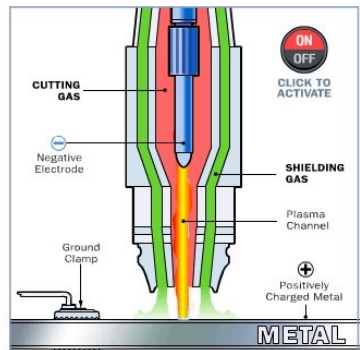
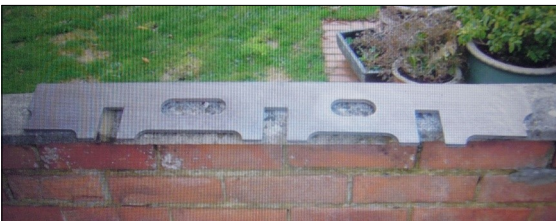
head so that I can clean-cut 14mm and a maximum cut of 18mm. The old head would only do 10 and 14mm. I also have a complementary hand-held plasma torch.

A simple explanation of how the cutting head functions is that the electrode in the head creates a spark, ionising compressed air, which is forced at about 70 psi through the head. This ionised air reaches 30,000 deg C and makes an electrical circuit with the workpiece, which is connected to the other side of the plasma arc control unit. (refer to the diagram below). There are more detailed explanations on-line. The compressed air, by the way, is filtered 3 times, as any entrained water will cause the plasma to be unstable.

The photo (*left*) shows the results of some experimentation on a 10mm thick blank (an old former for a copper boiler I made years ago), but I have made other



more functional items and recently cut the 7mm frames for the tender of the 7 1/4" B 17 being built by club member David Wilkinson (*below*) Videos of this cutting operation can be seen on YouTube under *cut50pnc* (look under Alan).



ANALYTICS

Where WP look at photographs taken by the editor



Changes at Paddington since 2017

Looking at John's picture he took on 16th December 2017 from the end of Platform 6 at Paddington it highlights the current speed of change on the railway, particularly in respect of rolling stock. All three types of train in the picture are no longer regularly seen at Paddington.

Starting with the train in Platform 2. This is an Alstom Coradia or *Adelante* as named by First Great Western. They were built in 2000/01 by Alstom at Washwood Heath in Birmingham and are owned by Angel Trains. Fitted with Cummins QSK19 750 HP engines with Voith hydraulic transmission (a throw back to the NBL Warships!) one under each of the 5 cars. They were ordered by FGW to supplement their 125 mph HST fleet in order to introduce a half hourly service to South Wales in 2001. Their introduction was delayed by poor reliability which did not improve greatly. They were based at Old Oak Common. They ended up working services on the Oxford and Cotswold line and to Exeter, having been replaced on the Bristol/South Wales services by HSTs released from the Midland Main Line by new Meridian class 222s.

The continuing problems meant GWR handed them all back to Angel Trains in 2007/09 replacing them with more refurbished HSTs. Five were leased to ECML in 2009 for services to Lincoln, but when this was abandoned before it even started, on commercial grounds; back went three to FGW to cope with rising passenger numbers to work on the Cotswold line. The other two were leased to Northern to work Hazel Grove and Manchester Victoria to Preston and Blackpool until the end of 2011.

By 2017 five sets were with FGW, five with Grand Central working between Bradford and Sunderland to Kings Cross and four with Hull Trains (maintained at OOC). FGW finally gave up the Adelante fleet in 2018. In 2020 Hull trains replaced their four with new Hitachi class 802s. Currently 10 of the units have been refurbished and now work for Grand Central who have disposed of their short HST sets and the remaining four ex Hull Trains units are now based at Derby for working East Midlands Railway on the Midland Main Line, having replaced their non-accessibility compliant HST sets.

Comments regarding the remaining two trains in the picture are considerably more straightforward.

In platform five is a classic GWR HST, which until 2019 had served the Western Region, First Great Western and GWR admirably in front line service since 1976 and now replaced by the controversial Hitachi 800 class fleet. GWR still operate 14 x 4 car HSs principally in the West Country between Cardiff and Penzance.

Finally we have in platform 6 one of the futuristic looking Siemens Class 332 no 332008, one of the five 5x car electric multiple units the other 9 sets being 4 x car, giving 14 sets in all. They were built for the new service from Paddington to Heathrow Airport (HEX) via a new link from Hayes introduced in 1998 and owned outright by Heathrow Airport Holdings. They have recently been replaced by 12 Bombardier (Derby) built four car Electrostar electric multiple units, based at Reading alongside 33 similar units used on Thames and Kennet Valley local services. The HEX service was reputedly the most expensive per mile ticket price certainly in the UK. As no other operator has been found for these 14 units, partly due to the limited number of seats to cater for airport luggage and the wide space between seats, they are now going for scrap to Sims Metals at Newport though one unit went by road to Sims's premises in Peterborough. Currently 10 have already been scrapped with 4 to go! (*I understand that they have all gone now. Ed*)

WHILING AWAY THE EVENINGS Part 3 by Terry Wood

To make enough heat to raise enough steam to propel the engine and the trolley with a passenger on board I decided to use a gas burner running most of way along the boiler which seemed like a good idea in theory but in practice there was good flames through the holes nearest the gas canister but the further away the flames just got smaller. Back to the drawing board I think.

The next idea was to make a large meths burner using an old thinners tin layer on its side this entailed To make enough heat to raise enough steam to propel the engine and the trolley with a passenger on board I decided to use a gas burner running most of way along the boiler which seemed like a good idea in theory but in practice there was good flames through the holes nearest the gas canister but the further away the flames just got smaller. Back to the drawing board again.

The next idea was to make a large meths burner using an old thinners tin layer on its side this entailed cutting a large hole in the bottom of the cab where the firebox usually sits. The tin can then be filled with cotton wool covered with a piece of perforated sheet, filled with meths, lit and then slid through the hole this worked out much better and within 15 mins the boiler had reached a pressure of 80psi!

The next problem was controlling the flow of steam in the end I used an old brass gas tap as a regulator which seems to work quite well at first it was a bit leaky but after taking it apart and re grinding the seat it was OK. When I first got the engine running it seemed to lack power to even run on its own

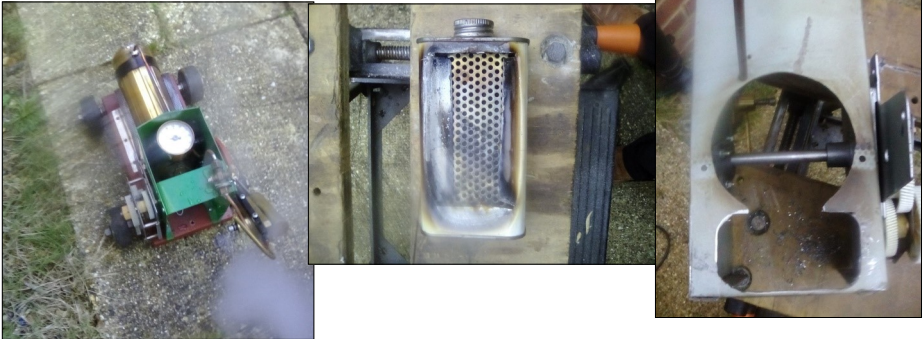
but by increasing the diameter of the exhaust pipe it then started running ok.

I then noticed that there was a lot more steam being expelled from the slide valve than there was coming out of the exhaust when the engine was running along the path so I then let the engine cool down took the slide valve apart and then refaced the surface using a sheet of fine wet and dry on a sheet of glass. This did improve things but there was still a lot more steam coming out from the valve than the exhaust. The valve is spring loaded to force it against the inlet / exhaust block but using a stronger spring increases the friction and slows the engine down.

Conclusion

Unlike the slide valve in a normal steam engine which uses the steam pressure to force the valve onto its mating surface this works the opposite way so when the steam pressure is applied it forces the two mating surfaces apart and is only prevented by a spring which if too strong creates too much friction. On smaller engines this is not a problem so the only way to make the engine work more efficiently is to redesign the entire engine using piston valves which is why this type of engine never took off in much larger engines.

Pictures by Terry Wood.



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