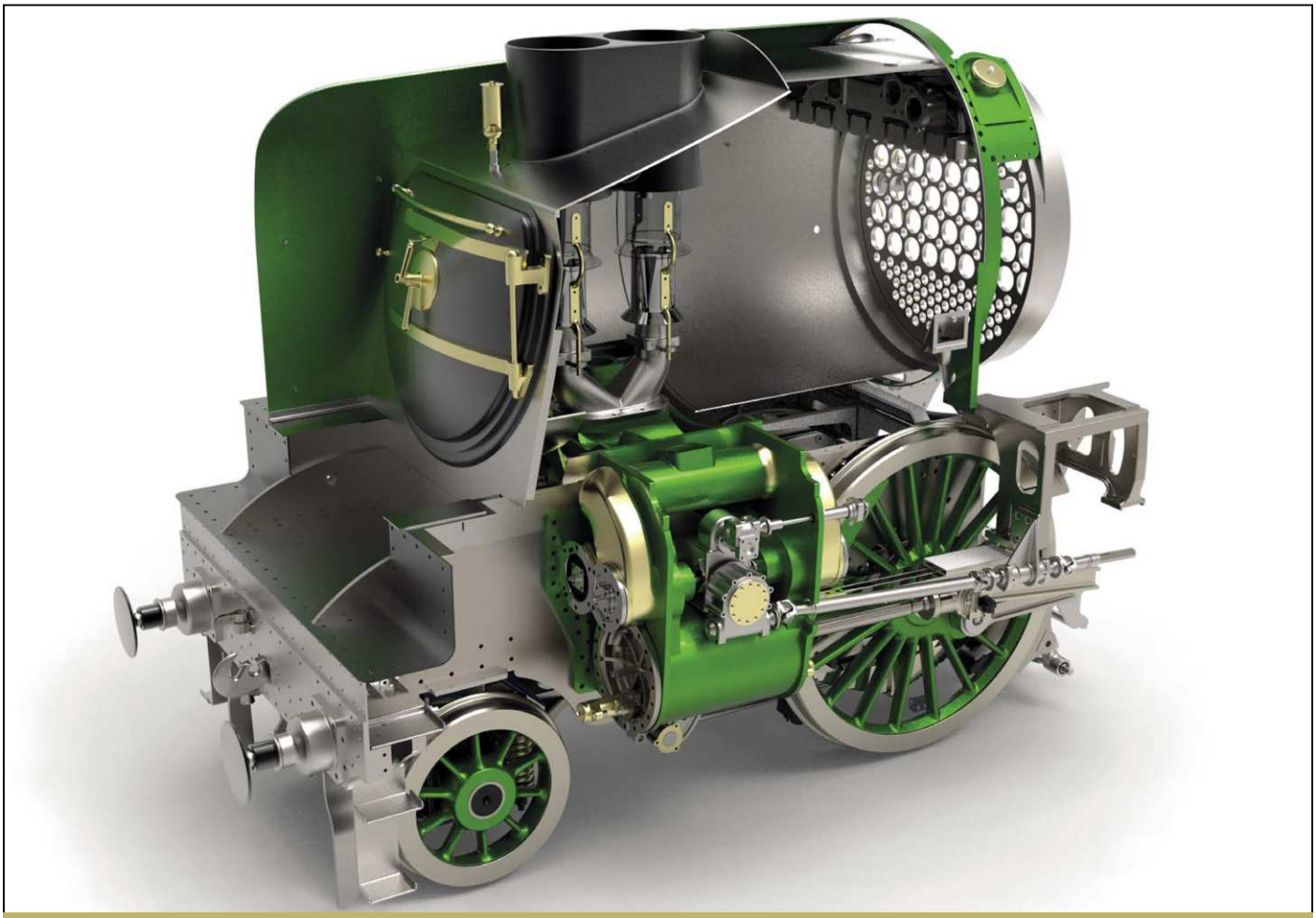
60163 TORNADO
New Steam for the Main Line

2007 PRINCE OF WALES
Building Britain's Most Powerful Steam Locomotive

3403 ANON
Recreating Gresley's last design

THE COMMUNICATION CORD

No. 61 Spring 2021



Simon Apsley/Frewer & Co. Engineers

A superb rendering by Simon Apsley of the 3D CAD of *Prince of Wales's* front end, cut away to show the Lentz gearbox and the double Kylchap exhaust in the smokebox.

POETRY IN MOTION? *by Graham Langer*

Despite the difficulties of the past year the P2 project continues to forge ahead and we have reached the stage of fine-tuning the design for the cylinders and valve gear so that construction can be put out to tender. Part of the process has involved Frewer and Co. Engineers undertaking the Computational Fluid Dynamics [CFD] analysis of the cylinder block steam passageways and one of their team, Simon Apsley, has got a bit carried away with the 3D CADs of No. 2007 – in consequence he has been sending us the most impressive renderings of parts and sections of the new P2, some of which we are delighted to feature in this edition of *The Communication Cord*. TCC

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EDITORIAL *by Graham Langer*

As I write this editorial *Tornado* is still "confined to barracks" pending a return to the main line on 22nd May with 'The Pennine Explorer' and in the absence of news about our tours I make no apology for the fact that this edition of *The Communication Cord* is rather "P2 heavy". We are approaching the stage in the build when increasing resources will be required to get the job done. A huge amount of work is continuing off-site and at Darlington Locomotive Works, miles (literally!) of pipework and wiring are being fitted to the chassis – this was an area of activity that significantly slowed the completion of No. 60163 but with the benefit of this experience and the huge amount of pre-assembly design work, much of it in 3D CAD, the elaborate 'kit of parts' is going together well. Money is, as ever, the governing factor and the simple rule of thumb is that the sooner we complete the locomotive the less expensive it will be!

Steve Davies pays tribute to the late Duke of Edinburgh in his column and I am sure many of us will mourn his passing. Prince Philip was a man of diverse talents and his influence could be felt across an incredibly wide range of organisations. No stranger to the footplate of a steam locomotive, he and The Queen toured parts of the Commonwealth extensively by train, many of these trips being steam-hauled at a time when the steam locomotive was losing its pre-eminence on railways around the world. The A1 Steam Locomotive Trust certainly owes him a debt of gratitude since The Prince was the progenitor of Gift Aid, the government scheme that adds 25% to donations made using the facility. Although it was said slightly tongue in cheek, we always stated that the government was the biggest donor to *Tornado*, albeit using your money!

In this edition of *The Communication Cord* you will find an article addressing the thorny issue of carbon production and capture by the Trust. Everyone involved in the heritage steam movement, including stationary engines and steam-powered ships, is only too aware of the growing antipathy towards the use of coal. However, the sector produces a tiny percentage of the country's greenhouse gasses and rail transport (including steam-hauled trains) has a smaller carbon footprint per passenger than many other forms of transport, especially long-haul air flights. We will be returning to this topic in future *TCCs* but outline our first steps to becoming carbon neutral in this edition, as they say, "oak trees from acorns grow".

Darlington & Stockton Times

HRH Prince Philip, Duke of Edinburgh on the footplate of *Mallard* at the NRM.

Red face department! I have to apologise for an avoidable gaff in captioning which appeared in *TCC 60*. In the 'Workshop Notes' column we stated that the photo of *Cock o' the North* featured a bell whistle rather than the chime whistle originally fitted. Clearly this could not have been a wartime expedient since No. 2001 had been rebuilt with an A4 front by the beginning of WW2! Must do better… TCC

Ian MacCabe

No. 2001 stands at Edinburgh Waverley (not!) during WW2.

FROM THE CHAIR *by Steve Davies*

In recent weeks we have all felt drawn even more closely to our Sovereign, Her Majesty The Queen, as she mourns the loss of her husband and consort, His Royal Highness The Prince Philip, Duke of Edinburgh. This was indeed an exceptionally sad occasion, and in many ways marked the passing of an era. Given his close association with our organisation, you will wish to be aware, I'm sure, that a personal letter was sent to His Royal Highness The Prince of Wales expressing the collective sadness, condolences and best wishes of all of us associated with the Trust. We look forward to future engagement with him and The Duchess of Cornwall in happier times.

There is a pessimistic phrase in the Army along the lines of *in the interest of economy the light at the end of the tunnel has been switched off*. Well, I am delighted to report that far from the light being extinguished it is in fact growing brighter as we begin to emerge from the Covid-19 restrictions which have unfortunately but necessarily blighted our lives for more than a year. By the time you read this edition of *The Communication Cord*, *Tornado* should have hauled, on 22nd May, its first main line tour in what seems a very long time, from Leicester to Carlisle via the spectacular Settle & Carlisle Railway. It might seem premature to say this, but I am sure we will be reporting a successful run in the next edition of *TCC*. The locomotive has been exceptionally well cared for whilst in residence at the National Railway Museum and the conditions have therefore been established for a successful return to the main line. I know our customers are certainly looking forward to once again enjoying the thrill and majesty of an A1 Pacific in full cry. Whilst on the subject, I would like formally to record our appreciation of the way in which the NRM has hosted us so royally over the last year. They have been extremely patient as we maintained the locomotive in first class condition, and I hope that in the not-too-distant future we will be able to repay the kindness of the Museum Director, Judith McNicol, and her team, with a visit by *Tornado* to one of the NRM's events.

Early on in the pandemic it was forecast that virtual meetings via Zoom and the like would be the 'new normal' even once restrictions were lifted. I don't know about you, but if there is one thing I yearn for it is actual human interaction. I am fortunate to live close to Darlington and frequently enjoy the (socially distanced!) pleasure of visiting the engineering team working on the P2 but what I and my colleagues want to resurrect just as soon as possible is the ability to enjoy the collegiate benefits of physically meeting. Video conferencing is probably here to stay but punctuated by periodic 'actual' meetings. It therefore follows that we as a Trust must return to getting the P2 Roadshow series of gatherings back on track as soon as possible – direct engagement with potential contributors, preferably in the presence of the locomotive at Darlington, is without doubt the most efficient way of exciting the senses and recruiting people to the cause. That's also why we are looking forward immensely to the annual Convention, which as previously advertised takes place in Darlington on Saturday 25th September. We have much to bring you up to speed on, but most importantly we want your direct feedback on a wide range of subjects.

Over the coming weeks and months we will hopefully be providing you all with updates on a number of key milestone events, one of which should be the exciting news that we have selected a contractor to manufacture the newly designed cylinder block for *Prince of Wales*, and of course updates on the delivery schedule of the first of our two new boilers, and a whole host of new components. I therefore hope you can see that despite Covid-19 and all that it has thrown at us, this is a great time to remain engaged with the Trust and indeed, if possible, to enhance one's involvement. My very best wishes to you all, and I do hope you will be able to travel behind *Tornado* on one of the trains in its very busy schedule. TCC

The sight we have all been waiting for. *Tornado* back on the main line! No. 60163 is seen approaching Barrow Hill on the final leg of a positioning move prior to 'The Pennine Explorer' on 22nd May.

A1 ENGINEERING REPORT *by Richard Pearson*

On Monday 1st February we returned to York to carry out our annual examinations on No. 60163 and support coach No. 21249. *Tornado* underwent full mechanical cold and hot functional examinations to enable us to carry out and complete our a 'C' exam, 'B' exam and an 'A' exam. The coach also underwent a full mechanical exam and functional examination as we completed No.7 and No.4 examinations. The photos below show you some of things we have been doing in the process of carrying out these examinations.

As well as the hands-on work at York, I've also been spending time working with Alistair Leach of Ricardo Rail, as we completed a remote audit of paperwork ahead of Ricardo's annual inspection which was done on the 18th February.

On 1st February we started with the mechanical No.4 and No.7 examinations of No. 21249. These examinations look at everything from door locks to wheel profiles, buffer heights, repairs to leaking windows and a full battery check.

The pictures (top/right) show the batteries being examined. The battery boxes were also cleaned out and box hinges lubricated, and the battery water levels were topped up with de-ionised water using the special lolly stick as a level indicator!

The cover was taken off the 'snifting' valve to allow for a visual examination, and all looked to be in good condition as seen in this image (centre left).

The wheelset flange heights and thicknesses were measured on both No. 60163 and the coach, and the picture shows (centre right) the measuring gauge in position on one of *Tornado's* driving wheels.

All photos - Richard Pearson

The engine was fully examined although not dismantled this winter due to the low mileage that it had completed since it was last dismantled over the previous winter. The picture (left) shows Ian Greenan carrying out an examination on the RHS radius rod die block. With the engine in forward gear Ian uses a bar to lift the rod and die block and check for excessive wear in the pin and block.

During the inspections several areas of corrosion were identified and noted as seen in the picture below of the tender coal space sprinkler, these areas were very closely examined, and all were deemed suitable for further service but with the proviso that they are replaced next winter.

With the cold mechanical examinations complete, all we had on our repairs list was a couple of 'running repairs' and a suspect broken RH Cartazzi spring, so putting these aside for later the engine was prepared for a steam test. The boiler washout doors were refitted and the boiler filled up, the newly calibrated pressure gauges were all refilled and all frost protection measures we had taken in December 2020 were reversed. The picture(top right)below shows Ian Greenan working under the cab to refit the bottom cap on the live steam injector, the cap was removed to ensure all the water was removed which in turn prevents frost damage occurring.

The OTMR (On Train Monitoring and Records Unit) – the black box data recorder which isn't actually black, it's bright orange - was refitted as it had been recently returned from the manufacturer where it had been for its five-yearly service, the picture shows it back in position under the fireman seat.

With the boiler refilled the fire was lit and the engine slowly brought into steam, the engine then underwent a thorough steam test, which included a full braked test of both the air and vacuum brake system. In the picture (centre right) you can see No. 60163's brake valve along with our calibrated digital test gauge which is used to test and verify the brake pressures.

All photos - Richard Pearson

The engine passed the steam test with the only things of note being the weather and a defective LH leading sand valve which wasn't working and had to be dismantled to remove a bucket full of wet sand. The image is just a glimpse of the weather we had during the steam test.

The following day we kept the engine in steam to allow us to carry out the functional parts of No. 21249's No.4 and No.7 examinations as we used the engine to provide air and vacuum to test the brakes on the coach. The brake testing procedure on No. 21249 is actually more complicated than the tests we do on the engine as it involved several complex operation, isolation and timing tests on both the air and vacuum brakes systems.

The week after we returned to York again to prepare the engine for its official annual in steam examination with our VAB, so the engine was prepared and steamed again and everything went well. The day after the VAB steam test, we were again in steam but this time for the visit of Mandy Sharp who was there to carry out the annual inspections on the TPWS/AWS, OTMR and GSMR.

The week following the official VAB's hot exam we set about completing all outstanding tasks the biggest of which was to change the broken Cartazzi spring (top) and in the picture (centre) Ian points to the broken top leaf on the old spring.

With the new spring fitted it was necessary to check the weight distribution on the Cartazzi wheelset to ensure both wheels are carrying the same weight, this was done using the weighing equipment as seen in the photo (bottom right). The equipment is fitted around the wheel and the two small hydraulic jacks push down on the rail and lift the wheel off the rail, at the point where the wheel lifts off the rail a reading is taken on the gauge, the wheel on the opposite side of the engine is also lifted using another set of weighing equipment and after one small adjustment we were able to obtain the same reading on both sides which confirmed even weight distribution.

So, with all essential tasks now complete the engine was laid up again, the firebox and ashpan washed out and left with doors open to allow air circulation, a chimney cap refitted to prevent rain and pigeon ingress, the smokebox door wedged open slightly to allow to air circulation and the boiler dosed with tannin which will remove the dissolved oxygen from the water and help prevent corrosion. Let's hope it's not too long before we return when we will carry out a boiler water change before refilling the boiler and lighting the fire again!! TCC

All photos - Richard Pearson

KEEPING *TORNADO* ON THE TRACKS *by Mark Allatt*

Keeping No. 60163 *Tornado* in tip-top working order is an expensive business as we are constantly being reminded! The profit from operating our programme of main line tours and *Tornado's* hire fees from heritage railways and working for other rail tour promoters normally covers her day-to-day and year-to-year maintenance costs. However, not only do they do not at present generate a sufficient surplus to fund her five and ten-year overhauls, conservatively estimated at around £500,000 each, due to the impact of coronavirus *Tornado* hasn't been able to generate these fees or be the greatest advert for becoming an 'A1 for the price of a pint of beer' (£2.50 per week) Covenantor. Therefore, it is vital for us to continue to maintain (and hopefully grow) *Tornado's* on-going Covenant income.

The last few months before we were impacted by the coronavirus saw our net number of Covenantors grow a little – with the new supporters coming on board just about managing to replace those leaving us – mostly for their final shed allocation.

However, without the positive profile generated by our planned 2021 railtours programme and the opportunity to meet new potential supporters on our trains and at the lineside who are

Sarne Yeeles

'The Ticket to Ride' at Northallerton.

captivated by *Tornado's* main line magic, our number of A1 Covenantors has started to gradually decline once more. I would therefore urge all our existing A1 Covenantors to help us to recruit new supporters and for P2 Covenantors (around two-thirds of whom are not also A1 covenantors) to come on-board if they are able to. And perhaps each of our existing Covenantors could pledge to recruit a friend or colleague? TCC

For more information on how you can help to keep Britain's only new-build main line steam locomotive on the tracks visit **www.a1steam.com**, email **enquiries@a1steam.com** or call **01325 460163**.

• SHED NOTICES •

NEW ROUNDABOUT SCULPTURES APPEAR IN DARLINGTON.

A new art installation has been unveiled in Darlington to help celebrate the town's rich railway heritage. The piece of public art takes pride of place on a key route into the town centre, the re-designed roundabout on Haughton Road.

Created by regional artist Andrew McKeown, the artwork features four signs depicting key locomotives from Darlington's past and present. The designs are influenced by an example of railway signage held in Darlington's Head of Steam railway museum and feature locomotives with particular significance to the town - *Locomotion No.1*, *Derwent*, *Tornado* and *Prince of Wales*. Manufactured in metal and painted in traditional style, the signs include the names of the locomotives and the dates they came - or are set to come - into service. Special lighting has also been installed to enhance the artwork. The project has seen the council's heritage and highways teams work alongside The A1 Steam Locomotive Trust and the Friends of the Stockton and Darlington Railway Group from the initial concept and design to the finished product. TCC

All photos Paul Bruce

The original Darlington locomotive, *Locomotion No.1*.

Another Stockton & Darlington engine.

The sculpture of No. 60163 *Tornado*.

No. 2007 *Prince of Wales* appears in Darlington!

***Tornado* by night, an image showing how the sculptures are illuminated.**

TORNADO TOUR DIARY - 2021

Below are the future operations *Tornado* is confirmed to be involved in. More details will be published on www.a1steam.com as trains are finalised.

- **Saturday 22nd May** – 'The Pennine Explorer' – Leicester to Carlisle and return – bookings through Tornado Railtours
- **Saturday 29th May** – 'The South Devon Explorer' – Woking – Bristol – Plymouth – bookings through The Railway Touring Company
- **Saturday 19th June** – 'The Edinburgh Flyer' – York to Edinburgh – bookings through The Railway Touring Company
- **Saturday 26th June** – 'The Fens and Fells Flyer' – Cambridge to Carlisle and return – bookings through Tornado Railtours
- **Sunday 11th July** – 'The Royal Duchy' – Slough – Taunton – Par – bookings through The Railway Touring Company
- **Thursday 15th July** – 'The Cheshireman' – London to Chester – bookings through The Railway Touring Company
- **Tuesday 20th July** – 'The Viking Venturer' – Edinburgh and Linlithgow to York and return via the S&C – bookings through Tornado Railtours
- **Thursday 22nd July** – 'The Aberdonian' – Edinburgh to Aberdeen and return – bookings through Tornado Railtours
- **Saturday 31st July** – 'The Aberdonian' – Edinburgh to Aberdeen and return – bookings through Tornado Railtours
- **Thursday 12th August** – 'The Aberdonian' – Edinburgh to Aberdeen and return – bookings through Tornado Railtours
- **Saturday 21st August** – 'The Clyde Aberdonian' – Glasgow Central to Aberdeen – bookings through Tornado Railtours
- **Thursday 2nd September** – 'The Aberdonian' – Edinburgh to Aberdeen and return – bookings through Tornado Railtours
- **Saturday 11th September** – 'The Aberdonian' – Edinburgh to Aberdeen and return – bookings through Tornado Railtours
- **Thursday 16th September** – 'The Jorvik Express' – Liverpool to York and return – bookings through Tornado Railtours
- **Saturday 18th September**– 'The Caledonian' – Birmingham to Edinburgh and return – bookings through Tornado Railtours
- **Thursday 30th September** – 'The Ribblehead Rambler' – Hull to Carlisle and return – bookings through Tornado Railtours
- **Wednesday 20th October** – *Tornado* and *Flying Scotsman* – West Midlands to Carlisle and return – bookings through Tornado Railtours
- **Thursday 21st October** – *Flying Scotsman* and *Tornado* – West Midlands to Carlisle and return – bookings through Tornado Railtours
- **Wednesday 27th October** – *Tornado* and *Flying Scotsman* – Middlesbrough to Carlisle and return – bookings through Tornado Railtours
- **Thursday 28th October** – *Flying Scotsman* and *Tornado* – Peterborough to Carlisle and return – bookings through Tornado Railtours TCC

Tornado operates on the national network with West Coast Railways and DB Cargo and the Trust respectfully requests that anyone wanting to see *Tornado* follows the rules of the railway and only goes where permitted.

Tornado Railtours	**The Railway Touring Company**
01325 488215	01553 661 500
www.a1steam.com	**www.railwaytouring.net**

Covenantors' Diary *by Leigh Taylor*

The office staff hope you are all continuing to stay well and enjoying the lovely spring weather.
The 2021 Spring Draw raised over £6,000 which will be used for maintaining *Tornado*.
The winners are:

- 1st Prize - Table for two in First Class Dining on a Tornado Railtour – Mr D Atkin
- 2nd Prize - 2 x First Class tickets Non-Dining on a Tornado Railtour – F Gibbs
- 3rd Prize - 2 x Standard Class Tickets on a Tornado Railtour – Mr W Longworth
- 5 x Prizes – '*Tornado* 10 Years in Steam' poster - Mr J Hunt, Mr R Spencer, Ms R Strong, Mr D Haigh, Mr J Hewson
- 5 x Prizes – 'A Giant Resurrected' poster – Mr G Bee, R M Combes, P Morell, Mr R Planterose, R Sayers

We hope to resume Open Days at Darlington Locomotive Works in the coming months. When we have firm plans, information will be made available through *The Communication Cord*, *The Tornado Telegraph* and *The Mikado Messenger*.
Please inform the office of any changes to your Gift Aid status, contact details and communication preferences.

Save the date – 25th September 2021 – The A1 Steam Locomotive Trust Convention.
We hope to hold this as a live event at the Mercure Darlington - Kings Hotel and Darlington Locomotive Works, however if that is not possible, we will be organise another virtual event, as in 2020. Invitations will be sent out in due course. We hope to see you in person this year! TCC

RAILTOURS *by Sophie Bunker-James*

Well, it feels a long time coming but we are very excited to be back on track this month! On board, you can look forward to the usual laidback luxury in First Class, with the addition of freshly cooked local produce in Premier Dining. The buffet car will be fully stocked with bottled beer and bacon sandwiches, and we look forward to a more social environment in Standard Class as restrictions ease.

Our first tour, 'The Pennine Explorer' from the East Midlands promises a fantastic change of pace following months of lockdown. It is the first of four Settle & Carlisle circulars with *Tornado* in 2021. If you're keen to take on the Yorkshire Dales with No. 60163 then 'The Fen and Fells Flyer' from East Anglia on Saturday 26th June or 'The Ribblehead Rambler' on Thursday 30th September are the trains for you.

July sees *Tornado* start from Edinburgh as part of 'The Viking Venturer', a wonderfully picturesque journey along the clifftops to York before *Tornado* returns to Scotland by way of the Settle & Carlisle. We are then perfectly positioned for an annual series of 'Aberdonian' trains. This year we are steaming to the Granite City from Edinburgh on five dates through July, August and September. They are the perfect way to see Scotland on your staycation, as the railway crosses the ever iconic Forth Bridge and weaves its way along the coastline, offering stunning seaside views. We are also delighted to be offering *Tornado's* first start from Glasgow on 'The Clyde Aberdonian', travelling via Stirling on the way to Aberdeen. Off train excursions to a National Trust of Scotland Castle and to a whisky distillery are available on these tours.

As we head into autumn, we have 'The Caledonian' from the West Midlands to Edinburgh. This is a great train through the lush green scenery of the Lakes and Scottish Lowlands, with *Tornado* climbing both Shap and Beattock en route. After a few hours exploring the historic Scottish capital, the train returns along its outward route.

We end September with a much-anticipated tour from Liverpool, *Tornado's* first from Lime Street, heading across the Pennines to York. 'The Jorvik Express' takes us along much of Stephenson's Liverpool and Manchester Railway and the beautiful Hope Valley, with the return along the Calder Valley line.

Our 2021 programme is rounded off with four extra special trains in October that see both *Tornado* and *Flying Scotsman* working across the Settle and Carlisle Railway. These trains have proved extremely popular and only Standard Class tickets remain on the trains from Tamworth and Birmingham (book now to avoid disappointment!), with the two Eastern starters now completely sold out. If you wish to travel on one of our sold-out trains, please contact the Booking Office to join the waiting list.

As always, bookings can be made online at a1steam.com/railtours or you can call the Booking Office on 01325 488215.

All that remains now is to welcome our passengers aboard - we look forward to seeing you all very soon! If you're not travelling, but are out to see our trains, remember to stay safe and share your lovely photos with us on social media. TCC

Mark Noble

***Tornado* is seen crossing the Forth Bridge with 'The Aberdonian'.**

CARBON NEUTRALITY – IS IT POSSIBLE FOR THE A1 STEAM TRUST? *by Graham Langer*

There has been much discussion recently about the Government's ambitious plans to reduce the UK's carbon emissions by 78% by 2035. This is probably not the place to debate the realism of such a target or how the country as a whole will be able to achieve it but we do need to consider how this will affect the operation of our steam locomotives and how the Trust might mitigate some of its carbon output. The environmental impact of rail and other modes of transport typically focusses on their contributions to greenhouse gas emissions, and thus their contribution to climate change. CO_2 emissions are typically used to quantify a transport mode's greenhouse gas contributions despite CO_2 having a smaller impact value per mass of pollutant than other greenhouse gases emitted by the transport sector (i.e. N_20 and CH_4). While the composition of coal can vary, calculations indicate *Tornado* produces roughly twice the weight CO2 as coal consumed and a hardwood tree needs to absorb two units CO2 to lock up one unit of carbon. This means, in rough terms, the coal used needs to be balanced by an equal weight of carbon sequestered for the operation of our trains to remain carbon neutral.

It is impossible to ignore the fact that steam locomotives consume coal and generate CO_2 but the total produced by the heritage railway movement in this country is tiny, the sector uses 26,000 tons of coal a year, producing 0.02% of the UK's CO_2 emissions. The less well-informed claim that we will be unable to get coal in the UK soon but as long as steel and concrete production continue in this country, industry will still require considerable amounts of the stuff! Parallel to this process is ongoing research to find an alternative to coal for the heritage industry such as torrefied biomass, "biocoal" and "subcoal" but, so far, this has failed to produce a worthwhile alternative. So, what else can be done?

"Carbon off-setting" is one of those buzz-word phrases used to prove a company's green credentials. Carbon offset schemes allow individuals and companies to invest in environmental projects around the world in order to balance out their own carbon footprints. This might involve rolling out clean energy technologies or purchasing and ripping up carbon credits from an emissions trading scheme or investing in re-forestation schemes. It is clear that a growing number of corporations understand that protecting and creating healthy forests are essential actions for companies looking to meet their overall carbon emission reduction goals, since forests sequester carbon. However, if not carefully designed and managed carbon offset projects can have the potential to negatively affect local communities and economies, and biodiversity and other natural resources.

The A1 Steam Locomotive Trust has been quietly running a carbon offset programme for many years with the aim of "banking" carbon in British hardwood plantations in an on-going environmentally friendly process that keeps the investment in the UK. The first of these woodland projects was established in Herefordshire in 1995, when *Tornado* was little more than a set of frames, encompassing 20 acres of new hardwood tree planting. Taking this as an example, if we assume that an acre of broadleaved trees can sequester between two and two and a half tons of carbon per annum, these plantations are locking up something like 50 tons of carbon a year and, since they were planted, they will have captured nearly 1,000 tons of carbon. A fringe benefit of this initial scheme was that one four-acre plantation was adopted as the very first clonal seed orchard to be planted by the Future Trees Trust, a project managed by the Earth Trust to improve the genetic base of native ash trees.

The Future Trees Trust is the only UK charity dedicated to improving broadleaved trees by conventional selective breeding. In just the same way that it's possible to breed better cows, pigs, wheat, apples and roses, it's possible to do the same with broadleaved trees. It takes much longer, but the results will be world changing. The research will make sure that the next generation of broadleaved trees produce better quality timber more quickly and will deliver all the environmental, social and economic benefits that they possibly can. By helping trees to survive longer, sequester more carbon and produce more timber more quickly, the trust hopes that more people will chose to plant broadleaved trees, with all the benefits they will bring to the environment, society and the economy. The recent spread of Ash dieback (a serious disease of ash trees caused by the fungus Hymenoscyphus fraxineus) has brought this work sharply into focus and the hope is that these plantations (the initial planting is now one of a dozen UK wide seed orchards) will produce a known clone that is resistant to the disease.

Graham Langer

What a difference 25 years can make. Here a plantation of ash trees (pictured right) has been added to an existing copse of oak.

Graham Langer

An area of scrub has been cleared and ash and wild cherry planted.

Graham Langer

Where a farm once had its muck heap, mixed Belgian and balsam poplars now thrive!

How can you help? We are seeking landowners among our supporters who would be willing to allocate new planting to the Trust's carbon offset programme. To future proof the process we would, ideally, be aiming to have at least 300 acres of hardwood forest in the scheme and although we have made a good start we need to add to the growing total to achieve this target. If you think you can help, please contact Graham Langer – graham.langer@a1steam.com – to discuss what you can offer us.

The Carbon Club! The only A1SLT club that doesn't need your money! TCC

Ken Richardson

The alternative to a carbon neutral future? *Tornado* as a static exhibit in a museum?

A1 ACCIDENTS *by Graham Langer*

Derailment at Tollerton 5th June 1950 – No. 60153 (later *Flamboyant*)

The headlines in the newspapers on 6th June 1950 could so easily have read, "Flying Scotsman wrecked!" had that train, by a slim margin, avoided the fate that was to befall the train following it on the East Coast Main Line. There is no record of which locomotive was hauling the up 'Flying Scotsman' that morning but we know all too well that the engine pulling the following service was Peppercorn class A1 No. 60153 (later *Flamboyant*) and that it came to grief in a spectacular fashion.

The scene

Tollerton station is about ten miles north of York on the East Coast Main Line and at this point the line is a four-track section, almost level and dead straight, running north to south. Tollerton signal box is in the middle of a section between Alne and Beningbrough boxes and on the morning of the accident it was switched out and its colour light signals were operating automatically, the lines being continuously track-circuited. During a period described as a "heatwave", the morning was already warm with the thermometer climbing into the high 80s after a week of very hot weather, the sky was clear and visibility good.

'The Flying Scotsman'

Into this scene came the 10:00hrs Edinburgh to King's Cross, up 'Flying Scotsman' consisting of thirteen vehicles and travelling at about 65mph. After passing Tollerton driver W. Etrington noticed that a brake application had been made and, after initially thinking the communication cord had been pulled, he quickly realised that it must be the guard and made a full brake application. Once the train had come to a stand, at about 14:20hrs, Etrington looked back to see the guard, G. Olney, examining the rear coaches of the train and asked his fireman, T. Atkinson, to go back to find out what was amiss. Olney mentioned to Atkinson that the brake coach had given a lurch and its cell box was broken and that the third vehicle from his end of the train had its dynamo belt adrift, possibly through hitting some obstruction on the track. Having cut the remains of the belt free and shown it to Atkinson, Olney walked with him to the locomotive, the fireman continuing to the next signal to 'phone control and ask that the coaches be examined at York (not a booked stop for this service). It appears that on his way back to his van, Olney told a platelayer what had happened and the latter, who had a bicycle, said he would go back and inspect the track. The train restarted at about 14:27hrs and proceeded to York.

On arrival at York, carriage and wagon foreman Appleby was ready to examine the rear vehicles of the 'Scotsman' and Olney told him that he "had been violently thrown about and it seemed as if he had been off the road". Appleby got the impression that something quite abnormal had occurred and went to look at the coaches. The bogie solebars of the rear brake van were seriously distorted and there was sufficient damage to the rear two vehicles to warrant removing them from the train as unsafe to run. It was Appleby's opinion, and that of the chief foreman, J. Gladders, that the affected vehicles had been subject to very violent oscillation.

The signalmen

Relief signalman B. Lacey was on duty in Alne signal box when the up 'Flying Scotsman' passed at 14:07hrs, shortly afterwards he was informed by his colleague in Beningbrough box that the train had stopped in section and therefore he placed the signal immediately behind it at danger and the others at caution. At 14:24hrs he was offered the 12:15hrs service by Pilmoor South box on the main line but on informing Beningbrough was told that the 'Scotsman' was on the move again. However, to be sure, he contacted Control to ask whether the express should be turned onto the slow line but was told to send it along the main line. He therefore cleared the signals and the 12:15hrs express which had slowed to about 10–12mph, passed his box at about 14:29hrs.

Lacey's colleague in Beningbrough box, E. Kettlewell, was offered the up 'Flying Scotsman' at 14:06hrs and accepted it. By 14:13hrs he realised that it was overdue and noticed two of his track circuits were occupied and remained so. He therefore asked Lacey to hold subsequent trains with a view to diverting them onto the slow lines, however, at 14:21hrs the track circuits cleared and the train was obviously on the move again passing his box at 14:26hrs; two minutes later he was offered the 12:15hrs express and accepted it on the fast line. At 14:33hrs Kettlewell received a 'phone call from a platelayer from a signal (U6) stating that the guard of the 'Scotsman' had reported that he thought his train had hit an obstruction and that he, the platelayer, was relaying this information to Kettlewell; a minute later Kettlewell received "Obstruction Danger" on the block bell.

No. 60153 and the 12:15 Express from Newcastle

– The driver of the A1, William Streeton of York, had joined his present link in February 1949 and had covered this section of line a number of times shortly before this June day. In his evidence he recalled seeing signal U12 at Alne showing a double-yellow aspect so he shut off steam and immediately reduced speed. The next automatic signal, U11, was showing a single yellow but beyond this, signal U11B, a controlled signal, cleared to green so he put on steam again, passing the latter signal at about 25mph. The train's speed had increased to about 35mph as it passed Tollerton station but immediately after passing under the bridge at the north end of the station he saw that the track ahead was distorted, just 60 – 80 yards ahead of the locomotive, the rails describing an 'S' shape, first to the left and then to the right. Streeton at once made a full brake application but this had little time to arrest the train's progress before it was derailed to the left. Streeton's fireman, Brian Carr, also from York, realised something was up as soon as the brake went in and, looking ahead, saw that the track was kinked and felt the locomotive go over to the left. The train's guard, F. Hobman, noticed the brake application just before he was thrown to the floor of his van and was unable to regain his feet until the train had come to a stand.

Thankfully the 12:15 Express had not been travelling at its

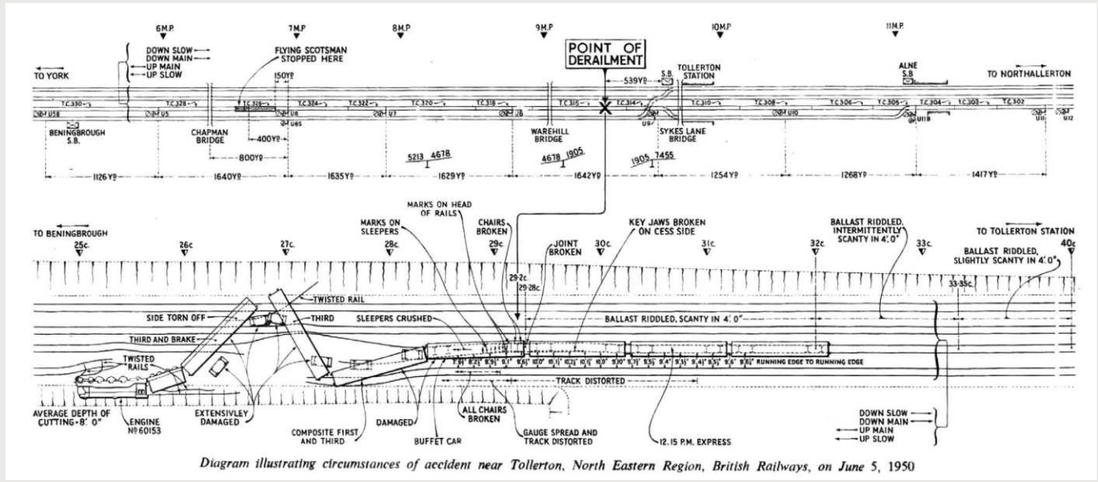


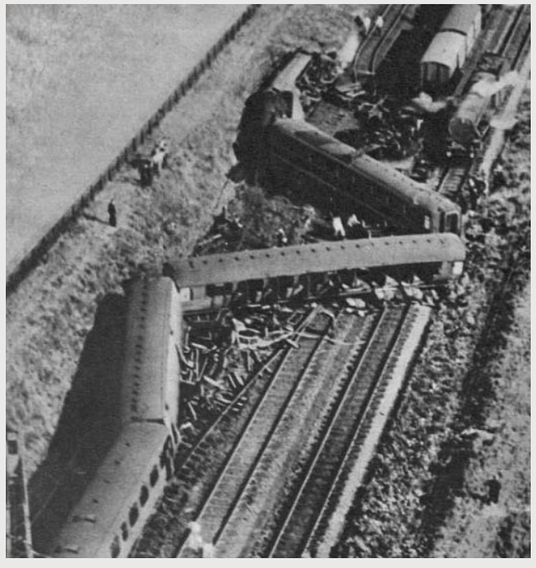
Diagram illustrating circumstances of accident near Tollerton, North Eastern Region, British Railways, on June 5, 1950

British Railways courtesy of NERA

A diagram of the accident taken from the Ministry of Transport Report.

usual speed at this point, normally about 65mph, and the brake application may have made some further reduction before the train came to grief. The A1 was completely derailed and fell onto its left-hand side, coming to rest against the side of a low cutting at an angle of about 45 degrees having cut through the adjacent slow line in the process. Built at Doncaster and outshopped in BR express passenger blue livery on 26th August 1949, No. 60153 was one of the roller-bearing fitted members of the class, by the time of the accident it had accumulated about 66,000 miles and was in tip-top condition and sustained surprisingly little damage. Consisting of seven coaches, the all-up weight of the train was some 400 tons (of Gresley teak stock) and the leading coaches jack-knifed across all four lines; the first coach, a corridor brake third with a welded underframe, turned on its side, losing much of the right-hand (corridor) side and the body separating from the underframe before it ended up across all four tracks with one end crushed against the locomotive's tender. The second (third class) corridor coach, derailed to the right, also ending up across all four lines and, again, lost most of its right-hand side although in this case it was the compartment side that was torn off, whilst the third vehicle, a Gresley corridor composite, derailed to the left, ending up across the slow line. The fourth coach, a restaurant car, and the rest of the train remained upright and more-or-less in line and sustained mainly superficial damage compared to the three leading vehicles.

Extricating himself from his stricken locomotive, driver Streeton, despite his injuries, set about protecting the Down lines with detonators and his fireman tried 'phoning the signal box without success, whilst the station master at Tollerton, realising an accident had occurred, opened the locked signal box and sent the "Obstruction Danger" code to the neighbouring boxes. The driver and fireman of No. 60153 and nine passengers were injured in the crash (one badly enough to require a stretcher) and were removed by ambulance to a hospital in York but none were detained. The remaining 100 or so passengers were conveyed by bus to York and the clearing up operation commenced at once. Needless to say there was considerable disruption to East Coast Main Line services with passenger trains diverted via Starbeck and Senderby and freight traffic held. Breakdown cranes and crews attended from



Yorkshire Post

An ariel photograph of the accident before recovery work commenced, taken by a *Yorkshire Post* reporter on the day of the accident.

Darlington and York, the Down slow line was re-opened for traffic 23:40hrs the same night, the Up and Down main lines by 08:00hrs the next morning and the Up slow by midday on 6th June after a total interruption of just over 26 hours. No. 60153 was sent to Doncaster for a 'Heavy Casual' repair, the only consolation being that following this work the locomotive left 'The Plant' bearing the name *Flamboyant*.

Speaking to The Yorkshire Post after the accident, driver Streeton said, "If there is a lucky man in this country tonight, I am that fellow, and that must also apply to my fireman and the passengers in the train. When I saw the bent line only a short distance away, there was nothing I could do except apply the vacuum brakes. After I put the brakes on it was simply a matter of waiting for the best or the worst."

R. Denny/NERA

No. 60153 rests against the cutting side after crossing the slow line and toppling over.

The enquiry and its conclusions

It is clear from the above that track distortion was to blame for the damage to 'The Flying Scotsman' and the derailment of the 12:15 Express. Colonel D. McMullen, Inspecting Officer for the Ministry of Railways headed the subsequent enquiry. Having gone through the statements and evidence provided his conclusions were as follows. It was apparent that there had been a failure of the expansion gaps between the 60' length rails, had the rails been able to take up the slack in these joints the track should have been well-able to cope with the high temperatures present during that week. In normal conditions the gap in these rail joints will vary between 1/2" (at 50 – 75°F) and closed (at 100°F) and the recorded rail temperature that day was 104°F, within normal parameters for well-maintained expansion joints. Despite the issue of "hot weather instructions" there was evidently a deficiency in the slackening off and oiling of the fishplates and fishbolts along this section of the line, compounded by "burring" of the fishplates. Colonel McMullen conducted a track inspection on 7th June when the weather was just as warm, during which slackening of the fishbolts caused the rails to "jump" and hitting the fishplates made them "jump" a second time, effectively closing the gap, proving that some of the joints were "frozen" and incapable of expansion. Careful examination of the fishplates and fishbolts revealed "bulges" at the fishbolt holes which prevented proper metal to metal contact between the plate and the rail and compromised the effectiveness of oiling in keeping the joint operable. Collectively these faults had resulted in a considerable length of track that was unable to absorb the heat of the sun without distorting, a problem that was compounded by some places having recently riddled ballast and others where the depth of ballast was insufficient to resist the lateral movement of the track.

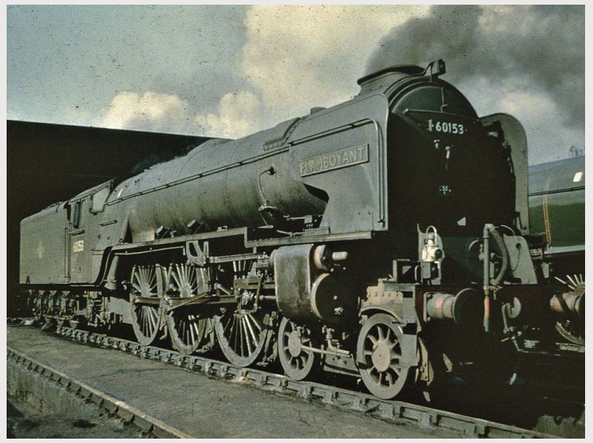
A. B. Compton/Ken Hoole collection

Another photo from a different angle.

NERA

Recovery operations looking south. The steam crane is lifting the third coach of the train, its arc reduced by the automatic colour light signals (mentioned in the text).

Colonel McMullen considered that the passage of 'The Flying Scotsman' had provided the required thrust and vibration that exacerbated the undue compression in the rails and released the locked-up stress in the track. The principal cause was a deficiency of maintenance, exaggerated by the heat of the sun and ganger Barnaby, whose length this was, came in for criticism on this point, as did his superior, permanent way inspector Bailey, who had been reminded of hot weather precautions by the district engineer on 27th May. McMullen also censured guard Olney of the 'Scotsman' for failing to realise the seriousness of the vibration of his van and down-playing its significance instead of reporting it from a lineside 'phone or at the next signal box. Colonel McMullen also had reservations about the use of automatic signals and the practice of switching out boxes, stating that if Tollerton signal box had been manned the accident might have been prevented. In the meantime, the trap was set and was simply waiting for the 12:15 Express to spring it…… which it duly did, much to the detriment of No. 60153!



Richard Greenwood

In happier times, this undated photo was taken at the end of *Flamboyant's* career at Top Shed.

This article was compiled from the official Ministry of Transport report of the accident and from local newspaper articles written at the time, with contributions from members of the North Eastern Railway Association and Alison Grange of the Darlington Railway Museum Study Centre.

We are preparing an article about the last two serious accidents involving A1s, the collision at Offord 7th September 1962 involving No. 60123 H.A.Ivatt and the collision/derailment at North Otterington (Near Northallerton) 16th January 1964 which ended No. 60120 Kittiwake's career. Any information about these crashes (or photographs) would be appreciated for TCC 62. TCC

A1 PROFILE - No. 60132 *MARMION* *by Phil Champion*

Chris Nettleton

***Marmion* is captured at Brafferton in December 1963.**

No. 60132 was one of the early A1s, part of the initial Darlington Works build comprising Nos. 60130 – 60152, the order for which was issued in January 1947. Works No. 2051 was noted there on 10th September 1948 fitted with boiler No. 3913. It was one of five to be completed in October (two at Doncaster and three at Darlington) and was preceded by two Doncaster and two Darlington examples. It joined No. 60115 at Gateshead shed and entered traffic on 18th October and with more A1s delivered over the next year it was one of a total of thirteen A1s shedded there at that time.

Gateshead A1s were noted for their long spells there, No. 60132's allocation of 11 years and 7 months was slightly above the average for those thirteen. First sightings were on the 23rd at Darlington, there again on the 30th with an up passenger train then the 20:10hrs Leeds-Darlington train on 3rd November. The locomotive was in the early BR livery of apple green with white and black lining and the owner's name spelt out in white capital letters on the tender. Along with fifteen other Darlington-built A1s the numbers and letters were in old gold. The new engine travelled along the East Coast Main Line (ECML) between the two capitals. On 20th and 30th December No. 60132 hauled the 13:15hrs from King's Cross while on 2nd April 1949 it was on Haymarket shed. Its first named train was the Up 'Flying Scotsman' from Newcastle on 8th June 1949. A failure was a diverted Edinburgh-King's Cross train on 11th September when No. 60132 failed at Stockton. A V2 was substituted on the fifteen coach train while B1 No. 61220 took No. 60132 to Stockton shed. Eleven days later No. 60132 entered Doncaster Works for general repairs. It was from there that it reappeared in BR blue with black and white lining in early November. It was one of two such A1 repaints that month, joining another repainted earlier plus the thirteen which had carried that livery from new.

Though No. 60132 was one of the early class members, over half of them (28) had been named when it became *Marmion* in December 1950 (when three others were also named). This is one of a number of A1s to have names from Sir Walter Scott's writings. It comes from an epic poem published in 1808 about the Battle of Flodden Field in 1513 when English forces decisively defeated the Scottish army. It follows the exploits of Lord Marmion, a favourite of Henry VIII, on and off the battlefield. Marmion was killed in the battle. A general overhaul, with the fitting of boiler No. 29865, including a repaint into BR green with orange and black lining with the early emblem came in March 1952, again about halfway through the class being so repainted. A variety of work was done by No. 60132, it ranged from the 17:19hrs Leith Walk/Niddrie-Marylebone goods as far as Newcastle on 21st August 1950, a down special from King's Cross seen at Stockton at 16:00hrs on 14th October 1951 to a parcels from King's Cross on 13th March 1952. Two runs with the Up 'Flying Scotsman' were noted in summer 1951, the first seen at Grantham but the second on 6th June was

Peter Townend

No. 60132 *Marmion* on an up express near St. Neots, 2nd June 1951.

David Hamilton

In final condition, No. 60132 is seen at 'Top Shed' on 17th June 1962.

when *Marmion* failed at Doncaster and B17 No. 61635 took over. A further 'General' in July 1953 saw the locomotive equipped with boiler No. 29814. As well as travels along the ECML No. 60132 reached Carlisle on 2nd August 1953.

Between 1953 and 1959 *Marmion* was recorded on a lot of named trains, particularly in 1957. The 'Flying Scotsman', 'Night Scotsman' and 'North Briton' featured a lot plus 'The Heart of Midlothian', 'The Aberdonian', 'The Tees-Tyne Pullman' then later 'The Talisman' and 'The West Riding'. Some of these were Up workings into Newcastle or down from there. After a general overhaul in April 1955 (boiler No. 29812) work included the up 'Flying Scotsman', worked as far as Grantham on 23rd December 1955, returning on the 17:40hrs ex-King's Cross up to Newcastle. On 25th, 27th and 30th September 1957 it worked the 'Night Scotsman' into King's Cross. It was often the practice for King's Cross shed to use Gateshead A1s on a return trip to Peterborough or Grantham. The diagram for *Marmion* for 3rd January 1957 illustrates this. It arrived at King's Cross at ➤

06:20hrs on a train from Edinburgh, left at 10:45hrs on a passenger to Grantham, returned with the up 'Flying Scotsman' then departed for Newcastle at 22:15hrs with 'The Night Scotsman'.

Along with this prestige work was the normal variety for the class of passenger, parcels and goods, but notable were two arrivals at King's Cross with the sleeper train. Some of No. 60132's workings were via the Durham coast line like the 16:15hrs from Newcastle bound for Liverpool. Not prestigious but still important traffic was the up fish train seen passing through Newcastle on 21st January 1957. After hauling a down goods into Newcastle on 27th April *Marmion* was later seen pulling just a brake van past Usworth where the combination was also seen on 17th May. The engine was on its travels when it hauled a King's Cross–Glasgow through a diversion via Bishop Auckland on 19th May 1957 and when on 29th June it took the 07:40hrs Sunderland–Bristol as far as Sheffield, returning on the 08:30hrs ex-Cardiff back to Newcastle. A further overhaul in April 1958 saw the locomotive equipped with boiler No. 29834 and during this period, in August 1958, the later BR crest was placed on the tender, being one of the last to be so fitted.

After attention at Doncaster in November 1959 (boiler No. 29836 fitted), a change of shed came in May 1960 when No. 60132 was one of a quartet of A1s transferred across the Tyne to Heaton along to join three already there and another five which came later to give a dozen for a while. Heaton A1s usually worked to Edinburgh, York and Leeds so its sphere of operation remained largely the same but with a few workings beyond. Examples include an additional train from Newcastle on 28th May at 12:10hrs for King's Cross, an extra Edinburgh-King's Cross train into Newcastle at 16:10hrs on 13th August and the Up 'Northumbrian' from Newcastle as far as Peterborough on 3rd April 1961. It was seen at Haymarket and York sheds but also Carlisle Citadel station and Copley Hill shed. Its final general overhaul took place during September 1961 when it acquired its last boiler, No. 29811, and was followed by a journey outside its normal area on 7th November 1961 when it hauled the 16:03hrs Edinburgh–Perth. *Marmion* took the 2S52 13:28hrs from Carlisle to Edinburgh on the 21st and 24th of April 1962. It was seen at Stockton on 29th June with an extra through South Shields–King's Cross train. Named trains were still pulled like the Down 'Heart of Midlothian' from Newcastle on 25th May, the Up 'Norseman' on 16th June from Newcastle then the Edinburgh–Newcastle leg of the Up 'Queen of Scots' on 25th July. Its travels took it further again when on the 28th it left Newcastle with the 1F56 10:46hrs train for Glasgow and was seen in Fife next day on Thornton Junction shed.

Cedric Clayson

***Marmion's* driving wheels at Doncaster during its final overhaul there.**

On 9th September 1962 *Marmion* and ten other A1s were transferred to Tweedmouth. It worked a number of trains south to Tyneside and beyond like the afternoon Heaton–Thornaby goods on 11th September, the 2G85 Berwick–Newcastle four days later and the up seed potatoes on 4th and 20th December. Northbound workings included the 1S31 York–Edinburgh train as far as Newcastle followed by the 2G85 Newcastle–Berwick stopping train on 28th November and the afternoon York–Newcastle parcels on 7th December. Workings in Scotland were usually as far north as Edinburgh such as the 1N21 18:30hrs Edinburgh–Newcastle train on 19th July 1963 but earlier, on 14th April No. 60132 had reached Perth shed. Rather more prestigious work was hauling the down 'Anglo-Scottish Car Carrier' from Newcastle on 22nd August. Its travels included a sighting each at Copley Hill and Carlisle Kingmoor sheds. Mundane but essential was the ballast train it hauled tender first at Tyne Yard on the morning of 28th December, more unusual was the 6S50 16:20hrs Carlisle–Portobello train on 4th May 1964. June showed several typical A1 runs of that time with Berwick–Newcastle and return trains. Other main line trains were still worked like the 10:10hrs Edinburgh–King's Cross passenger train brought into Newcastle on 13th June and the 3S46 York–Edinburgh parcels brought into Newcastle on 23rd July.

A final move back to Gateshead shed was made on 6th December 1964 along with four other A1s to join the trio already there. A mix of passenger and goods work was done in No. 60132's final months in traffic. Two days later it was on an up Class 8 at Newcastle around midday and a Down Class 4 express goods from Newcastle on 17th February 1965. A passenger working was the 1N84 ex 13:40hrs from Bristol into its Newcastle destination on 22nd January. Later it had been to Edinburgh as it was seen on St. Margarets shed on 27th February. On March 11th it was taken from Gateshead shed to Tyne Dock shed for storage but was returned to Gateshead on 2nd May. Its final recorded working was on 7th May when it hauled the 2G85 Berwick-Newcastle and return. *Marmion* was withdrawn on 14th June and was noted at Tyne Dock shed yard on the 26th. It was one eight A1s withdrawn that month. In July it was one of four sold to breakers Hughes, Bolckow of Blyth, Northumberland. It was last seen there on 21st August.

Although No. 60132 was one of the early class members, over half the class had already been withdrawn when it finally came out of traffic. It was in service for 16 years and eight months, about a year and a half longer than the class average. During its time it had been fitted with eight boilers, all of them diagram 118 designs.

This history was compiled by Phil Champion based on a database compiled by Tommy Knox and with reference to the RCTS book "Locomotives of the LNER Part 2A" as background. Revised and updated by Graham Langer – June 2020. TCC

BLOWN AWAY BY A *TORNADO* *by Joanne Crompton*

21st September 2011, a day that will be etched into my mind forever. It was a fresh summer morning, and I was on my normal daily commute from Leyland to my workplace in Preston. As I made my way to the platform, I saw something which made me stop in my tracks and my heart flutter, for there on the opposite platform stood something I had never seen before in my entire life, a full-sized steam locomotive.

As I boarded my train and travelled to Preston, I could not get the image of this steam locomotive out of my head and when I arrived at Preston, I decided that I was going to be late for work that day, I just had to see this steam locomotive again and I waited in anticipation for it to arrive. Shortly this stunning locomotive came to a stand at Platform 7 and I was instantly transported back to my childhood, for my grandfather had been a keen modeller and regularly ran his 3.5" gauge engines. My grandfather had passed away when I was still a child, but at that moment with every sound and smell of that steam locomotive, he was stood right there with me. I discovered that this huge and magnificent locomotive was numbered 60163 and was named *Tornado* and bore the headboard 'The Caledonian Tornado'.

As I stood among the excited crowd of onlookers, watching the footplate and support crew bustling around and going about their tasks, I noticed the Fireman climb up onto the footplate and begin to shovel coal into the fire. Curiously I pushed my way closer to the engine and watched, I was absolutely mesmerised, and at that very moment I decided that I wanted to become a Steam Locomotive Fireman.

By April 2012 I had joined Ribble Steam Railway in Preston, Lancashire as a Cleaner and in June of that same year, I went for a visit to the East Lancashire Railway, Bury, Lancashire and by March 2013, I had joined up and became a Cleaner in the steam department there. On the 20th September 2015, almost four years to the day since that chance encounter with *Tornado* at Preston, I made the grade as the East Lancashire Railway's first ever female Passed Cleaner. By December 2017 I had made Fireman grade. In August 2020 I also went on to become a Fireman at the Llangollen Railway. During 2015 to 2017 I was also fortunate enough to be involved as a Mainline Support crew and travelled on trips over the Settle-Carlisle and West/East Coast main lines, learning so much along the way.

Rory Lushman

Joanne sits atop a J94 saddle tank on the day she became a Passed Cleaner on the ELR.

Since that fateful day in September 2011, No. 60163 and I have crossed paths now and again, she visited the East Lancashire Railway in 2018, but I unfortunately never got the chance to fire her. She will always have a special place in my heart since without her I would not have pursued my dream and I would not have achieved what I have. She ignited a passion within me that has given me so many wonderful experiences. I am very much involved in the railway world now, I am the Treasurer for the Bury Standard 4 Group, Bury and the Friends of the Settle & Carlisle Line and I am excited to see that No. 60163 will be hauling trains over the Settle & Carlisle line soon!

No. 60163 is an engine of our time, created and funded by the dreams of many and built with the passion of the A1 Trust volunteers, preserving our heritage for the future. One day I hope to get a chance to fire her, maybe one day I will get to thank her for all she has enabled me to achieve, maybe one day... TCC

Peter Fitton

Where it all started. *Tornado* rolls into Preston Station with 'The Caledonian Tornado' on 21st September 2011.

Joanne Crompton

Joanne's ambition, to be back in the cab of No. 60163! A photo taken during *Tornado's* stay on the ELR in 2018.

Alan Weaver

Signs of spring! During her positioning move to Barrow Hill from the NRM, *Tornado* is seen in Sheffield in the pouring rain on 11th May.

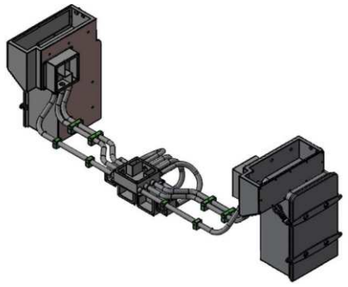
P2 ENGINEERING UPDATE *by David Elliott*

General

Good progress has been made on several fronts, although we are still encountering problems with externally ordered components. Covid-19 is still affecting our suppliers but as the vaccination programme proceeds and the lock-down is progressively lifted, conditions are improving.

Frames

The "shelf" across the outer frames under the cab has been fabricated and fitted which has enabled the electrical boxes which will carry the umbilical connections to the tender to be trial fitted along with the associated conduits. The frames are now substantially complete.



A 3D CAD of the conduit design for the "shelf".

A1SLT

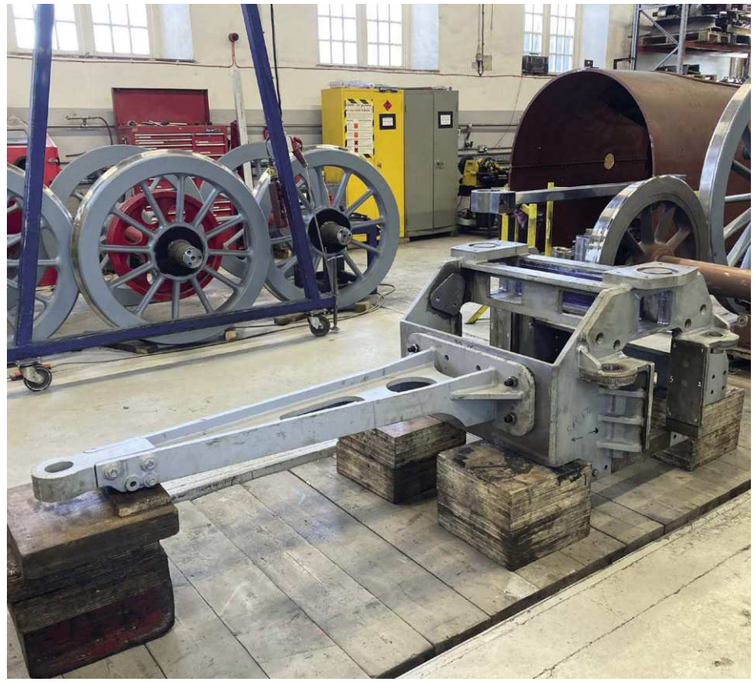
The "shelf" under the cab, ready for conduit fitting.

Pony Truck

We have at last received the pony truck from North View Engineering Services (NVES), with the knowledge that there would be some final adjustments to clearances in the hornblocks which we would undertake by using Ian Matthew's capabilities with precision angle grinding. However, having carried out a detailed geometrical survey, it appears that too much material has been removed from a pair of the manganese steel hornblock side liners which will require them to be replaced. Replacement liners are on order and the main pony truck frame has been returned to NVES for rectification.

The crosshead which transfers the sideways forces in the pony truck to the engine frame has had some minor machining carried out at DLW and is now a satisfactory fit in the main pony truck frame.

The steering arm is also satisfactory – we still need to complete fitting of the eye which forms the bogie pivot – this was deliberately excluded from the main manufacturing order for the pony truck to enable us to make any minor adjustments when the pony truck is trial fitted to the engine frame to correct for any cumulative manufacturing and assembly tolerances in the engine frame structure.



A1SLT

The pony truck, delivered by NVES.

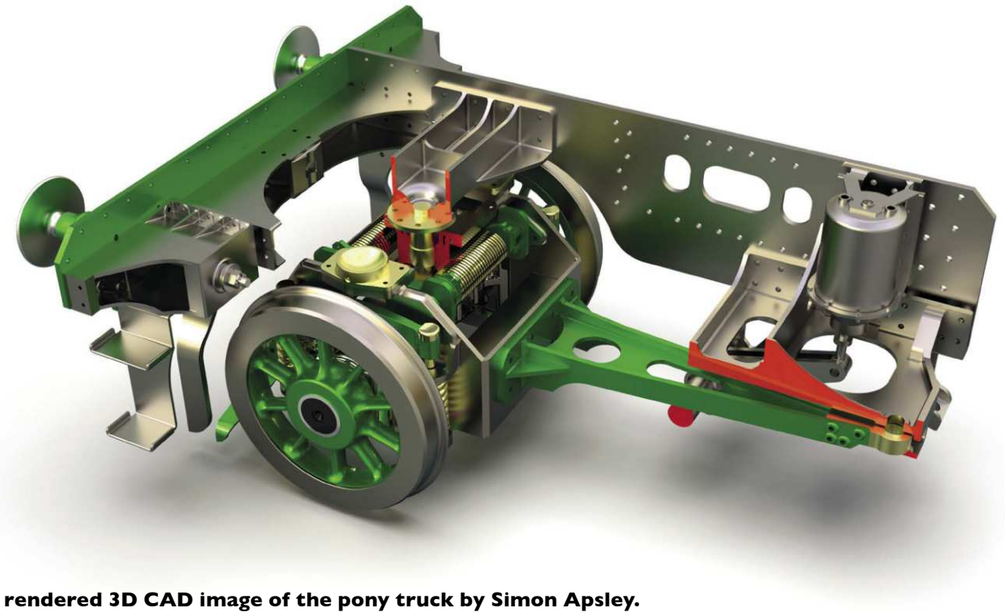
Meanwhile materials have been obtained and Ian is machining the detail parts for the side control spring assemblies.

An external machinist has been contracted to machine the bogie spring planks which will complete the bearer spring details (with the exception of the rubber secondary springs which we will order for the entire locomotive nearer completion so as to ensure maximum service life as the natural rubber they are made from perishes over time).

Daniela has continued the Finite Element stress analysis work (FEA) on the pony truck in collaboration with Ricardo Rail to demonstrate that it complies with current railway standards as far as is practicable

Daniela Filová

Pony truck side control profiles.



Frewer & Co. Engineers

A rendered 3D CAD image of the pony truck by Simon Apsley.

Boiler

Meiningen continues to make good progress with both the boiler for *Prince of Wales* and the spare for both engines.

The team at the Deutsche Bahn works in Meiningen have been working diligently despite the restrictions Germany has experienced, and continues to experience, because of Covid-19. There have been some inevitable delays because of this but nothing that causes any overall programme issues.

Work is approaching the final straight with the first of the two boilers. Processes such as X-Ray testing and the like on the welds is underway before annealing works, final tubing, stay works and such like before a hydraulic test which will take place in late June. Given other programme works the plan is now to deliver the first boiler to the UK in September and for it to go onto *Tornado* and the second boiler to arrive before Christmas to go onto *Prince of Wales*.

DBM

One of the boilers being assembled at Meiningen.

Under assembly, the regulator stuffing boxes viewed from the boiler side.

Assembled regulator stuffing box for hydraulic testing.

The polished regulator handles.

The regulator cross-shaft squares.

Photos: Daniela Filová

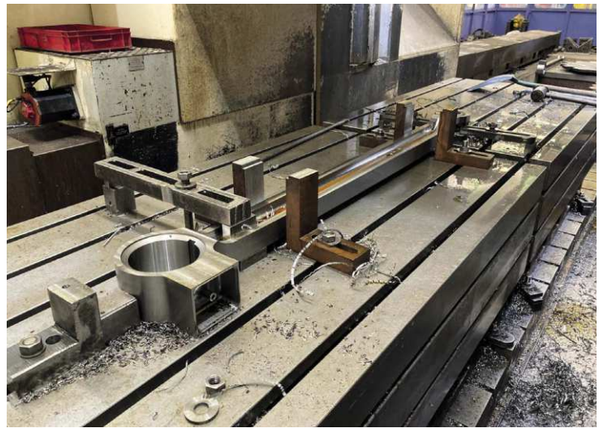
Two regulator cross shafts and stuffing boxes have been completed by Ed Laxton and following successful hydraulic testing of the stuffing boxes, have been sent along with the "Everlasting" blowdown valve and the boiler blanking plates to Meiningen for them to install the complete regulator mechanisms in the two boilers they are constructing, and to carry out the hydraulic test of each boiler prior to delivery.

The shipment has caused our shipping agents some head scratching as the post Brexit regulations concerning temporary exports are a bit vague! The components will be returned to the UK when the boilers are delivered.

A trial fit of the regulator handle.

Motion

The first of the trailing coupling rods has been delivered from Stephensons of Atherton near Manchester and has been subjected to the usual treatment by Ian to remove machining marks and apply a high polish. Some hand work has been undertaken on one of the taper holes in the gradient pin end of the rod as it has turned out slightly oval – more than likely due to residual stresses in the rod. This was achieved by using a taper plug gauge turned up by Ed Laxton initially to detect where high spots existed and then as a lapping tool using fine grinding paste. This latter process will have to be repeated when the gradient pin is made to ensure that both the inner and outer taper make full contact at the same time which is normal practice when this type of pin is fitted.



The final trailing coupling rod is machined at Stephensons.

Bushes fitted to the coupling rods.

A1SLT

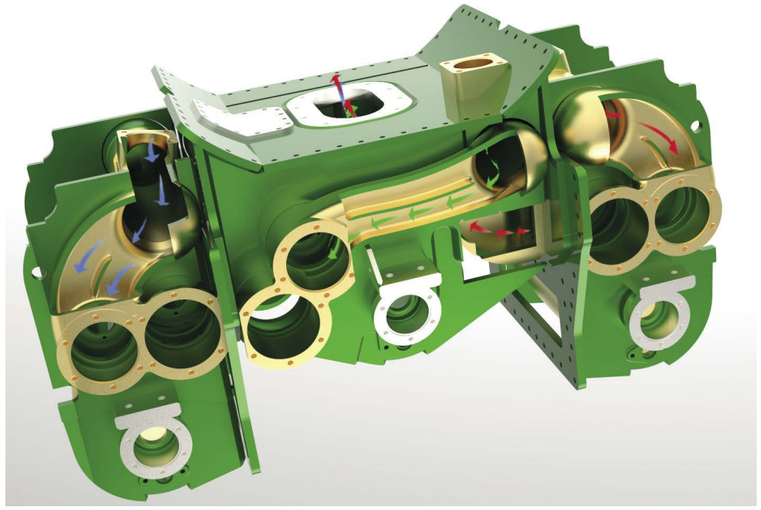
Unfortunately, Stephensons suffered a tool breakage when carrying out the final operation to insert a keyway into the same tapered hole in the other rod which created a deep gouge which, due to its high stress location, could not be repaired. They have since worked with commendable speed to forge and machine a replacement which has just arrived at DLW. Now we have all the coupling rods, the remaining crank pin bushes the four gradient pins will be manufactured and fitted.

Cylinders and valves

A shortlist of companies has been selected from those who submitted responses to the request for Expression of Interest (EOI) has been prepared and formal Requests For Quotation (RFQ) sent to them. We have received a number of quotations and have been reviewing these with a view to choosing a preferred fabricator for the cylinder block and are presently assessing these offers. We have been dealing with a number of queries and clarification and have paid visits to the companies which are new to us to assure ourselves as to their capacity and expertise to produce what is a large and complicated fabrication. The chosen supplier is expected to be selected during early May. It is likely that some detailed design changes will be made to make fabrication easier.

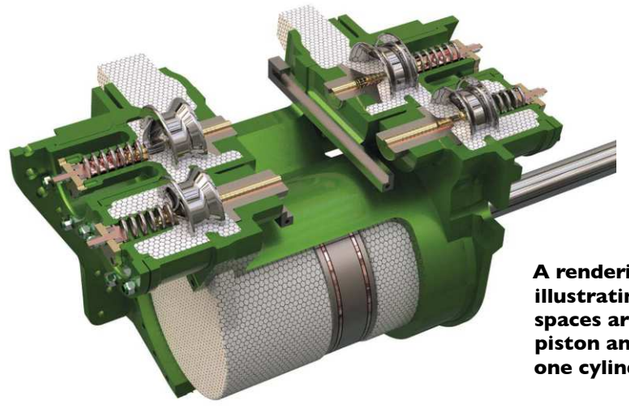
Martin Shepherd has continued to develop the valve gear and reversing mechanism and has made a link up with the Warwick University Manufacturing Group (WMG) who have kindly offered to 3D print a one third scale model of a cam box which will have windows in it so that its operation can be observed. This will be of considerable help to sort out detailed design areas prior to ordering what will be expensive components.

We are also receiving useful metallurgical advice for the highly stressed components from WMG.

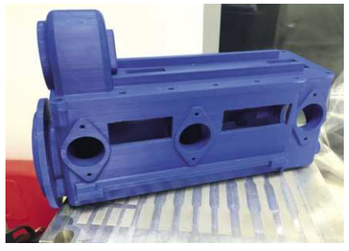


Simon Apsley at Frewers just can't help himself! Here is his superb rendering for the flow analysis conducted by his firm on the cylinder block.

Simon Apsley/Frewer & Co. Engineers

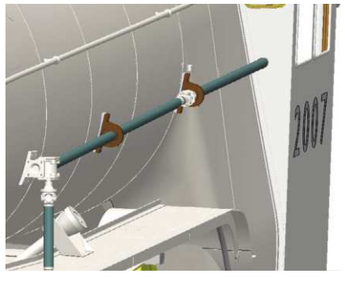


A rendering illustrating the steam spaces around the piston and valves of one cylinder.

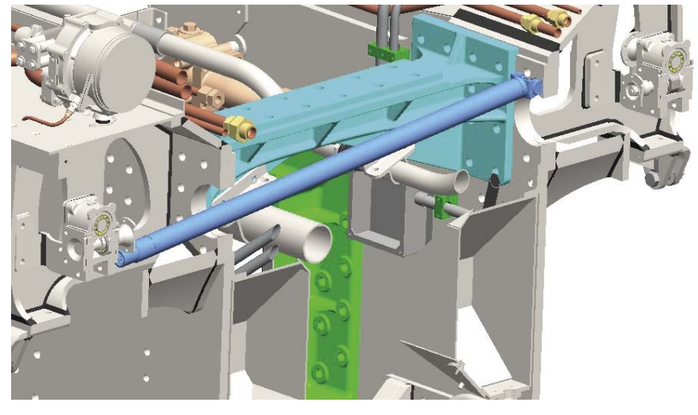


Martin Shepherd

The 3D printed cambox.



A 3D CAD of the reversing gear.



Martin Shepherd

The cardan shaft that transmits the reversing movement across the chassis.

Martin has also been developing the design for the reversing gear back to the cab including detailed design of the cardan shaft which crosses the engine frames to ensure that we can get it in and out without having to remove the gear boxes on each end. We are about to try this using a scaffolding pole with a flange welded on one end to on the actual engine frames to cover the possibility that the pipework is not quite where Alan Parkin's 3D CAD suggests it should be. (Please see Martin's article on page 29)

Brakes

Two of the recently acquired brake cylinders have been installed and connected to their cross shafts enabling Alan Parkin to complete the air pipework design to them.

The six Y-shaped brake hangers have been completed and trial fitted to the frames along with their brake stays. Further work on fitting the brake pull rods is on hold until we next put the wheels under the engine, as the length of these rods will be checked and adjusted in situ with a full set of brake blocks fitted pending finally welding the forked ends onto them.

Cylinder drain cocks

Ed Laxton has started machining the bodies and internal parts for eight cylinder drain cocks (six for the engine and two spares).

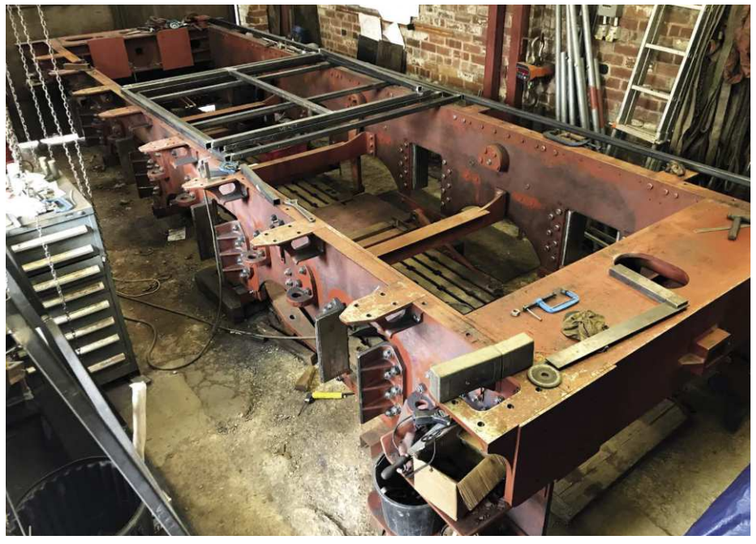
Above: A trial fit of the brake hangers.

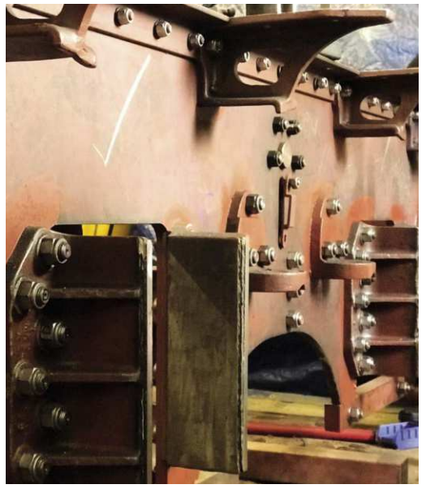
Daniela Filová

Right: Ed Laxton machining the cylinder drain cock.

Tender

Further progress has been made on detail parts for the tender frames by I D Howitt at Crofton, mostly for the brake gear. Two brake cylinders have been delivered to Crofton and are being fitted to the frames. Work is in had to find a contractor to balance the tender wheels prior to fitting the cartridge roller bearings to the axles.





Photos: Daniela Filová

Pictured above - good progress on the tender frames at Ian Howitts.

Pipework and fittings

Ian Matthews has made significant progress with the pipework between the frames with most of the metric pipe runs for air and train heating steam completed as far back as the front of the firebox. Almost all the imperial pipe copper pipe has been delivered along with a significant quantity of bronze bar for manufacturing LNER style cone joint fittings and with the air pumps now in place, a start has been made in laying out the steam pipes. The pump exhausts have been connected to the exhaust steam injector exhaust pipe which we used on *Tornado* with complete success.

Meanwhile we have largely completed the detailed drawings for the cylinder block, Alan has been producing the remaining detailed drawings for pipe runs between the frames.

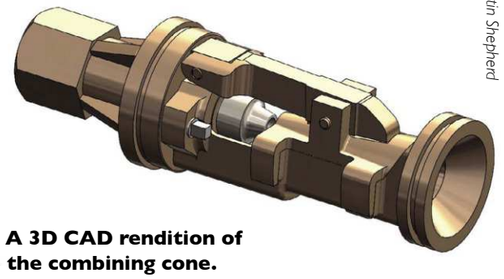
A major component which we still need to source is the exhaust steam injector. *Tornado* has been running with the overhauled Davies and Metcalfe class H injector obtained from the Sir Nigel Gresley Locomotive Trust which became available following their decision to fit a second live steam injector, as for a locomotive which spends a high proportion of its operation at low speeds on heritage railways, the environment is not good for an exhaust steam injector and little or none of the normally anticipated coal and water savings are achieved. However, with most of *Tornado*'s and *Prince of Wales*' work being planned for the main line, the coal and water savings of up to 7% are worth having.

There are still a few class H injectors available, however their condition is such (and the one on *Tornado* is heading that way) that there is little life left in the main injector bodies.

Given this position, we made a decision some time ago that the best option would be the final development of the exhaust steam injector – the class K. These were fitted to BR standard locomotives including Britannias, class 5s and No. 71000 *Duke of Gloucester*.

Drawings for the injectors are few and far between, so to ensure that we could build injectors that worked and any of the internal parts, thanks to Locomotive Services Ltd at Crewe we have been able to borrow and dismantle the class K injector from No. 70000 *Britannia*, currently undergoing overhaul at Crewe.

This has enabled us to "reverse engineer" the injector by producing a detailed and accurate set of 3D CAD models of the body (by David Elliott) and all the innards (by Martin Shepherd), from which 2D manufacturing drawings can be produced. We are fortunate to have secured the loan of pattern equipment for a class K body from the No. 71000 *Duke of Gloucester* group. However, before we have castings made the patterns need a "once over" against our new drawings to make sure they are complete and accurate.

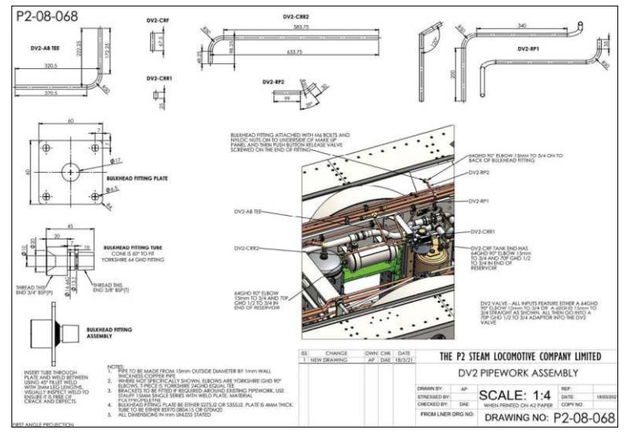


Martin Shepherd

A 3D CAD rendition of the combining cone.

A I SLT

Yards of gleaming (for now!) pipework have been fitted between the frames.



David Elliott

Drawing P2-02-068 of DV2 air/vacuum proportional valve pipework.

A I SLT

The injector being chemically de-scaled.

Electrical System

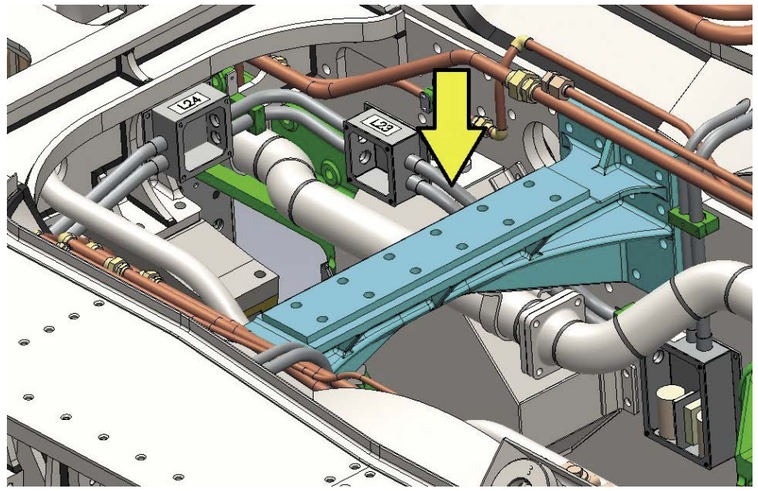
The electrical system design continues to proceed well and according to plan. Since *TCC 60* Rob Morland has completed the design of the engine wiring looms and an initial estimate of the wire required has been made. With some connections still to add, the total for the engine currently stands at 3,429 metres or 11,250 feet. The tender wiring will be assessed once the design is complete. The electrical Parts List is approaching completion, with over 300 separate component types defined and over 5000 individual items identified for ordering. This sounds a large number but it does include items like ferrules, which have to be ordered in multiples of 100!

Work continues on the design of small modules, including instrument lighting drivers, steam chest temperature gauge driver and sander indicator. Some products that we used on the A1 have become obsolete since we specified them back in 2007, so work to identify, check and qualify replacements is currently underway. One example is the corner bulkhead fittings used for illuminating the coal space and the tender water filler points. Suitable alternatives have been identified and samples will be ordered to allow the best option to be selected. Where there is concern about ongoing availability we may purchase 'lifetime' supplies, as we have done in a few cases for the A1.

Other work has included specification of the military connectors that we use throughout the system and putting all the suppliers we shall be using through our Supplier Qualification process.

A review of the system documentation is currently underway with Graham Nicholas, the Trust's Professional Head of Engineering. This includes the System Design Submission, clause by clause assessment against applicable standards and Hazard Analysis. Once this is complete the documents will be submitted to Ricardo for design scrutiny.

Alan Parkin has continued with details of the electrical trunking design including having to add an extra conduit between the two turbogens mounted on the fireman's side foot plate where the feed water pumps were located on 2001 *Cock o' the North* and the turbogen switch box behind the front buffer beam on the driver's side. A few years ago an overvoltage "crow bar" system was fitted to *Tornado* following an incident where the built in regulator on the turbogen alternator failed hard allowing the nominal 28v output to rise to over 70 volts which "cooked" a few components downstream. This overvoltage system occasionally trips



CAD illustrations: Alan Parkin

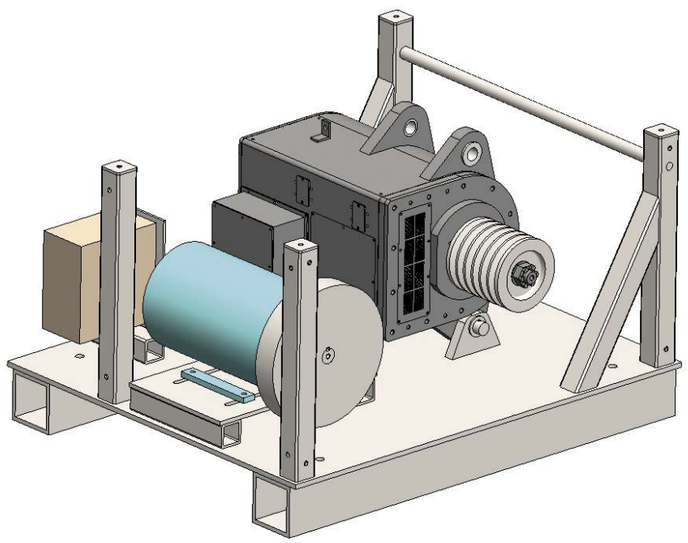
A 3D CAD of the additional trunking required.

out when en route, and by placing the reset switches on the driver's side it is possible to safely access them from the "cess" side of the railway if the locomotive is stopped on the main line, whereas the reset switch on *Tornado* is located under the turbogen on the fireman's side side normally adjacent to the other running line.

During Rob's finalisation of the engine wiring looms, it was discovered that the total quantity of wires that need to be run across the frames exceeded the capacity of the single 32mm conduit originally specified, hence the need for an additional conduit as illustrated.

Alan has undertaken a trial assembly of the prototype Axle Driven Alternator (ADA) which has resulted in a few minor tweaks to the design – this is what prototyping is for!

He has also completed the design of, and ordered materials for, a test rig comprising a 9 HP motor with an infinitely variable speed electronic drive unit which with the 5 kilowatt load bank built by Rob earlier will enable us to check the performance of the ADA over the full range of speed and power demands expected in service. As well as measuring the output, heat sensors will be fitted to various parts of the alternator to check that it is not running too hot for long time reliability. TCC



A 3D CAD of the ADA test rig.

3D PRINTING AS PART OF THE P2 DESIGN PROCESS

by Martin Shepherd

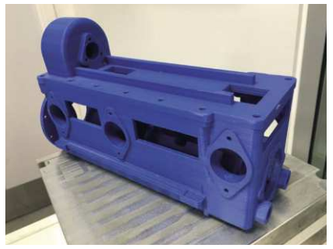
Since Christmas the engineering team have been working with the Warwick Manufacturing Group to create a ⅓ scale working model of the cambox for the Lentz-Franklin valve gear. The Warwick Manufacturing Group (WMG) is part of Warwick University and offer an outreach service to Small and Medium Enterprises for knowledge transfer from academia to industry. Their enthusiasm for the project was helped in no small part by the fact that Dr. Paul Lansdell is the former Steam Engineer at the Dean Forest Railway.

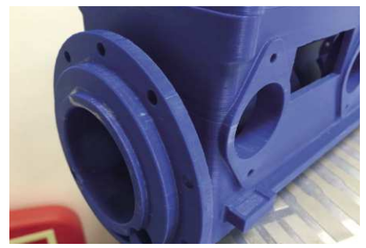
There are 120 parts that make up a cambox. This makes it one of the most complicated assemblies within the locomotive. The Engineering team have been conscious that before committing to spending many thousands of pounds on patterns, castings and machined components, we needed to satisfy ourselves that the overall concept was functionally correct, that we could manufacture and assemble the many parts of the cambox. We also wanted to be able to look at variations on profiles of the rollers that actuate the tappets, and in turn actuate the valves, as this was a known problem with No. 2001 *Cock o' the North*.

The parts are printed in ABS plastic so they are sturdy enough to test out the mechanisms without fear of it breaking. The 3D printed cambox will allow us to see if we need to make any changes to the parts before committing to manufacture. WMG offered to 3D print a ⅓ scale cambox and parts for us. Their capability is unusual in being able to print such large components with high accuracy and robustness. A full size cambox is over three feet long, so the ⅓ scale part is beyond the capability of anything else we have access to. Even with their state-of-the-art machines it still took seven days to print the main cambox!

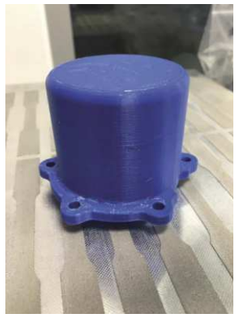
As well as the value of being able to check the functionality and assembly we have the opportunity to use the cambox model to educate sponsors and donors as well as school parties of the inner workings of Lentz Franklin valve gear. When the locomotive is complete this will be hidden away inside the cylinder cladding, so the 3D print will be an invaluable educational aid.

Another part of the service provided by WMG to the P2 project is support for metallurgy. Materials and lubrication have progressed immensely since Gresley's time, and even since the last developments of Franklin valve gear in the USA. We are able to access the latest thinking on material grades, surface coatings and heat treatment which will give us an advantage in making reliable and durable valve gear. By embracing modern material, it all helps get closer to fulfilling Gresley's vision of the P2. TCC



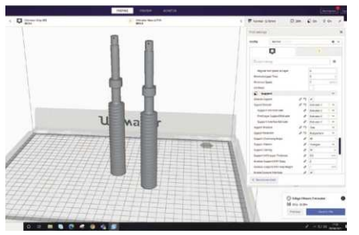


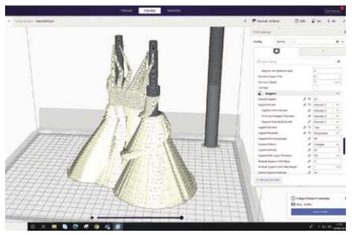
The 3D printed cambox.

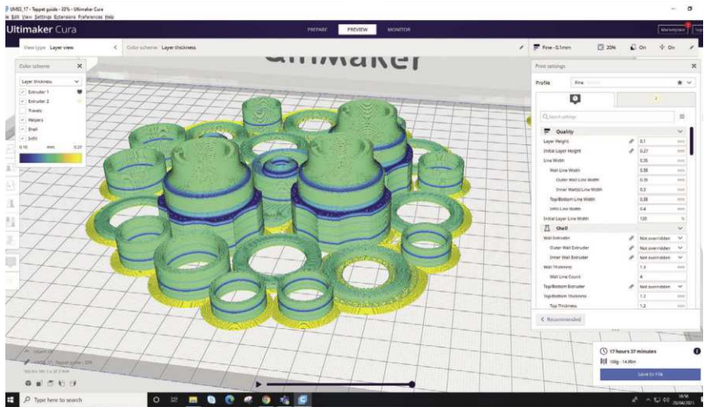


An end cap.

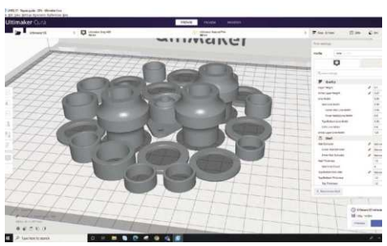
3D printing of one of the reverser screws.







The screen shots (above and right) also show the preparation of models for the printing before they are sent to the machine.



SMOKE LIFTING STUDY *by Ben McDonald*

Following the successful partnership with Frewer and Co Engineer's undertaking the Computational Fluid Dynamics [CFD] analysis of the cylinder block steam passageways, a further project has been commenced.

No. 2002 was documented as suffering from issues with exhaust steam obscuring the view of the driver. This problem was addressed by fitting additional smoke deflectors and was finally resolved with the fitment of the A4 style streamlined casing. To ensure that No. 2007 does not suffer from the same problem with the original Gresley P2 casing design, a CFD study of the influence of the Coanda effect on the exhaust steam over the casing is underway.

The Coanda effect is the tendency of a fluid to follow a flat or curved surface. In the case of the P2, a crosswind traveling over the casing will 'stick' to the casing and be drawn down over the surface before breaking away.

The study aims to attempt to replicate the documented problem in the simulation environment. If this is achieved, design changes can then be tested to investigate how to prevent this problem occurring with No. 2007. The intention being to find a means of influencing the air and steam flow that does not change the design outline of the locomotive casing.

Right: Frewer and Co Engineer's 3D illustration of of No. 2007's double Kylchap exhaust.

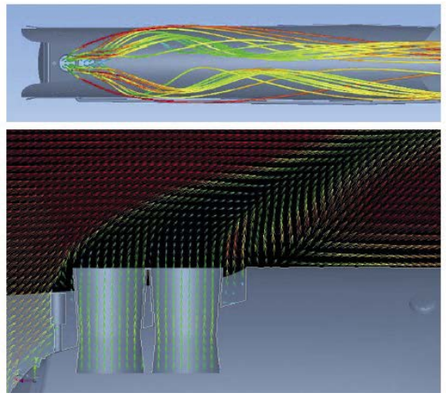
JET SEPARATION

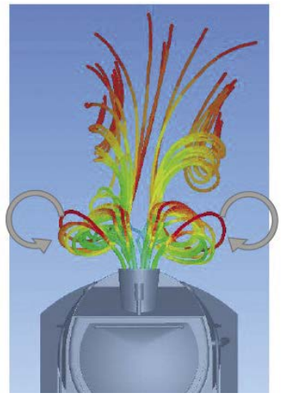
For the case of no cross wind, the plume separates as a result of a jet.

The upper image shows the initial separation of the plume which later combines downstream.

The lower image shows the jet causing this effect. It exits at high velocity and penetrates the plume rather than gently lifting it.

The far image shows the resulting circulation due to the jet.



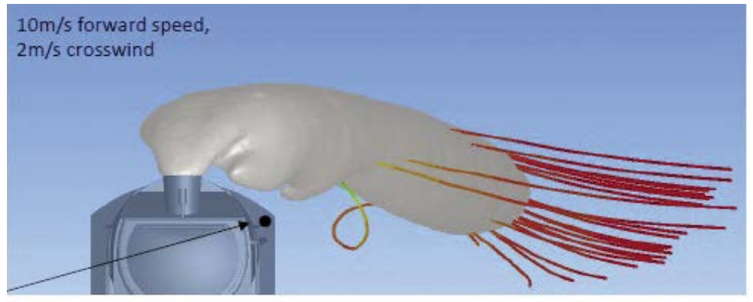


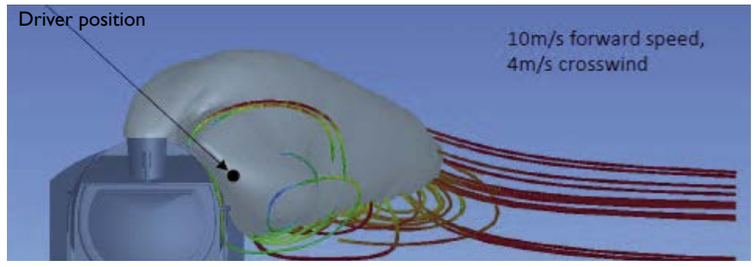
PLUME BLOCKING

Coanda effect is captured at the higher cross wind ratios. Using a combination of isosurfaces and streamlines, it can be determined whether the drivers view is hindered.

The upper image (2m/s crosswind) shows the plume successfully lifted away from the train.

The lower image (4m/s crosswind) shows the plume hugging the side of the boiler and blocking the sight of the driver.





THE P2 SUPPORT COACH APPEAL PASSES THE HALF-WAY MARK! *by Mark Allatt*

A unique opportunity has arisen for The A1 Steam Locomotive Trust to acquire BR Mark 1 BSK E35457 for eventual use as the support coach for No. 2007 *Prince of Wales*.

A support coach and crew are an essential part of the operation of steam locomotives on Network Rail. Since British Railways steam operations ended in 1968, much, if not all of the static infrastructure and paid staff required to support them no longer exists, requiring the use of support coaches and crews to travel with the locomotive.

Support coaches are usually drawn from passenger brake coaches of the BR Mark 1 era, taking advantage of the existence of the guards/ parcels van space for ease of conversion to workshop and store functions. The passenger area will provide mess room, seating and/or sleeping accommodation.

Brake Corridor Second (BSK) E35457 was built at Wolverton in 1963, is fitted with Commonwealth bogies and was most recently used as the support coach for BR standard class 4 No. 76084. In surprisingly excellent condition, E35457 will require minimal work other than the reinstatement of its dual-brakes and the addition of a similar electrical system to that fitted to E21249, No. 60163 *Tornado's* support coach.

The A1 Steam Locomotive Trust is seeking to raise £100,000 from 100 supporters to each donate £1,000 (in up to eight monthly payments of £125 by standing order) towards the acquisition, overhaul and conversion of BR Mark 1 BSK E35457.

BR Mark 1 BSK E35457 Support Coach at the Great Central Railway.

In recognition of their support, donors will receive:

- Exclusive certificate signed by David Champion (President) and Steve Davies (Chairman) of The A1 Steam Locomotive Trust
- The opportunity to buy a ticket (seat already reserved) on one of the first trains hauled by No. 2007 *Prince of Wales*
- Reasonable access to No. 2007 and No. 60163 at all times
- Special supporters' day with *Tornado*
- Two tickets (booked in advance) to travel behind *Tornado* or *Prince of Wales* in E35457 on a heritage railway and commemorative photograph with the locomotive and coach.

Launched in 2020 as part of The A1 Steam Locomotive Trust's 30th Anniversary Appeals, The P2 Support Coach Appeal has got off to a good start and by April 2021 had already attracted 51 supporters donating over £50,000 plus Gift Aid.

For further information on The P2 Support Coach Appeal, please visit **www.p2steam.com,** email **enquiries@p2steam.com** or call **01325 460163**.

The P2 Support Coach Appeal is raising funds for the acquisition and overhaul of BR Mark 1 E35457. If there are surplus funds left over following its acquisition and overhaul, we will use the money to purchase or manufacture other components for the Gresley class P2 that the charity would not otherwise have. TCC

P2 ROADSHOWS, DARLINGTON LOCOMOTIVE WORKS OPEN DAYS AND PRESENTATIONS *by Mark Allatt*

In the light of Government advice to prevent the spread of the coronavirus, we suspended our P2 Roadshow programme, Open Days at Darlington Locomotive Works (usually held on the first and third Saturday of the month) and ad-hoc Presentations to external groups throughout 2020 and have had to do the same in 2021.

We are currently working on restarting the P2 Roadshow programme later in the year and have tentative plans for Peterborough (Great Northern Hotel on Saturday 16th October 2021) and London (London Transport Museum, Covent Garden on Saturday 29th January 2022). When they re-start, the presentations will feature key team members including Mark Allatt and/or David Elliott and cover the background to the project to build new Gresley class P2 No. 2007 *Prince of Wales*, progress to-date, future plans and details of how to get involved.

The two-hour presentations will start promptly at 11:00hrs and run until 13:00hrs and are open to existing supporters and interested members of the public. We are also currently looking at ways in which we can re-open Darlington Locomotive Works for pre-booked guided tours from June 2021.

We would encourage you to attend our P2 Roadshows to find out more about our progress over the past year and our Open Days to see this progress for yourself. Please do bring along friends and family members who would also be interested in hearing about the project. Please keep an eye on our websites and other communications for further details. Thank you in advance for your patience and understanding.

For more information on the P2 roadshows visit **www.p2steam.com**, email **enquiries@p2steam.com** or call **01325 460163**. TCC

Follow us on
Visit: www.p2steam.com

Help Britain's most powerful steam locomotive to build a head of steam

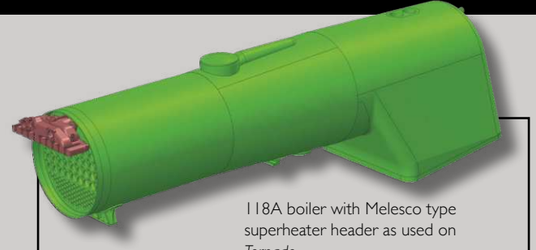
Join The Boiler Club today and help us to complete No. 2007 *Prince of Wales* in record time!

The boiler is the beating heart of a steam locomotive and to keep the construction of No. 2007 *Prince of Wales* on schedule for completion in 2021, we placed the order for the boiler in 2019 for delivery in January 2021. We have established The Boiler Club to fund the construction of *Prince of Wales'* boiler. It is our desire to leave No. 2007 *Prince of Wales* debt free upon completion and therefore our aim is to raise at least £600,000 for The Boiler Club from 300 supporters each donating £2,000 to the project (in up to 16 payments of £125 by standing order) **– we are over half way there, having raised £475,000 (including gift aid) so far!**

Special benefits for members of The Boiler Club:

- **Opportunity to buy ticket (seat already reserved) on one of No. 2007's first main line trips**
- **Reasonable access to No. 2007 at all times**
- **Opportunity to buy exclusive Boiler Club badge**
- **Opportunity to join one of the teams building No. 2007**
- **First choice of other components to sponsor**
- **Special limited edition version (signed/numbered) of the first official painting of No. 2007 *Prince of Wales* with No. 60163 *Tornado***
- **Special supporters' day with *Tornado*.**

Together we can build this remarkable locomotive - join The Boiler Club today!



118A boiler with Melesco type superheater header as used on *Tornado*

No. 2007's boiler in detail

- Use of diagram 118A *Tornado* boiler with detailed modifications to improve overhaul life
- Interchangeable with *Tornado* boiler
- *Tornado* boiler is 17in shorter than P2 boiler – No. 2007's smoke box will be extended within the cladding
- 250psi of No. 60163's boiler will be retained to improve economy and increase maximum power.

2007 PRINCE OF WALES
Building Britain's Most Powerful Steam Locomotive

For further information please visit **www.p2steam.com** email **enquiries@p2steam.com** call **01325 460163** or write to The Boiler Club, P2 Construction Fund, Darlington Locomotive Works, The A1 Steam Locomotive Trust, Hopetown Lane, Darlington DL3 6RQ

P2 DEDICATED DONATIONS UPDATE *by Mandy Grant*

The period 5th November 2020 – 23rd April 2021 has seen a steady increase in component sponsorship, with 18 individual components being sponsored, raising a further £2,470.00 before gift aid. This brings the total number of components now sponsored to 640!

We are most grateful to all of our supporters who have responded to the Dedicated Donations campaign so far!

Looking for an unusual gift? With prices ranging from one of many driven bolts & slotted nuts for £30 to the complete exhaust steam injector for £15,000. Why not treat the rail enthusiast in your family to something different and help us to complete this iconic locomotive!

Whatever your budget, please email Mandy at **dedicated.donations@p2steam.com** for more information.

Components sponsored during this period include:

- Clip for vacuum brake
- Brake Hanger Bracket 3 LH Machining
- Locomotive front screw coupling
- Tender rear screw coupling
- 7x 1" BSW driven bolts and slotted nuts - leading
- RH hornstay
- 2x Leading Coupled Axlebox Castellated Nuts
- Cab side screen glazing LH
- Vacuum pipe bracket inside motion bracket
- 2in top bowler hat pipe clip angle
- Vacuum pipe 1G
- Inlet valve tappet rear RH (Cylinders)

Our online donations system is live on www.p2steam.com

TCC

POWERING No. 2007 TO COMPLETION WITH THE TURBOGEN CLUB *by Mark Allatt*

In August 2018, the Trust placed a £350,000 order for a state-of-the-art electrical system for new Gresley class P2 No. 2007 *Prince of Wales*. The electrical system, based on that which has operated successfully for the past 12 years on No. 60163 *Tornado*, includes systems that generate and store electricity, together with lighting and instrumentation systems. Also included are all current railway safety and communication systems, plus new systems that will soon be needed on the Network Rail main line.

The Electrical system for No. 2007 *Prince of Wales* will be based on the following key principles:

- Dual redundant power supplies and electronic battery management
- Steam turbine and axle-driven generators
- Structured trunking system for wiring and optimised equipment locations for minimum wiring
- Military specification components for reliability and all LED lighting.

Power will be generated by the Trust's new design for an axle-driven alternator, based on an off-the-shelf truck product, and new turbo-generators, based on the German design fitted to *Tornado*. No. 2007 will be fitted with two turbo-generators, each with an output around 25A at 27V DC (675VA).

In order to keep on schedule to complete No. 2007 within the next three years, we need to have the two turbo-generators delivered to Darlington Locomotive Works in 2022. We estimate that each turbo-generator will cost around £40,000 to complete and install.

Spurred on by the success of The Pony (Truck) Club, in early July we launched The Turbogen Club – the second of our new mini-clubs to fund specific areas of construction that are beyond the reach of most people to support as a Dedicated Donation.

It is our desire to leave No. 2007 debt free and therefore our aim is to raise at least £40,000 with The Turbogen Club from 40 supporters each donating £1,000 plus Gift Aid (in up to four payments of £250).

Members receive the following special benefits:

- Opportunity to buy ticket (seat already reserved) on one of the first trains hauled by No. 2007 *Prince of Wales*

Turbo-generator assembly.

- Reasonable access to No. 2007 at all times
- First choice of components to sponsor as a Dedicated Donation
- Special supporters' day with *Tornado*
- Exclusive certificate signed by the electricals design team of Rob Morland and Alan Parkin
- A limited-edition turbo-generator coaster
- Invitation to the first official run of the new turbo-generator.

By April 2021, the fundraising campaign for The Turbogen Club had already 'generated' 40 members, reaching the initial target of 40 members, each contributing £1,000. Please consider joining The Turbogen Club before it is closed to new members.

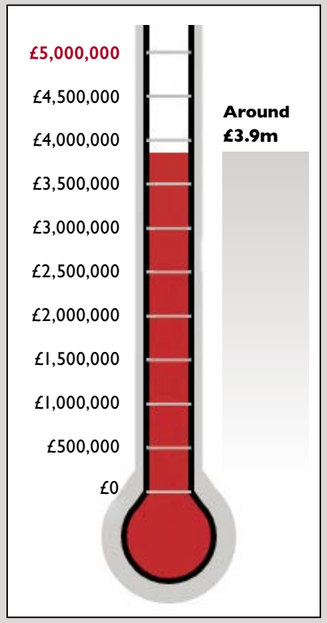
The A1 Steam Locomotive Trust is raising funds for the acquisition of two turbo-generators for the new Gresley class P2 No. 2007 *Prince of Wales*. If there are surplus funds left over following the acquisition of the two turbo-generators, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have. TCC

Turbogen Coaster.

IS THERE LIGHT AT THE END OF THE TUNNEL? *by Mark Allatt*

To-date, over £3.4m has been spent and around £3.9m raised of the estimated £5m required.

Gresley class P2 No. 2007 *Prince of Wales*.



Donated to date.

As you will have read elsewhere in this edition of *TCC*, even in these difficult times our project to build Gresley class P2 No. 2007 *Prince of Wales* continues to make good progress on all fronts. It's still difficult to ascertain at the time of writing what the long-term impact of the coronavirus will be on our fundraising efforts, but we are carefully monitoring our financial position and building as much flexibility into our project plan as possible. As we know, our fundraising works as a virtuous circle, with donations generating progress which encourages supporters new and existing to support the next phases of construction. Our biggest challenge at the moment continues to be the recruitment of new supporters due to the lack of opportunities to talk to potential supporters face-to-face. Let's hope that this will change soon and as you can read elsewhere in this edition of *TCC* we are already putting in place plans to restart our Open Days at Darlington Locomotive Works (DLW) in June and our P2 Roadshows in October. A huge thank you to all our supporters who continue to give most generously to the project. At this time, we are still on target to complete the new locomotive within three years provided we can turn up the wick on our income growth.

Public interest in seeing a new Gresley class P2 become a reality sooner rather than later remains high and over 965 people have already signed up to the 'P2 for the price of a pint of beer per week' (£2.50 per week or more) Covenant scheme since its launch in March 2014. The average monthly donation is over £17 per Covenantor (excluding Gift Aid) and the projected annual income for our P2 project from the monthly Covenant scheme is now well in excess of £200,000pa – a remarkable achievement in such a short period of time and all thanks to the generosity of our supporters.

Because of the Government restrictions imposed on us due to coronavirus, we had to suspend our programme of DLW Open Days and P2 Roadshows in 2020/2021 and have therefore not had the face time with potential new supporters that we would normally achieve. Whilst we are doing what we can do raise our profile digitally and in the print media, I would encourage all of our existing supporters to try to recruit a friend to come on board as a covenantor or if possible, consider increasing your Covenant.

In addition to this core scheme, funds have been raised through The Founders Club with over 360 members donated £1,000 each plus Gift Aid – target 100 people, now closed; The Mikado Club, launched in March 2016 with an initial target of 160 members to wheel the engine and extended in May 2017 to 200 members to also wheel the tender - now fully subscribed with 200 supporters pledging £1,000 each plus Gift Aid and therefore potentially raising £250,000; and The Cylinder Club, only launched at our Convention in October 2017, reached its initial target with 100 people having already pledged £1,000 each plus Gift Aid and therefore potentially raising £125,000. The Gresley Society Trust has sponsored the locomotive's distinctive front-end for which we are most grateful. You can read elsewhere in this issue of TCC where these funds have already been put to good use.

Our order in June 2019 for two new boilers – an heir and a spare – from DB Meiningen makes it more important than even that we reach our 300 members initial target for The Boiler Club as soon as possible. As of April 2021, we have already recruited 227 people – over three-quarters of the initial target - to The Boiler Cub, each of whom have pledged £2,000 to fund the boiler, meaning that £452,000 of the £600,000 initial target (excluding Gift Aid) is now pledged. With the delivery of the boiler for No. 2007 scheduled for December this year – and the spare boiler for both of our locomotives now expected to be delivered in this spring - we need an average of nine new members a month – please do consider becoming a member of The Boiler Club if you are able. If you are already a member of The Boiler Club, please do consider joining a number of Club members who have taken out a second membership to fund No. 2007's share of the spare boiler.

April 2018 saw the launch of The Motion Club, established to fund the manufacture of the heavy motion for No. 2007, where we set ourselves the challenge of raising an initial £210,000 from at least 175 supporters each donating £1,000 plus Gift Aid. In just ten days we had already signed up 24 members of The Motion Club, potentially worth £30,000 including Gift Aid – a remarkable achievement thanks to the generosity of our supporters. Although somewhat delayed through no fault of our supplier, you can see elsewhere in *TCC* that good progress is now being made with the heavy motion. As of April 2021, we had recruited 178 members to The Motion Club, with £178,000 pledged excluding Gift Aid. The Motion Club will remain open to new members until the last of the heavy motion is delivered.

We launched The Tender Club in April 2019 to raise the funds to manufacture No. 2007's tender. We set ourselves the challenge of raising at least £450,000 through The Tender Club from at least 250 supporters each donating £1,500 (plus Gift Aid) to the project in up to 15 payments of £100 by standing order. The Tender Club got off to a rather slow start, but progress has been steady, and we have now recruited 101 people – just over 40 per cent of the initial target - as of April 2021 which although a significant milestone is still in stark contrast to the tender's progress! As you can read in David Elliott's engineering update, work has progressed steadily on the tender frame since the last edition of *TCC*. We still have a long way to go to be able to fully fund the tender and will therefore need to more closely align its pace of construction with the availability of funds over the coming months. Please help us to close the gap and get on board The Tender Club.

As you will read elsewhere in *TCC*, in April 2020 we launched our first smaller – or bite-sized – fundraising club to provide the funds required to complete the pony truck. With The Pony (Truck) Club we were seeking to raise the necessary £20,000 (plus Gift Aid) from 20 supporters each donating £1,000. This club got off to quite a gallop - apologies for the pun - and as of April 2021 has recruited 32 supporters, enabling us to also fund some of the required certification. We are now in the process of closing this club now that the pony truck frame has been delivered to DLW and so please consider joining whilst you can!

Spurred on by this success, in we launched The Turbogen Club in July 2020 and by April 2021 the fundraising campaign has already 'generated' all 40 members of the initial target of 40 members each contributing £1,000. Please do take a look and consider joining The Turbogen Club as we are also in the process of closing this club.

Our newest fundraising campaign, The P2 Support Coach Appeal, was launched in August last year to acquire, overhaul and convert BR Mark 1 BSK E34547 into the support coach for No. 2007. Our target is to raise £100,000 from 100 supporters each donating £1,000 and we are delighted to announce that as of April 2021 we have passed the half-way mark and have already recruited 51 supporters which is fantastic progress - if you haven't already done so, please do consider stepping on-board.

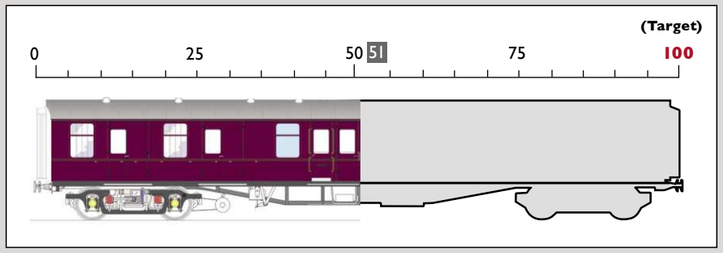
Our Dedicated Donations initiative continues to generate substantial income for the project, with over £400,000 to-date from existing supporters sponsoring a variety of components. There are still a considerable number of wheeling-related Dedicated Donations still available for sponsorship, ranging from a driving wheel spoke at £600 (or from £25 per month for 24 months) to a Cartazzi axlebox casting at £1,300 (or from £50 per month for 26 months) to and driving wheel casting & proof machining at £12,000 (or from £200 per month for 60 months). We also recently released some very visible Dedicated Donations related to the painting of the locomotive, with sponsorship of the LNER lettering on the tender available for £1,000 per side (fireman's side remaining) and the lining of the tender at £1,000 for each side and £500 for the rear.

We are delighted with the level of support that the project to build Britain's most powerful steam locomotive has received since its launch. This means over £3.4m (almost 70 per cent) converted into metal and more than £3.8m (over 75 per cent) raised.

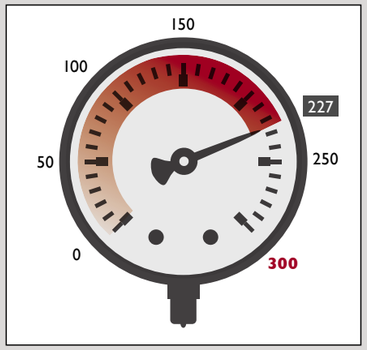
We now have a rolling chassis and we remain on-track for completion of the new locomotive within three years. However, to maintain this rate of progress we need to raise more than £700,000 per year, which given the nature of the regular donation scheme becomes more challenging as each year passes. Last financial year we didn't quite achieve our budget of £500,000 and so we will have to work harder this year to maintain our momentum.

We would encourage all our supporters who haven't yet contributed to this exciting project to help us to meet these deadlines by becoming a monthly 'P2 for the price of a pint of beer a week' Covenantor, joining The Boiler Club, subscribing to The Motion Club, becoming a member of The Tender Club, supporting The P2 Support Coach Appeal or taking out a Dedicated Donation. It's time to get on-board

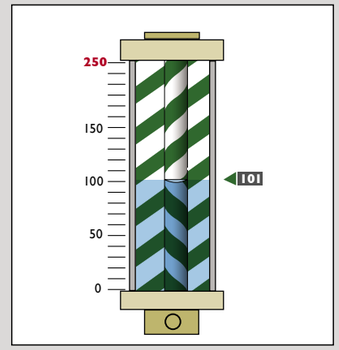
For more information on how you can help to build Britain's most powerful steam locomotive visit **www.p2steam.com**, email **enquiries@p2steam.com** or call 01325 460163. TCC



The P2 Coach Appeal - 51 supporters.



Boiler Club Gauge - 227 Members.



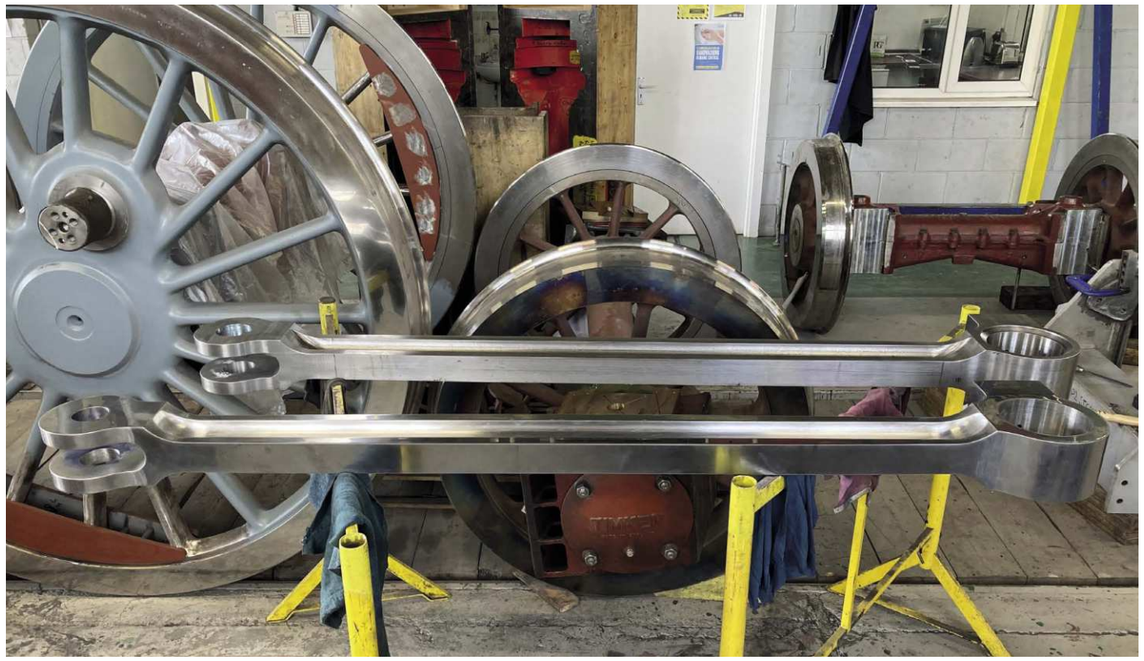
Tender Club Gauge - 101 Members.

Turbogen Club - 40 Members.

STOP PRESS!

As this edition of *The Communication Cord* was going to press we were delighted to see that all six machined coupling rods have now been delivered to Darlington Locomotive Works only seven years after the launch of the P2 project. The fundraising campaign to raise an initial target of £210,000 needed to pay for the manufacture of the heavy motion has also made good progress, with £178,000 plus Gift Aid already pledged by 178 supporters.

The delivery of the final pair of coupling rods for *Prince of Wales* is a major step forward for the project, especially given the limitations of working during the Covid-19 pandemic. The machining of each rod by Stephenson (Engineering) takes around 100 hours. The next few months will see the completion of all of the heavy motion and the trial fitting of the coupling rods to the engine – creating the first tender-engine standard gauge 'Mikado' in the UK since 1945. TCC



A1SLT

No. 2007 *Prince of Wales's* trailing coupling rods at Darlington Locomotive Works.

•WORKSHOP NOTES•

The Trust has a long history of April Fool jokes to its credit (who could forget *Tornado* in pre-grouping liveries or the French A1?) and this year was no exception, bolstered by the willing support of none other than model manufacturer Hornby! The headline was as follows, "Hornby announces model of Thompson class A2/2 No. 60507 *Prince of Wales*!" and the article went on to explain that the No. 2007 was to be be rebuilt as a Thompson class A2/2 during the locomotive's first overhaul expected to take place in 2027. In advance of the "rebuild", Hornby announced that it would be releasing a model of No. 60507 *Prince of Wales* in 2022, following the release of its models of the Thompson class A2s in early 2021 and its expected release of its new models of Gresley class P2s later in the year.

We'd like to thank Simon Kohler and Montana Hoeren at Hornby for indulging us in this little deception, even mocking up a model of the proposed model of No. 60507. Needless to say the suggestion of rebuilding No. 2007 was so outrageous that very few people fell for it! TCC

THE TENDER CLUB STEADILY FILLING UP *by Mark Allatt*

In April 2019, the project to build Britain's most powerful express passenger steam locomotive announced a new £450,000 appeal to fund the manufacture of the tender for new Gresley class P2 No. 2007 *Prince of Wales*. The A1 Steam Locomotive Trust has set itself the challenge of raising £450,000 (including Gift Aid) through The Tender Club from 250 supporters each donating £1,500 (plus Gift Aid) to the project in up to 15 payments of £100 by standing order. At the same time, the Trust was also pleased to announce that the order to manufacture the tender tank has been placed with North View Engineering Solutions of Darlington.

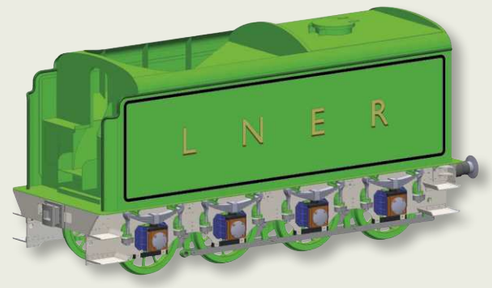
Substantial progress has been made on the tender with the erection of the tender frames by ID Howitt of Crofton (now over two-thirds complete), the construction of the tender tank by North View Engineering Solutions Ltd of Darlington (structurally complete, delivered to DLW in April 2020, primed & undercoated and now stored awaiting the frame) and the assembly of the four tender wheelsets at South Devon Railway Engineering Ltd in Buckfastleigh (now complete and in DLW where they have been filled and painted and await balancing).

In return for supporting this appeal, special benefits for members of The Tender Club include:

- Opportunity to buy ticket (seat already reserved) on one of the first trains hauled by No. 2007 *Prince of Wales*
- Reasonable access to No. 2007 at all times
- Opportunity to buy exclusive Tender Club badge
- Opportunity to join one of the teams building No. 2007
- First choice of other components to sponsor
- Special supporters' day with *Tornado*
- Special limited-edition print of Stephen Bainbridge's 'Locomotives of the future' painting.

The tender for No. 2007 *Prince of Wales* is based closely on the tender built for A1 class No. 60163 *Tornado*. The original P2 tenders were to the 1930s non-corridor design built for the new A3 'Pacifics' being built at that time.

The water capacity of the original design was 5,000 gallons, which at a typical consumption of 45 gallons per mile would provide a range between water stops of 80 miles (with as safety margin). The tender for *Tornado* was re-designed to increase the water capacity to 6,250 gallons which increases the range to about 110 miles. The additional water



David Elliott

capacity is at the expense of a reduction in coal capacity from 9 tons to 7½ tons.

The tender tank is a fully welded structure made from weathering steel (as used on motorway bridges and the Angel of the North) to provide improved resistance to corrosion. The main visible differences with the new tender when compared to that of *Tornado* is the curving inwards of the side sheets at the front to match the shape of the cab sides, and the extensive use of half round beading along the front and top of the sides and the top of the back of the tank.

We now urgently need the fundraising for the tender to keep pace with its construction if we are to remain on-track for completion of No. 2007 within the next three years. By April 2021, The Tender Club had recruited 101 members of its 250 members initial target meaning that just over £150,000 (excluding Gift Aid) of the required £450,000 (including Gift Aid) has already been pledged – that still leaves us with a lot of work to do. We realise that the tender isn't the most glamourous part of *Prince of Wales* – but our locomotive can't operate without one!

To become a member of The Tender Club, email **enquiries@p2steam.com**, call **01325 460163** or visit **www.p2steam.com** for more information.

PS The A1 Steam Locomotive Trust is raising funds for the manufacture of the tender for the new Gresley class P2 No. 2007 *Prince of Wales*. If there are surplus funds left over following the manufacture of the tender, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have. TCC

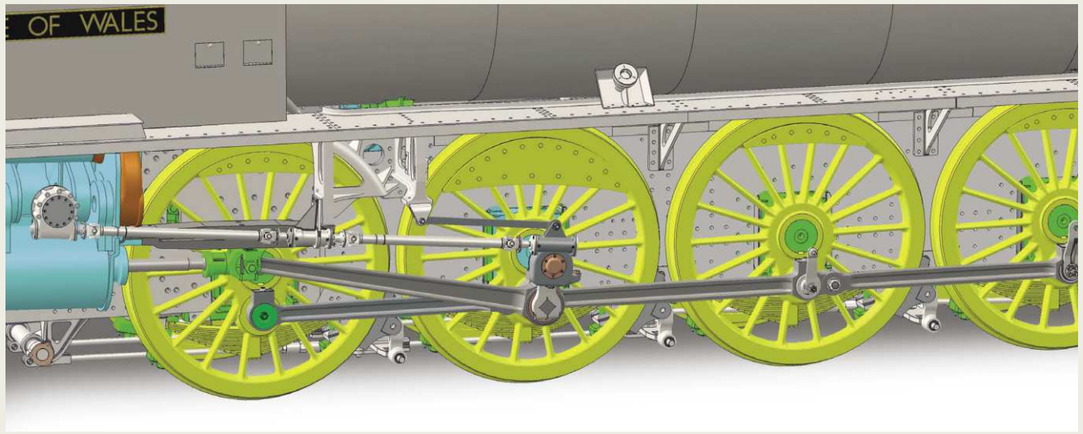
Attention all Club Members! - *Exclusive badges are available to purchase -*

The Boiler Club, The Mikado Club, The Cylinder Club,
The Motion Club, The Tender Club - All Club Badges £5.00 each (Badges shown actual size)

To purchase your badge please send a cheque for the relevant amount made payable to 'The P2 Steam Locomotive Company' and send to The A1 Steam Locomotive Trust, Darlington Locomotive Works, Hopetown Lane, Darlington DL3 6RQ.

COME ON, COME ON, DO THE LOCO-MOTION WITH ME!

by Mark Allatt



David Elliott /A1SLT

3D diagram of No. 2007's outside motion.

In April 2018, The A1 Steam Locomotive Trust launched a new appeal to raise the funds to manufacture the motion for new Gresley class P2 No. 2007 *Prince of Wales*. The Motion Club was established with the aim of raising £210,000 from 175 supporters each donating £1,000 (plus Gift Aid) to the project in up to eight payments of £125 by standing order. In just seven weeks the appeal had already reached over a quarter of its £210,000 target and by April 2021 we had recruited 178 members to The Motion Club, with over £210,000 pledged, including Gift Aid.

In May 2018 we were delighted to announce that we had placed a £181,000 order with Stephenson Engineering Ltd of Atherton, Manchester for the heavy motion No. 2007 *Prince of Wales*. The order included the forging, machining and heat treatment of the nine heavy motion rods - intermediate coupling rod LH/RH, trailing coupling rod LH/RH, leading couple rod LH/RH, outside connecting rod LH/RH and the inside connecting rod assembly (including strap, gluts and strap nuts and washers) – and the combined piston and rod. Following a delay due to lack of resources our supplier, the first heavy motion forgings – the two middle coupling rods – were completed in October 2019 and one was exhibited at Darlington Locomotive Works during the Convention in 2019. As of April 2021, six coupling rods, the inside connecting rod & strap and the two outside connecting rods have been forged, six machined coupling rods (leading, intermediate & trailing) are at DLW and the machining of the remaining rods is underway. Orders to follow for the motion include rod bushes, oil box covers and miscellaneous components.

In return for supporting this appeal, special benefits for members of The Motion Club include:

- Opportunity to buy ticket (seat already reserved) on one of the first trains hauled by No. 2007 *Prince of Wales*
- Reasonable access to No. 2007 at all times
- Opportunity to buy exclusive Motion Club badge
- Opportunity to join one of the teams building No. 2007
- First choice of other components to sponsor
- Special supporters' day with *Tornado*
- Special limited-edition version (signed/numbered) of Stuart Black's drawing of No. 2007 *Prince of Wales*.

The work involved in designing and manufacturing the motion includes:

- Redesign of coupling and connecting rods to use modern material (pre-war nickel chrome steel alloy proved prone to fracture
- Incorporation of late-pattern BR-type continuous white metal lined crank pin bearing bushes
- Use of the late-A1 design of inside connecting rod which overcame the tendency for the original design of inside connecting rods on LNER 'Pacifics' to big-end failure
- Open die forging of six coupling rods, two outside connecting rods and the inside connecting rod and strap
- CNC machining of all rods
- Manufacture of oil box lids, coupling rod knuckle pins, nuts and washers and bearing bush keys
- Casting of leaded gunmetal and phosphor bronze castings of crank pin bearing bushes
- Machining and white metalling of bearing bushes
- Fitting oil box tops
- Assembly of bearing bushes to rods
- Polishing rods.

We may have passed the initial target of 175 members of The Motion Club but there is still an opportunity to come on-board if you haven't already whilst the motion is being manufactured as there have been a couple of dropouts.

To become a member of The Motion Club, email **enquiries@p2steam.com**, call **01325 460163** or visit **www.p2steam.com** for more information.

P.S. The A1 Steam Locomotive Trust is raising funds for the manufacture of the motion for the new Gresley class P2 No. 2007 *Prince of Wales*. If there are surplus funds left over following the manufacture of the motion, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have. TCC

FROM THE ARCHIVES *by Graham Langer*

David Elliott

***Tornado's* boiler is craned back into her frames at the NRM on 8th April 2011.**

Spring 2001 - Hardy Non-Ferrous Metals Ltd of Middlesborough had cast all the coupling and connecting rod bushes from Leaded Gunmetal and Phosphor Bronze as appropriate to the application. The bushes were delivered to Darlington for machining prior to white metalling where appropriate. Machining of the coupling and connecting rods, pistons and crossheads continued at Ufone Precision Engineers in the West Midlands. At DLW the bogie frame was being assembled using fitted bolts made in the Locomotive Works. With this finished, the manganese steel liners supplied by Firth Rixon Liner Products at Sheffield could be welded onto the frames.

Spring 2006 - With the expected arrival of the boiler in July 2006, efforts were being redirected between the frames to complete tasks which would be difficult with the boiler on the engine. To this end, I D Howitt Ltd had been contracted to make fixtures for, and to machine, the inside big end brasses. Installation was under way for the long 4" diameter steel pipe that carries exhaust steam from the inside cylinder casting back to the exhaust steam injector under the cab and a full-sized wood and cardboard model of an air pump has been made to enable us to decide where to mount the pumps and to design brackets to fit them to.

Spring 2011 – Boilers were once again in the news in 2011, *Tornado's* boiler had just returned from an overhaul at Meiningen to adjust the pattern of flexible stays and replacing original, flush stays with the more common protruding stay heads. The original type had been specified when we thought that the boiler would be oil-fired and were not ideal for coal-firing. With boiler out of the frames a huge amount of work had been carried out on the 'bottom ned' at the National Railway Museum including the re-design and renewal of the grate and ashpan and improvements to the sanding gear. In addition to routine maintenance, Rob Morland designed and installed lighting between the frames to help servicing the locomotive.

Spring 2016 – With little of note to report about *Tornado*, *TCC 42* focussed on the progress being made with No. 2007. The frames for the big Mikado now looked very impressive with increasing numbers of frame stays being fitted and a temporary 'cylinder block' stay in place, buffer beam and rear dragbox in place as well as some of the footplating. The smokebox has been assembled and at SDR(E) the smokebox door had been pressed using male and female press tools and a lot of heat! In other news, on 1st April the Trust announced it was to build a J38 0-6-0, No. 1416… TCC

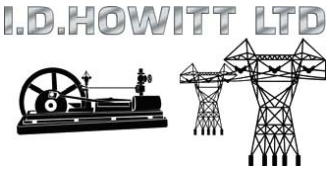
Andrew Shapland

Carrying a headboard, 'Matey', in tribute of the late Ray Towell, *Tornado* heads west with 'The Devon Belle' on 2nd April 2016.

The A1 Steam Locomotive Trust is pleased to display the logos of organisations giving us their ongoing support. Their contribution is gratefully acknowledged.

PRINCIPAL SPONSOR

The Gresley Society Trust



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Darlington Locomotive Works is normally open to the public on the first and third Saturday each month (11am – 4pm).
Access to the works is via Head of Steam: Darlington Railway Museum where Covenantors are entitled to free entry (with Covenantor card). Charity registration No. 1022834.
The Trust respectfully requests that anyone wanting to see *Tornado*'s main line passenger trains follows the rules of the railway and only goes where permitted.