



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. 60 Winter 2021

The rather wonderful sight of one of the Trust's two new boilers in the X-ray room at DB Meiningen for analysis of the welded seams.



DB Meiningen

THE RACE IS ON! *by Graham Langer*

There can be no doubt that the Covid-19 pandemic has had an extremely negative impact on the heritage railway movement and it will probably be some years before the financial damage done can be mended and The A1 Steam Locomotive Trust has not been entirely immune. If we are to

push the P2 project over the line it will require a final herculean effort in both terms of fundraising and construction to ensure that we meet our deadlines, getting No. 2007 *Prince of Wales* into steam during 2022, into traffic by the end of 2023 and "front and centre" during the Stockton

& Darlington Railway bi-centenary celebrations during 2025. We need all the help we can get from our Covenantors and supporters and one of the best ways to achieve this is to bring new people to the party – after all, it's not every day you get the chance to be part of history! **TCC**

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EDITORIAL by Graham Langer



"Nothing great will ever be achieved without great men, and men are great only if they are determined to be so." So said Charles de Gaulle. This year sees some significant anniversaries of those great men who form part of the story of the LNER. 3rd March 2021 is the 70th anniversary of Arthur Peppercorn's death which came just a couple of years after his retirement in 1949 following his short

but productive tenure of the role of CME of the LNER. The Trust was extremely fortunate to have recruited Pepp's widow, Dorothy Mather, as its President, a duty she performed with energy and grace until her own passing in November 2015 after a twenty-year involvement with *Tornado*.

This year also marks the 80th anniversary of Sir Nigel Gresley's death on 5th April as well as the entry into traffic of his last design, the V4 2-6-2. Gresley left a lasting legacy in terms of steam locomotives in preservation but his 'unfinished symphony' would have forever been the P2 Mikados, the improvement of which was superseded by the A4s, World War 2 and his own untimely death in 1941. If these events had not occurred it is interesting to conjecture how the great man might have further developed the class (having already abandoned the Lentz valve gear in favour of Walschaerts).

And so, we come to our own great man, our 'Chief Mechanical Engineer', David Elliott, without whom it is unlikely that *Tornado* would have been brought to life or a 'new, improved' Class P2 realised and created with such a degree of refinement.



David Elliott.

"What is being achieved in Darlington in a small and restricted workshop is simply awe inspiring and is a tribute to the dedication, foresight and determination of a small team." - Chris Milner, editor, *The Railway Magazine*, January 2021.

In other news we'd like to congratulate Jenny Chapman who has been given a Peerage in the Christmas announcement. Jenny was MP for Darlington for some years and a great supporter of the Trust and its ambitions, 'christening' the P2 frames at Darlington Locomotive Works among other things. We have been very fortunate that politicians of every shade have taken the Trust seriously and backed our endeavours, a mutually beneficial relationship has developed which, we hope, will culminate in the celebrations surrounding the bicentenary in 2025.

Meanwhile *Tornado*, an East Coast thoroughbred champing at the bit, remains confined to her 'stable' at York, impatient for another gallop along the old LNER main line as soon as she is allowed to do so. With the locomotive fully re-certified for another season we are all awaiting further news on the resumption of UK steam tours and hope to have a better idea of how and when this will happen soon. Please keep an eye on our raitour news section and join us on one of these great days out as soon as permitted. **TCC**



Arthur Peppercorn.



Sir Nigel Gresley.

FROM THE CHAIR by Steve Davies



The Covid-19 situation, and the restrictions it has placed on our main line activity, could, if one were a pessimist, put a major cloud over the motivation of the Trust and its management team. But far from it. We would all dearly love to see *Tornado* in full flight, and it will surely happen in the not-too-distant future, but there is plenty to keep us occupied in maintaining her, and reference is made elsewhere in this journal to the locomotive recently being steamed to ensure she remains in tip top condition ready to be allowed back where she belongs. With the maintenance of *Tornado* entrusted to a very competent team, in which your Council has full confidence, the main focus for thought, planning and manufacture has therefore, not surprisingly, been the P2.

We have seen solid progress with *Prince of Wales*, and not just with the eye-catching star items such as rods, boiler and pony truck, but also with the often hidden but nevertheless

essential pipe runs, conduits and the myriad of other small components which go to make up such a complex machine, and we look forward to once more opening our doors so that we can show this beautiful machine off to you all again. However, notwithstanding the current rate of progress, one major impact of not being able to hold the P2 Roadshows, and indeed of our inability to open the doors of DLV, has been the loss of opportunity to bring on board new supporters and covenantors. We regularly put out mail shots and other marketing literature (and I suspect some of you are becoming mightily bored with them!) but this can never be a substitute for the sheer thrill of seeing the locomotive with your own eyes, and thus being incentivised to contribute. This lack of fresh fundraising opportunity exercises a lot of Council's time and which is why I am constantly addressing the subject with you all, at the expense of being accused of being the proverbial stuck record. The longer the lockdown restrictions are in place the more urgent the need to think outside the fundraising box. Could I therefore ask you all to consider one of three things? First, increase your financial

commitment to the P2; second, please act as an ambassador on our behalf and bring friends and colleagues on board whom we are unable to reach; and finally, write in with ideas of your own as to how we can increase our fundraising performance in these difficult times. We are not precious about the origins of constructive bright ideas and indeed I would welcome your thoughts.

Finally, I would wish to draw your attention to a Zoom online event being hosted by *The Leaders Club* on Wednesday 31st March at 18:00hrs. David Champion and I will be giving a joint presentation on the amazing story of the Trust, its origins, its highlights – and its challenges – and of course where we are going. The price for non-members is £30 of which £15 will be donated to the Trust.



The Leaders Club
Bringing Great Minds Together

The Leaders Club link for booking a place is as follows: <https://www.theleadersclub.org/events/category/virtual-meetings/>
TCC



Tornado sits astride the Skerne Bridge in Darlington, hopefully both the locomotive and bridge will be at the centre of the S&D 200 celebrations.

AI ENGINEERING REPORT *by Richard Pearson*

With *Tornado* side-lined at the National Railway Museum during the winter and little prospect of any work until the spring we have taken the opportunity to change five locomotive driving wheel springs. As previously reported, we changed one driving wheel spring which had broken just before 'The Ticket to Ride', and during further inspection we identified two other springs which were starting to show signs of distress. After discussions it was decided that the time was now right not only to change the two other distressed springs but to change all the five remaining springs, this would then build in a degree of reliability going forward over the next 12 months.

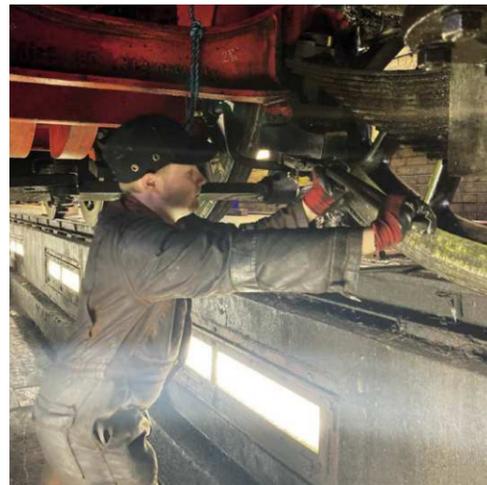
Right: Five new springs before fitting. The springs are very heavy – two people are needed to lift and manoeuvre a spring. Changing a spring is heavy work, with lifting equipment required for removing the old and fitting the new.



All photos Richard Pearson

Using the lifting equipment and a lifting block (centre left) the new springs are carefully lowered into the pit.

The brake gear pull rods were first removed to create the room we needed under the engine to work. Using the hydraulic jacks, the locomotive is lifted to remove the weight from the springs, and after carefully measuring the position of each nut (so they are refitted back to the original position) they were removed. The photo centre right shows Ian Greenan removing the nuts using the 'big' spanner.



Once the nuts have been removed, the spring boxes should slide off, but unfortunately most were stuck fast on the spring hanger bolts. Releasing the spring boxes proved to be the most difficult and heavy-going part of the job as we had to employ several different techniques to release them. Several sand pipe brackets had to be removed and we also had to be creative in other ways to jack and push off the boxes. The picture (bottom left) shows one of the boxes packed with wood. We then carefully lowered the engine down and used the weight of the engine to push off the box.



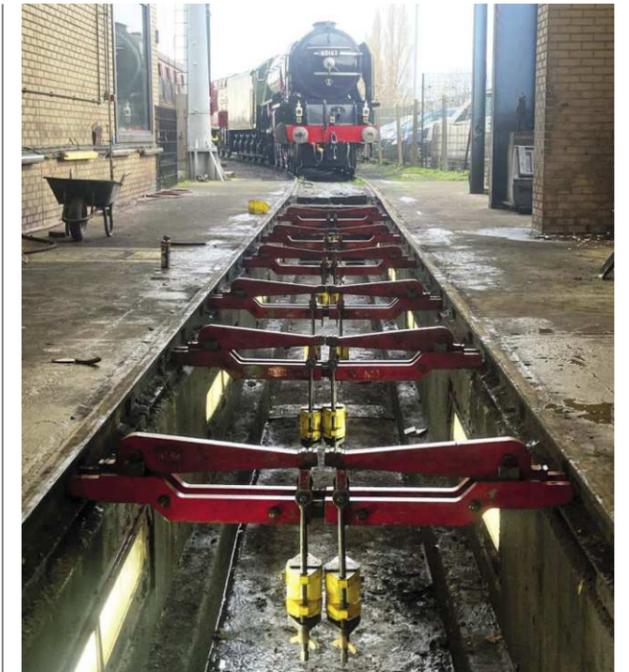
Bottom right: The distress in the old springs is very difficult to show in a photograph, but in this picture you can see that a gap developed between the top and the second leaf, and the shadow at the far end between the top and second leaf shows the offset/twist that has occurred between the leaves. You can also see that there is no offset between the second and third leaves.

On Monday 23rd November the NYMR sent a fitter and their weighing equipment to York to allow us to weigh the engine. This process allows you to measure the weight on each wheel and then adjust the tension on each spring to ensure the correct weight distribution is achieved, the picture right shows the weigh beams being set up on the pit.



The picture above shows the engine sitting on the weighing equipment. Tension is applied to the screws on the bottom of the yellow load cells, this, via the lever arm, then lifts (floats) the engine off the rails, once lifted the load is measured by the load cells and displayed on the digital display boxes.

A number of adjustments were made to the driving wheel springs, and after each adjustment the wheels are re-floated and the weights checked. This process took a full day and at the end of the day the readings on the driving wheels and the cartazzi were within spec, but as you can see in the picture below the readings for the leading bogie wheels (1 is front right and 4 front left) were still a long way off. To bring the weights on the leading bogie wheelset within spec we tried to adjust the bogie spring tensions but, unfortunately, we found the nuts on the spring hanger bolts had seized solid. So, the following day with the help of an oxy/propane heating torch we were able to fully dismantle the front bogie wheel suspension. The spring hanger bolts were cleaned up, and where necessary the threads were dressed and the rubber damper blocks on each bolt were replaced. Everything was then re-assembled and the engine re-weighed, and this time the weights were all within spec.



A man happy in his work, Ian is seen adjusting one of the springs.



The pictures show Ian dressing one of the bolts (left) and reassembled with spring (right).

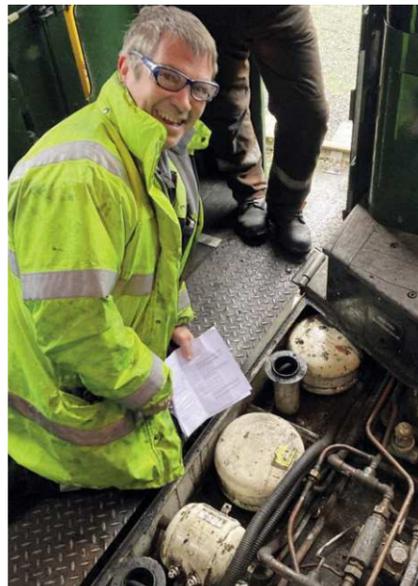


These pictures show the final weights, starting on the left with the front of the engine and working across to the rear on the right, the top row shows the RHS of the engine and the bottom row is the LHS.

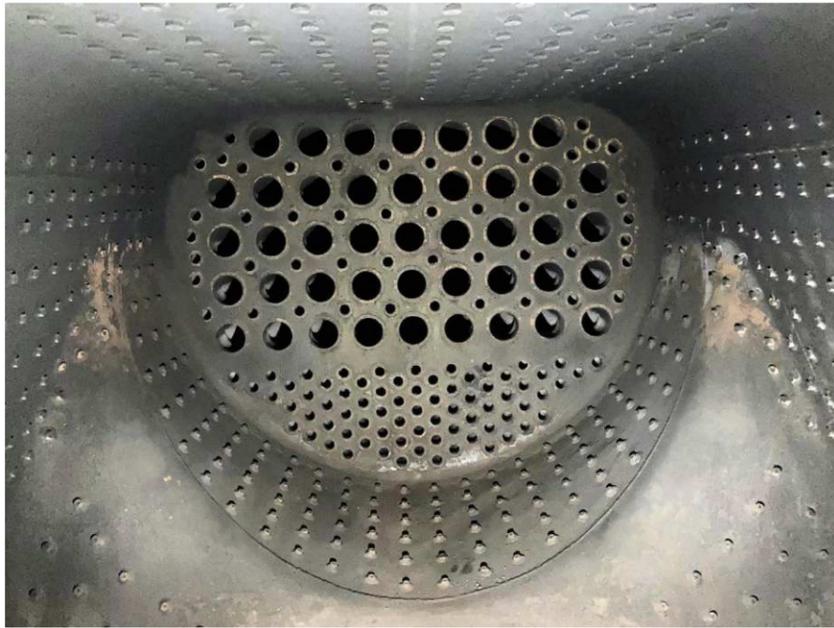
At the end of November we prepared for the visit of Andy Wright, the British Engineering Services boiler inspector. Andy was to carry out the annual insurance company cold inspection on the boiler and also to conduct the six yearly internal examination on all 14 air receivers. After locating the air receivers, we then set about disconnecting the pipework which would allow Andy to look inside the receivers. We also did a final clean out of the firebox and smokebox, and all the washout doors and plugs received a final clean and were laid out ready for inspection.

Andy was very happy with the condition of the air receivers and he has also passed the boiler fit for another year making a recommendation to programme in a couple of repairs on the water side of the LH and RH back corners of the inner firebox. This work is routine and will now be done in January and can be conducted without dismantling the engine.

Andy was booked to return on Thursday 4th December to carry out the hot examination. With this is successfully passed, the boiler will have a ticket to 3rd February 2022. We then set about refitting the pipework to the air receivers and refitting the cab floor and floor plates (four are under the floor). The boiler also had all of its doors and plugs refitted along with a new set of gauge glasses. We then added water treatment and filled the boiler, and once full, we lit the fire. Steam was slowly raised overnight and the following day we successfully completed the full A exam steam test.



Andy Wright conducts the examination of the receivers.



A clean firebox.



The cab floor lifted to reveal the air receivers.



Washout doors and plugs ready for inspection.



A fire in Tornado's belly once more!

All photos Richard Pearson

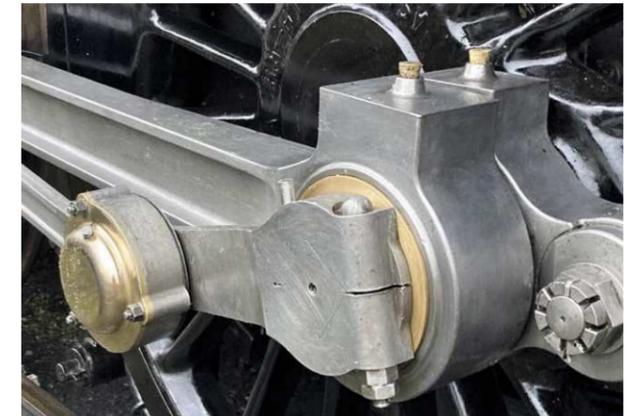


In steam and ready for the A exam.

At the start of the maintenance period we removed the whistle to have the valve and the linkage modified, the whistle has now been refitted and works much better. The photo (below left) shows the whistle as it is now with a modified valve, a straight operating arm and with a much straighter linkage.



As well as the boiler inspection and the A Exam steam test, we also completed several other smaller tasks. The fittings on the air brake pressure test points had become seized so they have been replaced with new.



Above: The bright metal work has also been cleaned and a fresh thin coat of protective grease applied by members of the famous York based 'Dave team'. The rest of the engine was also cleaned and the new green paintwork received a coat of protective polish to see it through the winter, as the locomotive will be outside in the elements for the next couple of months since the covered accommodation that we used previously in the prep bay is no longer available because the NRM have one of their own machines in there.

We were now preparing for another period out of traffic, the boiler was drained and winterized, the steam and air pressure gauges were removed and sent for calibration in early January. The OTMR unit had already been removed and sent away for its five-yearly service. We also spoke to Ricardo Rail and set a date for the engine's annual Ricardo Rail hot examination, dates for the annual TPWS, GSMR and OTMR recertification were planned for the same week. The repairs to the water side of the LH and RH back corners of the inner firebox as recommended by Andy Wright when he did the cold boiler exam were programmed to take place in early January. **tcc**

TORNADO ON TOUR by Huw Parker



Richard Pearson



Steve Davies



Steve Davies

Above: Despite a long period stored out of traffic, *Tornado* gleams in the cold at the NRM.

Left: 'Snow, steam and (very little) speed' (with apologies to J.M.W. Turner).

During the last few months it has been necessary to occasionally move *Tornado* around the yard at the National Railway Museum to change the resting positions of the wheels and bearings, here the NRM's 08 shunter shunts the locomotive on 8th February prior to steaming the locomotive for her hot exams.

Sadly, 'The Ticket to Ride' was to be the last railtour operated by *Tornado* for quite some time as the lockdown restrictions were reimposed at the end of last year. With the locomotive and coach secured at the Railway Museum in York, our full-time staff ensured they were safely prepared for the winter, draining the boiler and coach water systems and ensuring all the motion and other brightwork were greased and oiled to reduce corrosion as much as possible. Several visits to York were undertaken during the very cold weather to ensure all was well and check there were no problems with power supplies to the coach.

In February, the team has been conducting annual exams on the support coach and *Tornado*, prior to recertification inspections on the boiler and key locomotive systems such as the On Train Monitoring Recorder (OTMR), Train Protection and Warning System (TPWS) and Global Systems for Mobile Communications – Railway (GSMR). The battery in the OTMR unit was replaced, which required the whole unit to be sent away, as this has to be completed and the unit bench tested before being refitted to the locomotive. By the time you are reading this, *Tornado* will have been recertified for another 12 months on the network.

Following the acquisition of a second support coach for use with the P2, we have also recently secured a set of spare Commonwealth bogies, which will be overhauled to replace those currently under BCK No. 21249, *Tornado's* Support Coach. These have been transported to Darlington Locomotive Works for assessment before work begins to prepare them for use. Our second support coach, BSK No. 35457 is currently stabled at the Great Central Railway awaiting further planning to improve the facilities it provides and replicate some of the really useful features installed in No. 21249. Hopefully, as Covid-19 travel restrictions ease, we will be able to spend some time on both these vehicles which play such a vital role in supporting our operations on the main line. [TCC](#)



Daniela Flavia

The spare bogies are unloaded at DLW for assessment.

FURTHER ADDITIONS TO THE TEAM by Graham Langer

Since the last *Communication Cord* there have been further developments in the Trust's management structure, Richard Courteney-Harris has been appointed a trustee, Ben McDonald has also joined the Trust Council and Tony Peters has been added to the team as Council and Board business administrator.



Ben McDonald is a Chartered Mechanical Engineer working within the Automotive Industry. After completing his degree at Queen's University Belfast in 2013, he moved to England to take up a position with Triumph Motorcycles within the Powertrain development team. This progressed to calibration of the engines and other electrical systems before a move to Jaguar Land Rover. Based in the Midlands he now looks

after the development and testing of roll stability control systems on 4x4 products. Not old enough to remember steam in service days, Ben's earliest memories are of childhood trips on Railway Preservation Society of Ireland 'Santa Specials'.

Ben started operating steam engines while still at school at the Model Engineer's Society of Ireland learning the skills to operate, maintain and build miniature live steam locomotives from 3 1/2" gauge up to 7 1/2". Not long after starting, an invitation was extended to help at the Railway Preservation Society of Ireland's Whitehead depot for a day shunting. There in started the affiliation with main line steam. Ben has operated RPSI locomotives across the length and breadth of Ireland on RPSI May Tours as well as being involved in various 'Youth Projects' and the overhaul and maintenance activities of the locomotives. Following his move to England, Ben started volunteering at the Great Central railway in Loughborough. Here he progressed to qualifying as a fireman and becoming involved in the training of future steam crew.

It was through Great Central Railway connections that an invitation was extended to help with a short-staffed railtour

with *Tornado* in 2016. Enjoying the opportunity to join main line operations closer to home, Ben became more involved with the AI Trust. Ben has since been part of crews operating the AI from Penzance to Aberdeen and is now responsible for the rostering activities of the Support Crew. In addition to this, Ben has taken an interest in the development of the P2 with a particular focus on looking at how modern automotive modelling techniques can be implemented to simulate design performance before the manufacture of components.



Tony Peters was born and brought up in the shadows of Bury (26D) steam shed in 1961. Tony joined the Royal Air Force in 1980 and was posted to the UK and Overseas. The highlight of Tony's career was being selected to serve as a crew member of the

elite Queen's Flight, which during the course of 11 years, took him to over 100 countries. He remains the Chair of The Queen's Flight Association, a post he has held for the past 15 years.

In 2002, Tony retired from the Royal Air Force and became a Civil Servant working as a regulator within the Intelligence and security community in London. Tony is now a part-time lecturer at a number of overseas universities.

Underpinning his careers, Tony has been heavily involved in Heritage Railways for the past 30 years, he specialises in Railway Operations, and is a diesel driver and guard trainer and assessor. Tony is a Young Railway Professionals ambassador, guiding younger members of the railway family, in the early stages of railway careers. He is also a Railway Mental Health First aider. Many of you may have met Tony on a *Tornado* railtour, where he volunteers as a carriage host.

Tony is married to Jane, he lives in Didcot, and is often seen out walking with his two mad spaniels. **TCC**

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 'AI 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



Some Yeates

'The Ticket to Ride' - Northallerton.

captivated by *Tornado's* main line magic, our number of AI Covenantors has started to gradually decline once more. I would therefore urge all our existing AI Covenantors to help us to recruit new supporters and for P2 Covenantors (around two-thirds of whom are not also AI 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.

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. All these ours are promoted by Tornado Railtours.

- **Saturday 22nd May** - 'The Pennine Explorer' - Leicester to Carlisle (steam Barrow Hill to Carlisle, Carlisle to Hellifield) - bookings through Tornado Railtours
- **Saturday 29th May** - 'The South Devon Explorer' - Woking - Bristol - Plymouth - bookings through The Railway Touring Company
- **Saturday 5th June** - 'The Buxton Spa Express' - London - Leicester - Buxton - bookings through The Railway Touring Company
- **Saturday 19th June** - 'The Edinburgh Flyer' - York to Edinburgh - bookings through The Railway Touring Company
- **Saturday 3rd July** - 'The Cumbrian Explorer' - Darlington to Carlisle (steam Darlington to Carlisle, Carlisle to Carnforth) - bookings through Tornado Railtours
- **Sunday 11th July** - 'The Royal Duchy' - Slough - Taunton - Par - bookings through The Railway Touring Company
- **Saturday 17th July** - 'The Cheshireman' - London to Chester - bookings through The Railway Touring Company
- **Tuesday 20th July** - 'The Viking Venturer' - Edinburgh to York (steam York to Edinburgh via Carlisle) - bookings through Tornado Railtours
- **Thursday 22nd July** - 'The Aberdonian' - Edinburgh to Aberdeen - bookings through Tornado Railtours
- **Saturday 31st July** - 'The Aberdonian' - Edinburgh to Aberdeen - bookings through Tornado Railtours
- **Thursday 12th August** - 'The Aberdonian' - Edinburgh to Aberdeen - 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 - bookings through Tornado Railtours
- **Saturday 11th September** - 'The Aberdonian' - Edinburgh to Aberdeen - bookings through Tornado Railtours
- **Thursday 16th September** - *Tornado* and *Flying Scotsman* - West Midlands to Carlisle and return
- **Thursday 16th September** - *Flying Scotsman* and *Tornado* - Peterborough to Carlisle and return
- **Saturday 18th September** - *Tornado* and *Flying Scotsman* - Middlesbrough to Carlisle and return
- **Saturday 18th September** - *Flying Scotsman* and *Tornado* - Birmingham to Carlisle and return

The Trust respectfully requests that anyone wanting to see *Tornado* follows the rules of the railway and only goes where permitted.

Tornado Railtours
01325 488215
a1steam.com/railtours

The Railway Touring Company
01553 661 500
railwaytouring.net



Liam Barnes

Tornado crosses Horsfall Viaduct, Todmorden with 'The Ticket To Ride', Darlington to Liverpool & Return.

V4 UPDATE by Mark Allatt

Drawings being scanned for new Gresley class V4 on 80th anniversary of unveiling of prototype

Cleardata has started the process of scanning 366 original Gresley class V4 drawings from microfiche and upon completion later this month they will be uploaded onto the Trust's CAD system. These drawings were acquired from Malcolm Barlow, a Doncaster scrap dealer who launched the now defunct Gresley V4 Society in 1994 to build a new example of the class.

Other progress to date now includes:

- Trustee agreement to fundraising strategy and proposed project timeline: it closely follows that used to fund the building of No. 60163 *Tornado* and No. 2007 *Prince of Wales*, which will hopefully leave the latter debt free on completion
- Sign-off of the high-level specification for No. 3403 - although just two in number, the class V4s were very successful in traffic with no known design and development problems
- Acquisition of 366 original Gresley class V4 drawings - Graham Nicholas catalogued these drawings in advance of their scanning into the Trust's CAD system
- Purchase of a complete set of fully-certified tyres for the new Gresley class V4's pony, Cartazzi and 5ft 8in driving wheels from David Buck, owner of Thompson class B1 4-6-0 No. 61306 *Mayflower*, along with a chimney, two BR class 08 shunter speedometer drive generators and two air pumps of Finnish origin for use on No. 2007; the tyres were originally manufactured in South Africa in the late 1990s for Malcolm Barlow and the other components salvaged from Doncaster Works on its closure
- Delivery of 12 Tender Spring Hooks from a closed die forging to an original LNER drawing; this was part of a much larger order placed by Network Rail with Unilathe of Stoke-on-Trent for replacement components for its LNER 4,200-gallon tender-based snowploughs which has been piggybacked on by AISLT for its new Gresley class V4 and the project building a new Gresley class B17, therefore considerably reducing the unit costs.
- Component acquisition in advance of the start of construction continues on an opportunistic basis. The Trust has taken delivery of a set of cab side window frames made for use on No. 3403 by Colin Vickridge, a long-standing supporter and volunteer with the Trust. Colin also provided the cab side window frames for *Tornado* and *Prince of Wales*. A speedometer from ex-LMS Jubilee No. 45657 *Tyrwhitt* (withdrawn in 1964) has also been acquired by the Trust for eventual use on No. 3403.
- The creation of a new subsidiary, The V4 Steam Locomotive Company Limited, of The A1 Steam Locomotive Trust to carry out the building of new Gresley class V4 No. 3403 as part of the preparations for the formal launch of the project

Although there is no specific fundraising appeal open for No. 3403 yet, any donations made towards it will be ring-fenced for the project. Due to the impact of COVID-19 the formal launch date of the V4 Project and launch of The Founder's Club is yet to



Colourised photograph of Gresley class V4.



Scanning the V4 drawings at Cleardata.

be finalised. This will be used to acquire all of the components needed to assemble the engine's frames so that when No. 2007 *Prince of Wales* leaves Darlington Locomotive Works within the next three years, everything will be in place to rapidly assemble the frames. This will then be followed by the launch of the 'V4 for the price of a pint of beer a week' covenant scheme and other specific fundraising clubs familiar to those who have supported the building of No. 60163 *Tornado* and No. 2007 *Prince of Wales*. In this way, the V4 Project can capitalise on the momentum built up to complete the new class P2 with sufficient funding to keep staff and contractors busy. It is hoped that the new locomotive will take 5-7 years to build depending on the rate at which the funds are raised.

Steve Davies MBE, chairman, The A1 Steam Locomotive Trust, commented, "We are in the pre-launch phase of the project to build our third new main line steam locomotive, the yet-to-be-named Gresley class V4 No. 3403 - Sir Nigel Gresley's final design. With the order for construction now placed at Darlington Locomotive Works, the scanning of the drawings commenced, and further components acquired, we are well positioned for the formal launch of the project.

"We want to be ready to start assembling our new Gresley class V4 as soon as our new class P2 is completed. We anticipate the project costing around £3m and taking around five years subject to the pace of fundraising. Our new Gresley class V4 is an ideal locomotive for regional main line tours, repeat main line itineraries and the longer, main line connected heritage railways. Unlike with our class P2, where we have had to do a considerable amount of development work to complete the job that Sir Nigel Gresley started in 1934, there will be very little redesign work needed as there were no known problems with the Gresley class V4s.

"As previously mentioned with no specific appeal open for No. 3403 yet (and any donations ring-fenced), our next step will be to launch The Founder's Club to fund the early stages of the project. More announcements will be made during 2021 as the project builds up steam."

For more information on how to help, visit www.v4steam.com, email enquiries@v4steam.com or call 01325 460163. **TCC**

THE A1 STEAM LOCOMOTIVE TRUST IS YOUR LEGACY

You can ensure that A1 Peppercorn class No. 60163 *Tornado*, Gresley class P2 No. 2007 *Prince of Wales*, our yet-to-be-named Gresley class V4 No. 3403 or any other on-going project at the Trust, has a secure future for generations to come by leaving a legacy to The A1 Steam Locomotive Trust in your Will. When writing your Will, if your wish is for the legacy to go to a specific initiative of the Trust, please specify this and we will of course respect your wishes.

Donations via legacies during the 30 years that The A1 Steam Locomotive Trust has been in existence have been relatively limited when compared to other types of donation - although the Trust has always been extremely grateful for any gifts received. If legacy donations to the Trust were to reach the same level as those for the top UK based charities - where it represents around 40% of fundraising income - the Trust would raise an additional £80,000 per year. This would go a long way towards funding a five-year overhaul for *Tornado* or *Prince of Wales*.

Many of the Trustees have already made provision for No. 60163 *Tornado* and No. 2007 *Prince of Wales* in their Wills by leaving a legacy to The A1 Steam Locomotive Trust. If you would also like to support the Trust through a legacy, then please take a look at www.a1steam.com or contact our Legacy Coordinator who will talk you through the process on legacy.coordinator@a1steam.com or 01325 460163.

How has Legacy funding been used by the Trust?

Legacies helped the Trust during the construction of No. 60163 *Tornado* by funding specific components and equipment in Darlington Locomotive Works. Since completion, generous gifts have helped fund the conversion of BR Mk 1 E21249 into *Tornado's* support coach and contributed towards the repayment of loans and the £500,000 bearer bond.

What will my Legacy go towards?

A bequest left in your Will, will not be used for the general day to day expenses of running No. 60163 *Tornado* or No. 2007 *Prince of Wales* on the Network Rail main line and heritage



Newly painted in apple green, *Tornado* outside Darlington Locomotive Works, 2015.

railways. If you do not state a specific use, we will devote your gift towards the funding of *Tornado's* next major overhaul. If, however you would like your legacy to be used for something more specific, you will need to talk to our Legacy Coordinator in order to realise your contribution and by doing this, we will be certain that your gift will be used for a specific purpose.

To whom do I make my bequest?

If the value of your estate is above a nil rate band threshold value, then it will be liable for inheritance tax (IHT). Any gifts made to UK registered charities are exempt from IHT and further tax savings can be made if you gift more than 10% of your net estate to charity as the IHT tax rate reduces to 36%. A gift to The A1 Steam Locomotive Trust would be classed as a charitable gift and therefore, attracts the favourable tax rules. If your estate is chargeable to IHT, specialist advice should be sought. The A1 Steam Locomotive Trust is the organisation that holds the funds for fundraising projects and has trustees that can accept bequests for any purpose linked to it. The Trust is governed by a Council and its Trustees will ensure your wish is fulfilled.

How do I make a Will?

You could simply fill out a form from

a major stationer or online but if your affairs are a little more complex it would be much better to take advice from a solicitor. It costs between £150 and £200 to make a Will.

Can I update my existing Will?

Yes, you will need to produce a document called a codicil; it is not that complicated and suitable forms are available from www.a1steam.com or from our Legacy Coordinator.

What wording do I use?

It depends on how you wish to divide up your estate. Details are available on www.a1steam.com or from our Legacy Coordinator.

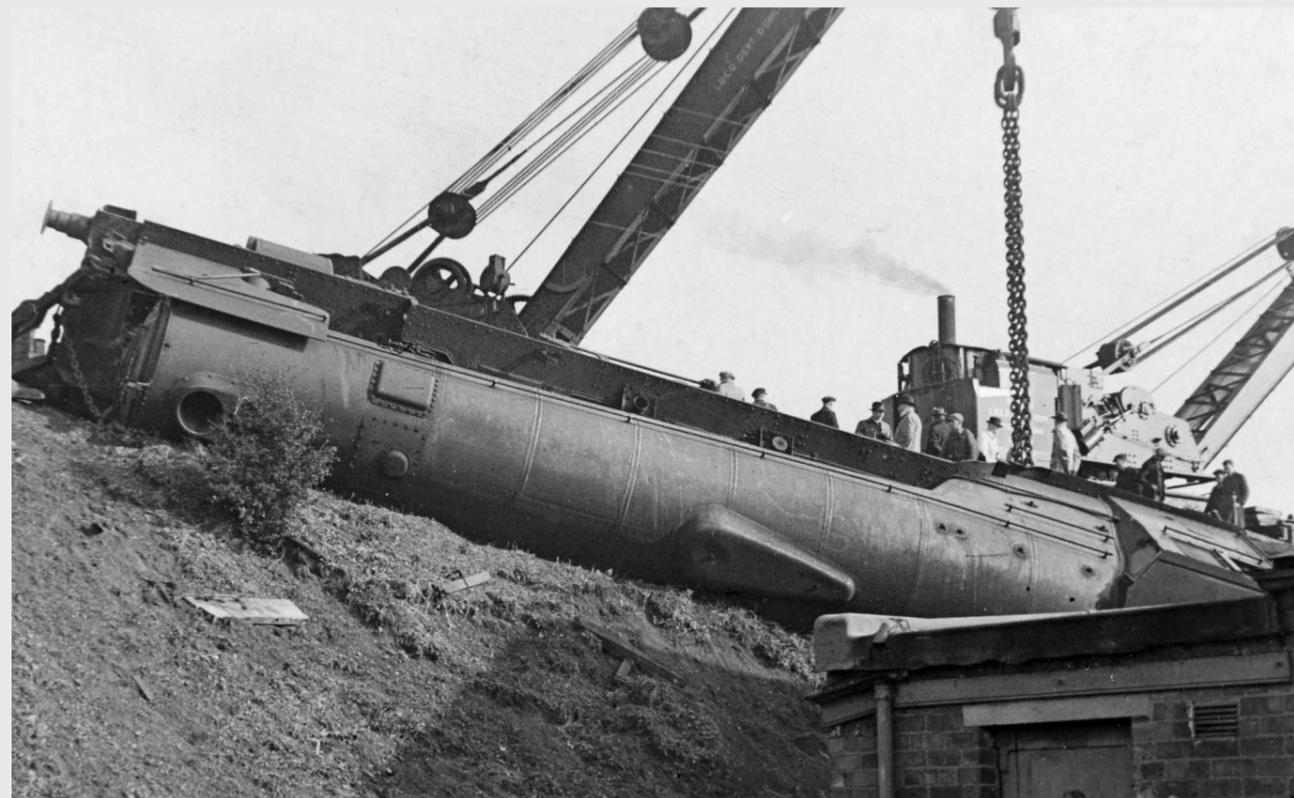
So, please remember The A1 Steam Locomotive Trust in your Will and you too can help to ensure that No. 60163 *Tornado*, No. 2007 *Prince of Wales*, No. 3403 and our subsequent locomotives have a secure future on the main line for generations to come. **TCC**



AI ACCIDENTS *by Graham Langer*

Serious incidents involving Peppercorn AIs are remarkable for their scarcity, especially given the enormous mileages the locomotives accumulated during their short careers. There were four accidents which resulted in serious damage to the locomotive concerned, none of which led to a loss of life. Only one involved a passenger train and therefore no official reports were filed concerning the others, making research on this subject quite a challenge. This article is the first in a short series covering the events in more detail.

Collision at Lincoln 25th October 1949 – No. 60123 (later H.A.Ivatt)



Stephen Williams

The upturned locomotive lying on the embankment side near Coulson Road, Lincoln.

No. 60123 may have been the unluckiest of the Peppercorn AIs, coming to grief twice during its career. In the early hours of Tuesday 25th October 1949, when the locomotive was only a few months old, it was involved in a collision with a goods train at Lincoln. It was still dark and conditions were foggy. No. 60123 (still unnamed) was working a fast goods train, the 00:10hrs King's Cross to Doncaster, on the Lincoln avoiding line (the 'High Line') under permissive block rules, in other words, proceeding on sight. The train would not have normally taken the loop line but had been diverted because of a broken rail at Claypole, which may have played some part in the ensuing drama. On the skew bridge over the Coulson Road, No. 60123 ran into the back of a slow-moving goods train, shattering the brake van before turning over on its side down the 30' embankment on which the line runs at that point. Both the crew of the AI and the three men in the brake van had lucky escapes and no-one was seriously injured. Both Peterborough men, driver of No. 60123, C. J. Basker, sustained a cut to his head and his mate, John Negus, suffered a cut eyebrow, whilst the guard, Fred Hunter, a Lincoln man, had a shoulder injury which required a trip to hospital for an X-ray and treatment. Travelling in the van with Hunter were a spare crew, driver F.Willis of Doncaster and guard George Sharrock, who received only minor injuries which were dealt with in Lincoln County Hospital.

It is remarkable that nobody in the brake van was badly injured since No. 60123 dashed it pieces before the van's wrecked stove then set what was left of the vehicle on fire! The remains of the van ended up at the bottom of the embankment with the AI nearly on top of it! Local people were roused from their sleep by the sound of roaring steam and called the local fire brigade who extinguished the burning brake van. The wreckage completely blocked both running lines and breakdown gangs from Peterborough, Lincoln, Colwick and Grimsby were summoned. Heavy rain made recovery operations difficult, preparatory work included removing the damaged rolling stock, re-laying the track and shoring up the embankment to provide a safe position for the crane outriggers. The loop line was back in operation the next day with trains proceeding with "extreme caution" as plans were finalised for lifting the locomotive on the Sunday of that week. Cranes from Peterborough and Colwick attended, the team including District Officers and Shed Masters and a young Allan Garraway who recorded events in his memoirs.

"The first job was to drag the tender up the bank, lay it on its side at the top, roll it over and put it on the track, a simple operation which took just over an hour." recorded Garraway. In fact, the tender was lifted from its resting place inverted, chains and hooks being passed through the frames. "The two cranes were then so positioned that they could both drag the back

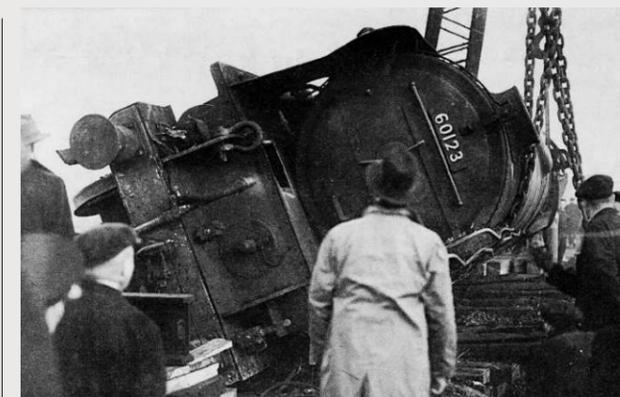
end of the engine up the embankment. Once that was on top of the bank, it was parallel to the track and the cranes were repositioned so that the engine could be rolled over onto its wheels. It was then a simple rerailing job, which was completed just as it was getting dark." The cranes were working at their limit, a process made all the more difficult by the lack of width in the formation at the top of the bank which required anchor foundations in addition to track clamps. The locomotive had been prepared for the lift by the removal of its ashpan and firedoor and most of the cab fittings and the subsequent preparation of an attachment through the firehole to which the cranes could be fastened. A week later the Grimsby crane and gang visited the site clear up the brake van and any other remaining debris.

No. 60123 was delivered to Doncaster on 7th November for a 'Light Casual Repair' (!) followed by repainting into BR express blue before its release in December.

In *Top Link*, Issue No.3, Spring 2002, we carried the following letter from Covenantor Stephen Williams which is worth re-printing to add some further detail to the story above. Stephen has very kindly scanned the images again which we can now reproduce in a much better format.

"You may be interested in the following information for your AI Datafile. It concerns an accident involving an almost brand-new AI Class locomotive at Lincoln in October 1949.

My grandparents lived in Coulson Road, Lincoln for a period after the Second World War. Beyond the back garden of their terraced house ran the Lincoln Avoiding Line, known to local railway enthusiasts as the "High Line" because it ran on an embankment in a roughly west – east direction across the south side of the City from Pyewipe Junction to Greetwell West junction. Part of the Great Northern & Great Eastern Joint Line, it enabled goods trains to avoid the notorious bottleneck at High



Lincolnshire Echo

Having been dragged to the top of the embankment, No. 60123 is lifted upright.

Street crossing near Lincoln Central Station.

My father recently gave me two black & white photographs (see attached) of a mishap involving an AI on the High Line in October 1949. One picture shows the locomotive lying on the embankment side near Coulson Road, the other one shows the damaged tender after being righted by the Peterborough Loco Dept. breakdown crane.

The locomotive was then unnamed, and had a double chimney of the earlier, unlippped variety. The tender is in light livery (presumably apple green) with 'BRITISH RAILWAYS' lettering. The first three numbers (601) on the front numberplate can be identified from the first photograph using a magnifying glass, but the fourth and fifth numbers are unclear. The origin of the photographs is unknown. Incidentally, I was only one year old at the time, and have no personal recollection of the accident!

Yours faithfully, Stephen Williams. (Trust Member no. 274)" **tcc**



Stephen Williams

No. 60123's tender after being righted by the Peterborough Loco Dept. breakdown crane.

AI PROFILE - No. 60131 OSPREY by Phil Champion



On 26th July 1952 Osprey passes Werrington.

No. 60131 was one of the earliest Peppercorn AIs built and one of the longest-lasting. It was one of 23 authorised in January 1947 for construction at Darlington. It was noted nearing completion at Darlington Works on 4th September, having been fitted with boiler No. 3911. As Works No. 2050 it was completed in October 1948, one of three to emerge from there that month along with two from Doncaster. Just three AIs had been built earlier. As with all Darlington-built AIs the cabsides and tender used countersunk rivets giving a smooth finish. Livery was LNER apple green with black and white lining and 'BRITISH RAILWAYS' on the tender.

On 2nd October it was seen at Darlington. It was the second AI allocated to King's Cross but, as more were built, became one of eight initially shedded there. The first working logged was the 14:12hrs Darlington -Leeds train on the 20th. Eight days later it was on the same train then seen at Neville Hill shed. The first working logged in the capital was leaving King's Cross on 18th December with the down 13:00hrs train. The first named train for No. 60131 was the up 'Queen of Scots' from Leeds to King's Cross on 2nd April 1949. On the 11th it followed the 13:55hrs up into King's Cross with the down 17:30hrs 'Yorkshire Pullman' of eight coaches. Runs logged seemed to be from Leeds to King's Cross with shed sightings at Neville Hill and New England. The first non-passenger run recorded was the down 19:05hrs parcels from King's Cross on 11th June. Two days later came its third named train with the up 'White Rose'. The 18th February 1950 marked No. 60131's first sighting further north in Newcastle though it was seen

there several times over the next two months.

Repainting into BR blue came, during a month and a half for classified repairs at Doncaster Works, in June 1950, along with two others, 24 having appeared in blue earlier. At the same time it was named *Osprey*, one of six AIs named after birds and one of four to use an ex-A4 name. It was previously carried by LNER No. 4494 (which later became BR No. 60003). This was one of the earliest AI namings and one of three that month following six named earlier. Sightings indicate Newcastle to King's Cross was its sphere of operations with shed sightings at York and Doncaster. There were normal trains like the 13:55hrs into the capital on 19th August. A number of named trains were hauled by *Osprey*, the up 'Tees-Tyne Pullman' on 9th August with the down 'Yorkshire Pullman' the next day and 2nd September and the up 'Norseman' of 6th August. However, 17th September has a record of No. 60131 failing at Newark with the 09:50hrs Glasgow-King's Cross.

A couple more 'namers' were the down 'West Riding' on 15th May 1951 and the down 'Flying Scotsman' into Newcastle on 1st August.

In September 1951 No. 60131 was one of eight moved to Grantham. *Osprey* was one of the early AIs in BR green, being repainted in September 1951 following a 'Heavy Intermediate' at Doncaster along with two others. Workings continued on the main line between Tyneside and London with passenger trains, 'namers' like the down 'Flying Scotsman' of 27th December and parcels trains like that on 31st May 1952 in King's Cross station. However, on 27th June *Osprey* was failed in King's Cross station. The locomotive's most prestigious working came in January 1953 when No. 60131 hauled the Royal Train from Peterborough to Leadenham on the 9th where the train was stabled overnight then forward and on the 11th with the return to York then Peterborough, part of working the Royal Train from Wolferton to Edinburgh and back conveying HM the Queen, HRH the

Peter Townend

Michael Denholm



No. 60131 Osprey passes No. 60146 Peregrine on an up freight, 30th May 1964.

Duke of Edinburgh and HRH Princess Margaret. Normal workings through the mid-1950s were Leeds to King's Cross and return, with the 13:18hrs and 18:18hrs workings from the latter common. Named trains included the down 'Harrogate Sunday Pullman' (15th September 1953), the 07:50hrs down 'Bradford Flyer' (21st June 1954), the down 'West Riding' two days later, the down 08:50hrs 'White Rose' on 21st June 1958 plus many sightings of the up and down 'Queen of

Scots' between 1954 and 1959 often on a series of consecutive dates. During this period the locomotive visited Doncaster for its first general overhaul and boiler change (for boiler No. 10595) at the end of 1952, a return in February 1953 for light repairs including fitting Automatic Train Control (ATC) and another 'General' in the spring of 1958, receiving its third boiler, No. 29808. Two specials were hauled, one on 4th August 1958 from Leeds at 15:10hrs with 11 coaches to King's Cross arriving

at 19:18hrs and another from King's Cross on Sunday 9th August 1959. The first goods working noted was on 22nd July 1959 leaving King's Cross Goods at 12:24hrs with a Class C for Ardsley. The '50s closed with another general repair at Doncaster and the fitting, remarkably, of the locomotive's last boiler, No. 29779, a diagram 117 example. These Thompson boilers were 7 cwt heavier with thicker barrel plates and a dome further forward but hidden under a banjo - shaped dome. *Osprey* was one of 16 AIs to carry these at various times.

The new decade opened with a new 'namer', the down 'Night Scotsman' at 22:15hrs from King's Cross on 21st January. General trains were worked between Leeds and King's Cross in the early 1960s plus 'The Queen of Scots', 'Yorkshire Pullman', 'White Rose' and 'West Riding'. A Sunday diversion took No. 60131 past Lincoln on 2nd October 1960 on a King's Cross-Leeds/Hull train. Less common were a down passenger through Wetherby on 24th April 1961 and a Lincoln to Blackpool special was hauled through Doncaster on 29th July. On 8th April 1962 No. 60131 was reallocated to Ardsley shed along with three other AIs. There were some passenger workings like the up relief 'White Rose' on 24th April then in 1963 on 14th January the 07:45hrs Leeds-King's Cross arriving at 11:55hrs and the 18:18hrs King's Cross-Leeds on



No. 60131 dips Garsdale troughs with the 09:50hrs Edinburgh-Leeds 24th July 1965.

Roger Bastin



Neil Wilson

The end of the line at Neville Hill shed, 18th September 1965.

12th February. Going back to the North East after a decade No. 60131 hauled the 17:35hrs King's Cross-Newcastle on 14th February, being seen in Gateshead shed yard the next day. On the 17th it worked the IA43 Sunderland-King's Cross train. A Rugby Cup Final special was hauled from Leeds at 05:38hrs destined for King's Cross on 11th May 1963. On 27th July it was back to the North East again taking the Fridays only 09:30hrs Manchester-Newcastle forward from Leeds. There were, however, more sightings of No. 60131 on goods trains while at Ardsley, usually leaving King's Cross Goods at 20:58hrs for Ardsley. Wagons loads of 34, 38 and 41 vehicles were recorded with the heaviest being the 59 wagons on 11th January 1963.

A transfer to Neville Hill took place on 28th July 1963. The five A1s based here were intended to substitute for failed diesels on Leeds-Newcastle trains as well as cover Holbeck turns to Glasgow via the Settle and Carlisle line, especially in the summers of 1964/65 working reliefs or specials. Examples of the former are hauling the IS37 08:45hrs Leeds-Glasgow into Newcastle on 3rd August, being serviced on Gateshead before heading back with a Glasgow-York train. Three days later it took the 11:00hrs ex-Liverpool forward to Newcastle from Leeds, although on the 8th it brought the 13:59hrs ex-Millerhill Class 4 goods into King's Cross before heading a down goods. An excursion over the Settle &

Carlisle line was worked on the 10th with the 06:30hrs ex-Birmingham-Gourock CTAC special taken forward from Leeds to Glasgow, and on the 16th No. 60131 was noted in Ayr. Both the Settle & Carlisle and Waverley routes were taken on 9th September with the down 'Waverley' between Leeds and Edinburgh, servicing on Haymarket shed, working back from Edinburgh to Carlisle then the next day taking the 08:35hrs ex-Glasgow from Carlisle to Leeds. More local were the relief Leeds-Doncaster trains on 29th December. There were a few more non-passenger workings such as the up pigeons brought into Newcastle at 14:57hrs on 30th May 1964, the up parcels on the Durham coast line at Ryhope at 11:55hrs on 3rd July, a Glasgow-Preston goods on the 18th, then working an extraordinary double-heading of the down 'Lakes Express' with MetroVick Co-Bo No. D5713 from Preston. A range of duties and locations were apparent in 1964 including station pilot at York South on 11th June, an up parcels at Leeds at 07:57hrs on the 13th, a visit to Carlisle Kingmoor's long shed in steam 12th July, on the IX39 up military special at Carlisle on the 18th, then working a Glasgow to Carlisle stopping train nine days later. Even more diverse workings came with the Law Junction to Lostock Hall ECS on 2nd August with No. 60131 being seen on Lostock Hall shed the next day. While on 25th September *Osprey* took the 07:50hrs ex-Leeds to King's Cross

as far as Peterborough on 7th November it was back into Newcastle with a train originating from Liverpool.

Even in 1965 No. 60131 was still covering a wide area, sometimes with specials. It hauled the RCTS 'Tyne Solway' tour (itinerary Leeds-Stockton-Newcastle Carlisle-Leeds) on 21st March then on 29th April brought the 10:33hrs Huddersfield-King's Cross special into Doncaster. On 24th July it hauled the 09:50hrs Edinburgh-Leeds from Carlisle then on 14th August took the 09:30hrs ex-Manchester to Newcastle via the Durham coast and was later seen heading south light engine past Durham, its last recorded runs. Latterly *Osprey* was seen on Neville Hill shed, being withdrawn on the 4th, one of nine A1s withdrawn that month, remaining there until at least the 31st. Along with Nos. 60121/38/46/55 it went to T.W.Ward of Killamarsh for scrapping in November. The last sighting of it was on 8th December being cut up at Wards scrapyard in Beighton, Sheffield. With a service life of 17 years, No. 60131 was the third longest-serving A1, outlasting the class average by nearly two years and yet it had only carried a total of five boilers.

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, May 2020. TCC

Covenantors' Diary by Leigh Taylor



The office team hopes you are all well. It has been lovely for Lauren and I to communicate with many of you, throughout 2020, on the telephone and by email. With the works being closed to visitors and railtours postponed, it has been especially valuable to be able to share news about *Prince of Wales* and *Tornado* through *The Mikado Messenger* and *The Tornado Telegraph* and your feedback is always welcome.

Your 2021 supporter card and two books of raffle tickets for the spring 2021 draw were sent out in February. A data collection form was also included in the mailing; please could you return the form so that the office can keep an accurate record of your contact details, communication preferences and Gift

Aid status. If any these change over the next 12 months, please contact the office.

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 and Darlington Locomotive Works, however if that is not possible, we will organise another virtual event, as in 2020. Invitations will be sent out in due course. We hope to see you in person this year!

Due to the uncertainty of how Covid-19 restrictions will impact large gatherings at Heritage Railways, we are still in the planning stage for our annual Tornado Team and Supporters' Day. When we have firm plans, we will send invitations by post and information about them will also be available through *The Tornado Telegraph*, *The Mikado Messenger*, and *The Communication Cord*. TCC

DARLINGTON LOCOMOTIVE WORKS 2



Darlington Council have made public their ambitions for the Railway Heritage Quarter and residents and businesses have been invited to have their say on the proposals for the redevelopment of the Head of Steam – Darlington Railway Museum into a major new visitor attraction and museum.

The proposals intend to develop the existing museum on North Road, as well as surrounding heritage buildings, into a new world class major visitor destination before the 200th anniversary of the Stockton and Darlington Railway in 2025.

The development will combine multiple listed buildings to create a unique visitor experience.

The refurbishment scheme comprises:

- **Goods Shed** – visitor centre, café and display space in remodelled and refurbished Grade II* Listed building
- **Head of Steam (Existing Museum)** – major exhibition and interpretation space in remodelled and refurbished Grade II* Listed building
- **Carriage Works** – archive, study area, function and temporary exhibition space in remodelled and refurbished Grade II* Listed building
- **Live Engineering Works** – a purpose-built facility for the creation and maintenance of steam locomotives by A1 Steam Locomotive Trust with public

viewing facilities and interpretation

- **1861 Building** – a facility for the repair, maintenance, storage and display of locomotives and associated rail artefacts.
- **Lime Cells** – refurbished Grade II Listed building
Councillor Andy Keir, Cabinet member for Local Services, said, "These are exciting and ambitious plans, which would see a world class rail heritage visitor attraction developed in Darlington in time for 2025. I would encourage residents, businesses – and anyone with an interest in rail heritage – to look at the plans and share their views."

TCC



On 26th September 2020, Tornado stands on the York turntable between duties.

P2 ENGINEERING UPDATE *by David Elliott*

General

Further steady progress has been achieved in spite of two further Covid-19 lockdowns. Luckily, the present lockdown is slightly less severe than the one last Spring and we have all got better at working with (and round) them!

We have experienced an above-average occurrence of unforeseen problems in production in a number of components, however at the present time these are fortunately not threatening the completion date for the locomotive.

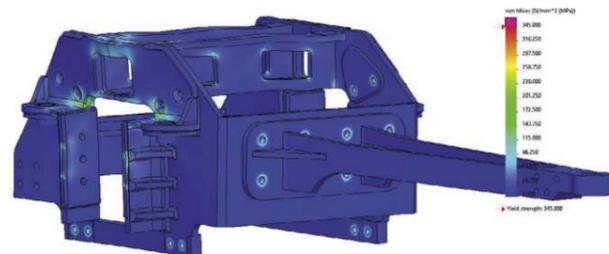
Frames

The “shelf” under the cab which requires two tight radius bends into a flange at each end has proved to be rather more of a challenge than originally expected. It turned out that our pressing capacity at Darlington Locomotive Works (DLW) was not up to the task. Enquiries were sent out to find someone to complete the hot bending, but these proved to be very expensive due to the amount of tooling required. As a result, the decision has been taken to carry out a minor re-design to convert the shelf into a welded fabrication – a process we have become skilled at on other parts of the frame structure. This will involve full penetration welding of the flanges onto the main plate. The result will be in form and function identical to the original design.

Pony Truck

The expected delivery of the pony truck did not materialize because North View Engineering Services discovered that the gap between the horn faces (after the manganese steel liners had been welded on) is insufficient to get the smallest right angle head of a milling machine into the resultant space. 11-14% manganese steel used for the liners is a difficult material to machine. The reason it is used to line the hornblocks (and associated cannon/axleboxes) is that it has a work hardening property. The more it is subjected to percussion or movement the harder it becomes which makes it an ideal choice for locomotive hornblocks. Machining in the “soft” annealed state has to be carried out at high speed with as few deep cuts as possible as each passage of a cutting tool starts the hardening process. NVES ordered some special tooling to machine the opposing faces of the hornblocks which took some time to arrive, after which the machine operator succumbed to Covid-19 (from which he has since fully recovered). However, on resuming the new tooling was found not to be up to the job, so another approach is being sought.

Daniela has continued work on developing a Finite Element Analysis (FEA) model in collaboration with Ricardo Rail of the pony truck to provide scientifically backed evidence that it complies with current international design standards. The initial problem is that there is no current international or national standard for a pony truck as modern rail vehicles do not use them. The nearest we can get are regulations applying to bogies. The present work is seeking a common agreement on how many of the bogie requirements can be read over to the pony truck and Ricardo think that we are not far off reaching agreement on all the force conditions (vertical, lateral, longitudinal, twist etc.) that will apply to a bogie. The full panoply of load cases will then be



Pony truck FEA analysis - 100 times exaggerated displacement.

Daniela Flovd



Leigh Taylor

The first attempt at forming the “shelf” to go under the footplate.



Leigh Taylor

Progress machining the pony truck steering arm at North View Engineering.



Leigh Taylor

Machining the pony truck hornguides at NVES.

applied to the FEA model to check that the new pony truck design will cope with them in extremis. The preliminary output from this and the FEA work carried out during design is suggesting that there is plenty of margin and that it is extremely unlikely to fall apart in service.

Boiler

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



Above: Boiler #2 (or is it #3?). Drilling the outer firebox throatplate for stays.

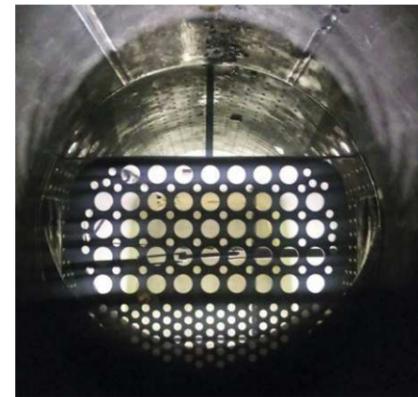
Centre Right: Looking more like a colander, the outer firebox is fully drilled for stays.



The firebox is then offered up to the boiler barrel...



... and welded in place.



Above: The firebox tubeplate is tried for size.



The inner firebox welded up.



Above: The boiler shell in Meiningen’s X-ray room for weld checking.

Right: A view of the firebox combustion chamber with the tubeplate welded in place (this makes an interesting comparison with the photo of the same area on page 6 of Richard Pearson’s *A1 engineering piece*).



Above: Welded seams detail, firebox.



(all photos by DB Meiningen - except where marked)



A series of photos showing the machining of the boiler supports from solid steel.

Locomotive Maintenance Services at Loughborough were given the job of applying the bronze coating on the regulator cross shafts where they pass through the glands in the stuffing boxes. However, the first time they did this a number of gas bubbles formed in the bronze layer. Eventually after considerable experimentation with combinations of material, TIG welder and shielding, gas pressure has been achieved and the cross shafts are back at DLW enabling Ed Laxton to complete the machining of the stuffing boxes for the two new boilers.



The machined regulator stuffing box.



The regulator cross shaft.

Motion

In addition to the two intermediate coupling rods, we now have the two fully machined leading coupling rods which Ian Matthews has fettled and polished to the same standard as the intermediate rods. Meanwhile, Stephenson's have almost completed machining the trailing coupling rods. The inside connecting rod has been forged and the outside connecting rods are not far behind.

Right: The newly forged inside connecting rod.

Below: An outside connecting rod.



The machined oil pot on the connecting rod.



Above: The leading connecting rod being machined at Stephenson's.



Christmas came early at DLW – the leading connecting rods were delivered by Stephenson's.



Ian polishing the leading coupling rods.

With delivery of the four rod crank pin bushes for the intermediate rods from LMS, with some minor adjustments to suit their individual positions and with manufacture of some special tools to facilitate fitting and removal, they have all been pressed into their respective rod eyes. Drawings are being prepared for the remaining coupling rod bushes and for the gradient pins which connect the rods together and permit them to hinge in the vertical plane to cope with uneven track.



The polished leading coupling rods.



The first rod bush pressed home.

Cylinders and valves

David Elliott completed 3D printing the 1:8 scale model of the cylinder block which enabled production of a Powerpoint slide show suggesting a logical sequence for welding the many parts of the cylinder block together. This was incorporated in our request for Expressions of Interest (EOI) which was sent to several large fabrication companies. Having received a number of compliant responses, we are in the process of selecting a shortlist. In the meantime, Alan Parkin continues to produce drawings for all the components which make up the cylinder block (presently in excess of 44 individual drawings) and is also working on an assembly drawing which will enable a prospective builder to quote accurately for the work. Requests for detailed quotations will be issued in the near future to the companies on our shortlist.

Having placed an order with Frewer Engineering in December for the Computational Fluid Dynamics (CFD) study of the cylinder block, they have completed the work in a remarkably short time. Please see the accompanying piece by Ben McDonald who has been overseeing it from our end which explains the process and results.

The outcome is that the block is about as good as we are going to be able to make it but will benefit from a few improvements by rounding sharp edges in a few places which will be incorporated into the final design before construction starts.

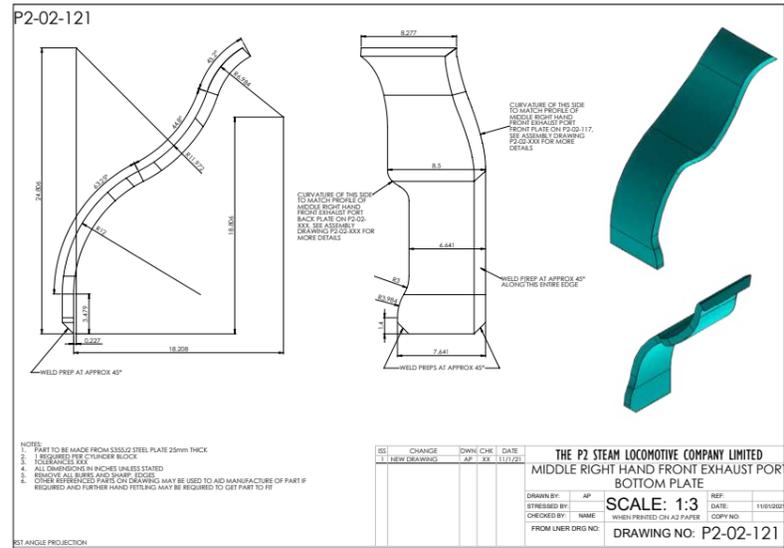
During the Christmas/New Year interregnum, with lockdown in force, your Director of P2 Engineering staved off boredom by 3D printing a full-sized Lentz/Franklin inlet valve as these are difficult to describe!

I am pleased to report that we have been successful in finding some temporary

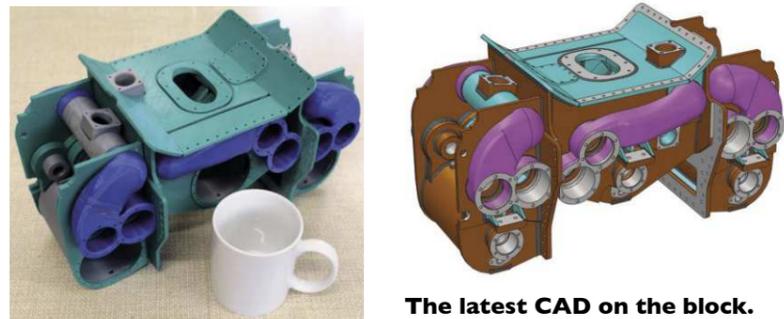
additional CAD drafting capability in the form of Martin Shepherd, formerly a CAD designer with Jaguar Landrover who also led a team which fully restored and overhauled a Portuguese narrow-gauge

Martin Shepherd.

locomotive for the Leighton Buzzard Light Railway. Martin quickly got stuck into the detailed design and drawings for the cam and gearboxes for the Lentz/Franklin valve gear including seeking opening discussions with gear manufacturers for the several gears in the valve and reverser operating mechanisms. He is completing detailed drawings of the cam boxes, cam box covers and cam box gear casing to enable us to send requests for quotations to pattern makers and foundries for these cast spheroidal graphite iron components.



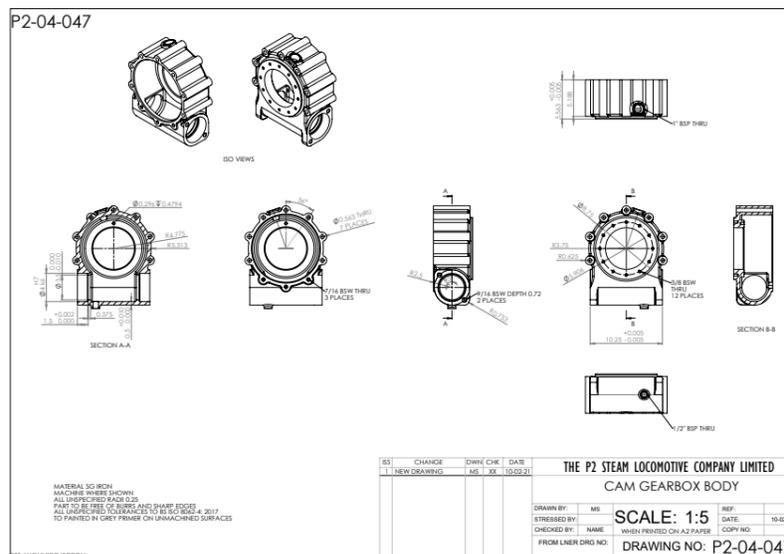
Alan Parkin's 3D CAD drawings.



Above: The assembled 1:8 scale 3D printed model of the cylinder block (mug for scale).

Right: The printed valve (mug for scale).

Below: Some of Martin's handiwork.



Running gear – Brakes

Triple T at Newton Aycliffe have now delivered all the complicated Y shaped brake hangers which have necessitated CNC machining which means that we now have all the main components for the engine brake rigging at DLW. As soon as Ed Laxton has finished making and pressing the mild steel bushes into the six complex leading brake hangers, we will carry out a trial installation. This will enable us to measure the required true lengths of the non-adjustable brake rods to have the remaining forks welded on their ends.

Whilst the construction of *Prince of Wales* has thrown up a significant number of problems over the years, sometimes good fortune strikes! Air brake cylinders have been threatening to become a serious problem. Having designed the air brake system for the engine and tender to be similar to that on *Tornado* including using the same 12" bore 12" stroke brake cylinders, attempts to procure the MZT Hepos made cylinders have come to nothing. MZR Hepos are based in Skopje, Macedonia and were taken over several years ago by Wabtec. After several unsuccessful attempts to communicate with Wabtec's sales organisation it appears that these brake cylinders are out of production. We approached one of our brake equipment overhaulers/suppliers to see if they could supply or make a like-for-like alternative. This turned into an offer to make new cylinders, however compared with what we were last quoted in 2012, the price was eye watering! It might have been possible to modify the brake equipment to take different cylinders, however this would involve a fair amount of design work with some possibly expensive certification activity as brakes fall into the safety critical category.

As a result of this a decision was taken to dismantle *Tornado's* spare brake cylinder and to reverse engineer it into an accurate and detailed 3D model so that we could, if necessary, create production drawings and make our own new cylinders. This involved making some special equipment for dismantling and reassembling the cylinder as it contains two long and powerful coil springs which if released suddenly could do the operator considerable harm. This gear will come in handy when we start having to overhaul brake cylinders for either engine. The dismantling and assembly process was photographed in detail to aid making a proper overhaul manual for the cylinders.

Shortly after we reassembled the spare *Tornado* cylinder, Bingo! Huw Parker, our Operations Director, obviously feeling rather bored in these Covid times, was surfing the internet for sites that offer spares for locomotives and rolling stock and came across an advertisement of four unused 12" brake cylinders! Contact was established with their owner, Bressingham Steam Museum, which kindly offered to send them to us on a sale or return basis. On close inspection these turned out to be almost identical to our existing cylinders, the only differences being that the bush in the piston rod eye is 31mm bore as opposed to 41mm and there are no holes in the bolting flanges which attach them to engine frames. Both of these problems are readily rectified.

All four cylinders have been tested on air at up to 100psi, work properly and do not appear to be leaking. Their maker's plates (MZT Hepos) date them to September 2003, so before they go into traffic, they will require dismantling to check the condition of the rubber seals. As a result of this, a deal with Bressingham has been done and potential delay to the project has been eliminated. In the meantime, the *Tornado* spare has been temporarily fitted to the frame in the rear position and after some subtle adjustment of the forks on the brake cross shaft, works correctly.



The 'Y' shaped brake hanger being machined.



The 'Y' shaped brake hanger.



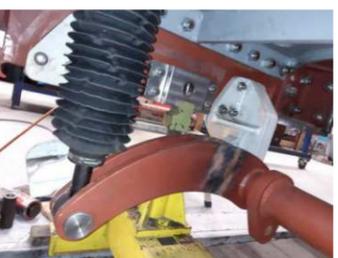
The six complex leading brake hangers.



Brake cylinder on test.



Brake cylinder connected to rear brake cross shaft.



Brake cylinder and cross shaft with piston rod fully extended.

Cylinder drain cocks

It is now possible to operate the lever in the cab and see the shaft rotate under the front of the engine, the cranks of which couple directly to the cylinder drain cocks.

Tender

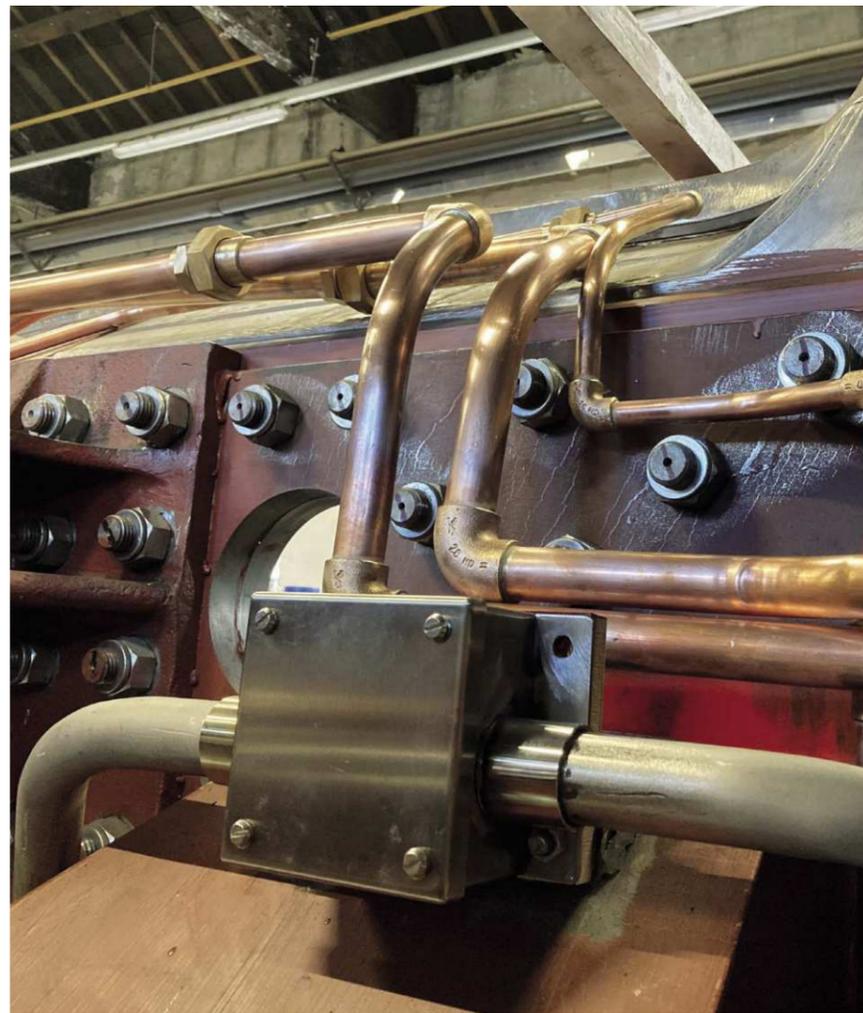
Further progress is being made at I D Howitt Ltd at Crofton, Wakefield with the tender frames. All the hornblocks have had their manganese steel liners finish machined and are now permanently mounted on the frames. Good progress has been made with details of the brake and hand brake linkage.



Right: The tender hornguides being set up at Crofton and below the hornguides finish-fitted.

Pipework and fittings

The metric pipework for the air and brake systems along with the Pegler GHD fittings have been delivered and Ian Matthews has cut, bent and fitted a fair amount of it to the frames including the brake and reservoir pipes to the front buffer beam, sander pipework, main reservoir and air pump control pipework.



Some of the pipework in position.



Above: Tender brake stay and bearing details.

Ian Howitt Engineering



Some of the pipe fittings.

Leigh Taylor



Ian Matthews bending copper pipe for the air brake system.

David Elliott

Terry Graham, in his recently adopted role of procurement, has sourced almost all the imperial pipe sizes we need and this will be ordered shortly along with the raw materials to make the LNER style fittings.

We now have the two overhauled air pumps at DLW that are due to be fitted to *Prince of Wales*. In order to make these standard with the air pumps on *Tornado* and our spare, some modifications are required including fitting lifting lugs from angle iron to the top of the low-pressure air cylinder, as the "standard" European lifting eye which screws into the oil feed adapter on the extreme top of the pump is useless in our application as it fouls the underside of the boiler cladding and is impossible to use with a chain hoist under the engine. To overcome this, we fit lifting lugs on both sides of the low-pressure air cylinder head and use two 250kg chain hoists attached to a lifting beam which can be rapidly installed and removed above the pump, enables the pump to be carefully lowered into or raised from a pit under the engine.

In order to fit the new lifting lugs it is necessary to remove two cylinder head studs on each side and replace them with longer ones. This process had been carried out successfully on the first pump, but the last stud on the second pump sheared. An attempt was made then to use a stud extractor to remove the broken stud, however that sheared as well. The presence of a hardened steel broken stud extractor presents a more serious problem as ordinary drills will not look at it. Additionally, access to the stud hole with the pump assembled was difficult. Not wishing to incur the not



Rear air pump is lowered into pit.



The guide for the drill and tap in place.



Pieces of broken stud and stud extractor.



Helicoil and insertion tool.



Helicoil inserted.



Air pump split with new stud fitted.

inconsiderable time delay and expense of sending the pump back to Meiningen to fix it, some lateral thinking was called for.

To start with the pump was set up lying horizontally on a bench with various wood packers under it to support it evenly. It was then split at the low-pressure cylinder head and carefully drawn apart until the pistons in the steam cylinder was at the bottom of its stroke and that in the high pressure air cylinder at the top of its stroke. This provided better access to the broken stud and about a nine-inch gap to insert tools. A DeWalt 90 degree battery drill was used with a 12mm diamond tipped tile cutting core drill to very slowly

(over about two and a half hours) drill through the stud and stud extractor. Once all the pieces of the broken stud extractor were out of the way, a conventional drill was used to remove the remaining stud within the threads in the cast iron cylinder block.

A tap was then passed through to clean the thread. In spite of being made in Europe, the air pump, in deference to the original Westinghouse license, uses American threads – in this case 5/8" UNC. Unfortunately, the thread was somewhat damaged so a repair was undertaken by tapping it out and fitting a Helicoil insert. The pump is now safely reassembled.

Photos: David Elliott

David Elliott

Electrical System

Rob Morland has continued to work on the electrical system design in his home workshop near Cambridge.

Most recent effort has been on documentation, with the largest task being the clause-by-clause assessment of the system design against applicable standards. Whilst the new heritage standard RIS-4472-RST makes this job easier, there are still over 15 standards that need to be considered. The design needs to be assessed for compliance against each applicable clause, with mitigations being developed where full compliance is not achievable. Once complete, the standards assessment and previously completed Hazard Log for the electrical system will be reviewed by Graham Nicholas, the Trust's Professional Head of Engineering.

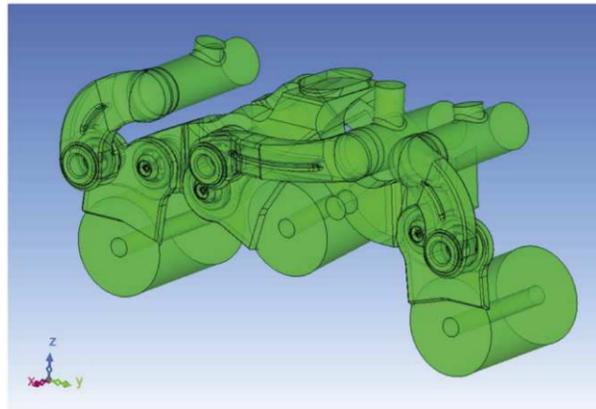
Since TCC 59 some remaining items of design have also been completed, including the addition of data cabling to the engine. A start has also been made on the tender wiring design. The bulk of the tender system design is awaiting appointment of the East Coast Digital Project ETCS equipment supplier, as this will determine the exact location of equipment and wiring routes.

Plans for the next period include the assembly and workshop testing of the new Axle Driven Alternator (ADA). **tcc**

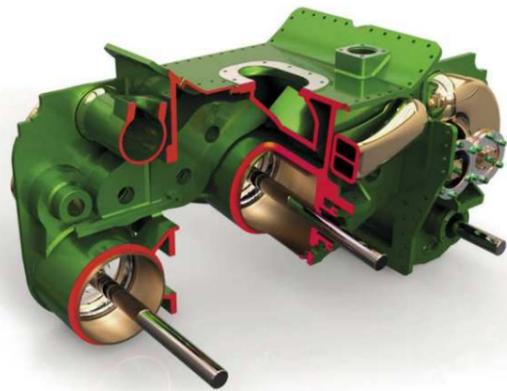
FLUID DYNAMICS by Ben McDonald

As part of the continued application of modern techniques in the design and development of the P2, the P2SLC contracted the services of Frewer Engineering to undertake a Computational Fluid Dynamics analysis of the inlet and exhaust steam passages of the cylinder block to ensure that these were both optimised and free of avoidable throttling.

Frewer's took the P2SLC's computer model of the cylinder assembly and converted this into a model of the steam passages. To reduce the computing time the model was split in half, taking advantage of the symmetry of the port designs. This left only the rear passages to be analysed.



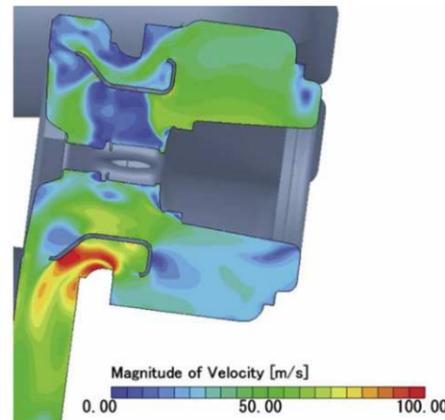
3D model of the steam passageways at the rear of the cylinder block.



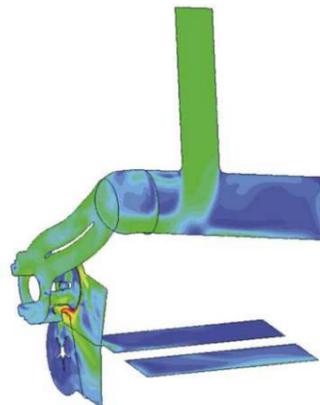
Rendered sectioned view of the cylinder block showing the cross section of some of the passageways.

Each inlet and exhaust valve was simulated individually with the start and end conditions of the models for steam pressure, temperature and flow rate provided based on the performance of No. 60163. The results of this analysis have confirmed that the design of the modified fabricated cylinder block is as efficient as it can be given the design restrictions. The study has confirmed that the highest pressure drop is through the small cross sectional area of the valves themselves.

Several areas have been identified where minor modifications can be made to further improve the flow which will now be subject to a design review to determine the impact of adopting them. **tcc**



Cross section colour plot showing the change in steam flow velocity through an inlet valve.



An image showing the flow velocity through the centre intake valve.

THE P2 SUPPORT COACH APPEAL by Mark Allatt

A unique opportunity has arisen for The AI 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 AI 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 AI 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 as part of The AI Steam

Locomotive Trust's 30th Anniversary Appeals, The P2 Support Coach Appeal has got off to a good start and by the middle of February had already attracted over 40 supporters donating almost £40,000 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.

Whilst it looks unlikely that we will be able to restart the P2 Roadshow programme any time soon, we are currently looking at ways in which we can re-open Darlington Locomotive Works for pre-booked guided tours. In addition, after receiving such positive feedback from the virtual annual convention, we are working on an on-line substitute - please keep an eye on our website for the latest updates. Thank you in advance for your patience and understanding.

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.

We would encourage you to attend and bring along some friends and family members who would be interested in hearing about the project. The two-hour presentation will start promptly at 11:00hrs and run until 13:00hrs and is open to existing supporters and interested members of the public:

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

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!



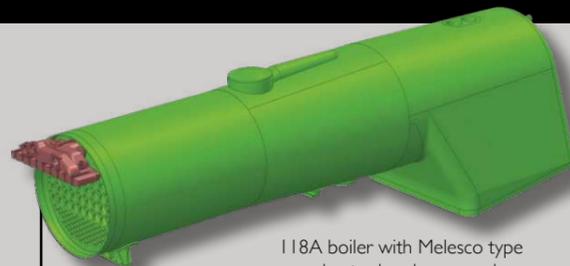
The boiler is the beating heart of a steam locomotive and to keep the construction of No. 2007 *Prince of Wales* on schedule for completion in 2021, we placed the order for the boiler in 2019 for delivery in January 2021. We have established The Boiler Club to fund the construction of *Prince of Wales*' 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!

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, FREEPOST RTJS-XECR-XARL, The A1 Steam Locomotive Trust, Hopetown Lane, Darlington DL3 6RQ



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

THE RACE IS ON TO GET UP STEAM! by Mark Allatt

Only nine months until No. 2007's boiler is delivered.

In June 2019 the starting gun was fired with the order of two new boilers from DB Meiningen – and we now have less than 9 months to raise all of the funds necessary to pay for No. 2007's boiler – that's more than one new member recruited to The Boiler Club every four days! By the beginning of February 2021, The Boiler Club fundraising campaign had recruited over 70 per cent of its target membership with pledges of almost £430,000 excluding Gift Aid. Launched in October 2014 to raise the £600,000 needed to pay for the manufacture of the boiler, The Boiler Club now has 214 members who have each donated or pledged £2,000 (plus Gift Aid).

Following the success of The Founders Club, which was designed to get to the P2 Project to the point of cutting No. 2007's frames, the Trust established The Boiler Club to fund the construction of *Prince of Wales*' boiler. It is the Trust's desire to leave No. 2007 *Prince of Wales*

debt free upon completion and therefore its 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). In return for this commitment, members of The Boiler Club receive these special benefits:

- Opportunity to buy ticket (seat already reserved) on No. 2007's first main line train
- 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* – 'Dream Team' by renowned railway artist Chris Ludlow
- Special supporters' day with *Tornado*.

Passing the 70 per cent point in the funding of No. 2007 *Prince of Wales*' boiler through The Boiler Club marks a significant milestone in the project to build Britain's most powerful steam locomotive. 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 within three years we need to take delivery of the new boiler in 2021.

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

The A1 Steam Locomotive Trust is raising funds for the manufacture of the boilers for the new Gresley class P2 No. 2007 *Prince of Wales*. If there are surplus funds left over following the manufacture of the boilers, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have. **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 2020. 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 Turbogenerator 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 Turbogenerator 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*
 - 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 early February, the fundraising campaign for The Turbogenerator Club had already 'generated' 27 members of the initial target of 40 members, each contributing £1,000.

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

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**

STEADY PROGRESS DESPITE THE IMPACT OF COVID-19

by Mark Allatt

**Over £2.5m spent – and more than £3.8m donated
- of £5m target**



Gresley class P2 No. 2007 Prince of Wales.

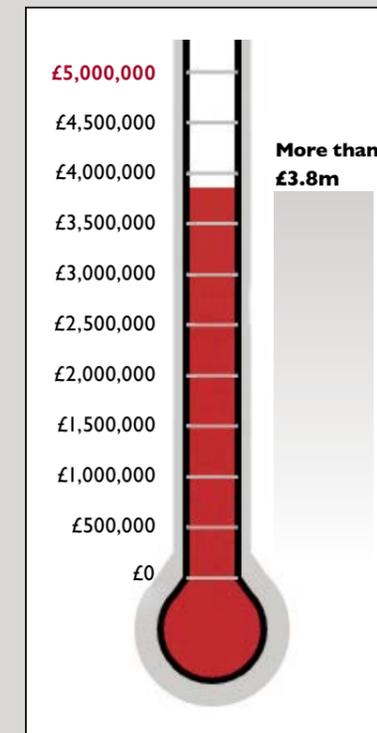
As you will have read elsewhere in this edition of *TCC*, even in these difficult times our project to build Gresley class P2 No. 2007 Prince of Wales continues to make solid progress on all fronts. It's still difficult to ascertain at the time of writing what the long-term impact of the coronavirus 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 remains the recruitment of new Covenantors due to the lack of opportunities to talk to potential supporters face-to-face. 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 940 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 still over £15 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. However, due to the coronavirus we have had to suspend our programme of Works Open Days and P2 Roadshows in 2021 and so are not getting the face time with potential new supporters. 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. This is ever more important as we move into our second year of lockdowns and limitations on meeting in person.

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, is also fully subscribed with 100 people (initial target) 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 target for The Boiler Club as soon as possible. We have already recruited 216 people to The Boiler Club, each of whom have pledged £2,000 each to fund the boiler meaning that over £430,000 of the £600,000 target (excluding Gift



Donated to date.

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 eight 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 £210,000 from 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 and the first pair of coupling rods were delivered to DLW in time for the virtual convention. As of the end of October 2020, we had recruited 175 members to

The Motion Club, with £175,000 pledged excluding Gift Aid – at last reaching the initial target, proof indeed that visible progress really does drive donations.

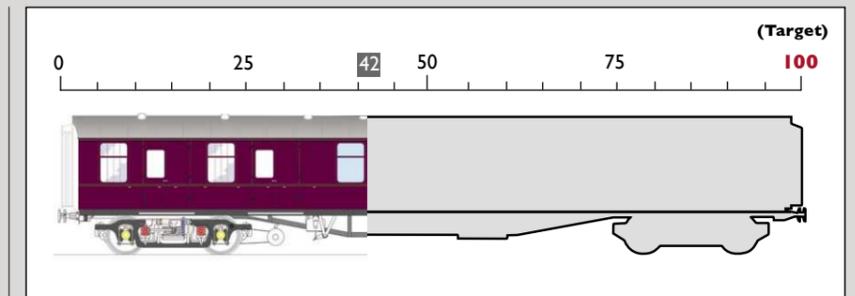
We launched The Tender Club in April 2019 to raise the funds to manufacture No. 2007's tender. We set ourselves the challenge of raising £450,000 through The Tender Club from 250 supporters each donating £1,500 (plus Gift Aid) to the project in up to 15 payments of £100 by standing order. The Tender Club got off to a rather slow start, but progress has been steady, and we have now recruited more than 90 people as the end of February which 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 – apologies for the pun - we are 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 and has recruited over 30 supporters that have signed up enabling us to also fund some of the required certification.

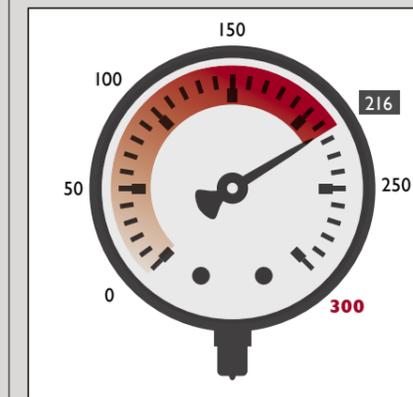
Spurred on by this success, we launched The Turbogen Club in July 2020 and by the end of February the fundraising campaign has already 'generated' 34 members of the initial target of 40 members each contributing £1,000. Please do take a look and consider joining The Turbogen Club before it reaches its target.

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 have already recruited over 40 supporters which is a fantastic start - if you haven't already done so, please do consider stepping on-board.

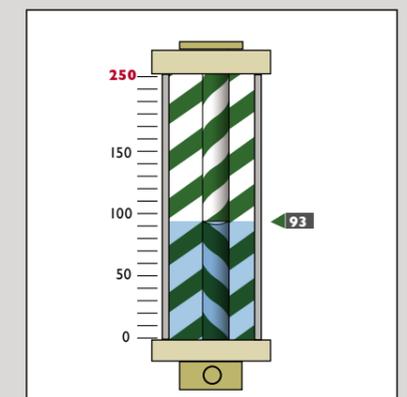
Our Dedicated Donations initiative continues to generate substantial income for the project, with over £400,000 to-date from existing supporters sponsoring a variety of components. There are still a considerable number of wheeling-related Dedicated Donations still available for sponsorship, ranging from a driving wheel



The P2 Coach Appeal - 42 supporters.



Boiler Club Gauge - 216 Members.

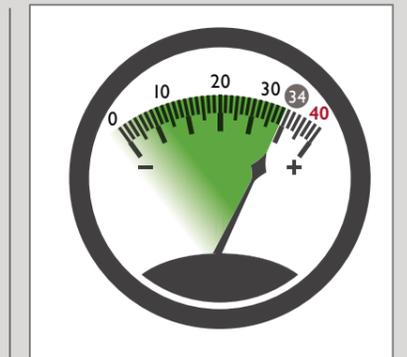


Tender Club Gauge - 93 Members.

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 a driving wheel casting & proof machining at £12,000 (or from £200 per month for 60 months). We have also 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 £2.5m (over half of the total required) converted into metal and more than £3.8m (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.



Turbogen Club - 34 Members.

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 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**

WORKSHOP NOTES



Ian MacCabe

No. 2001 stands at Edinburgh Waverley during WW2.

Ian MacCabe of the Gresley Society recently sent us this colourised rendering of a black and white photo in his possession, Ian noted, "Here is a recent colourisation I have completed of a black & white print I have had for many years of *Cock o' the North* at Edinburgh Waverley. It wasn't until I got to the smokebox area that I noticed for the first time that the chime whistle has been replaced by the standard LNER bell type. As you will know, along with the A4's this was a wartime expedient to prevent confusion with air raid sirens which helps to date the photo."



Steve Davies has recently acquired two volumes of 'Locomotives' by A. M. Bell which features an image of No. 2001 embossed on the cover and includes M. Secretan's famous image of the locomotive as well as a section on poppet valves.



Ann Glen

No. 2001 at 'full chat' in Scotland.

Ann Glen, railway historian and long-time supporter of the Trust, has recently sent us this image taken by her father of No. 2001 in Scotland. As far as we know it has never been published.

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.

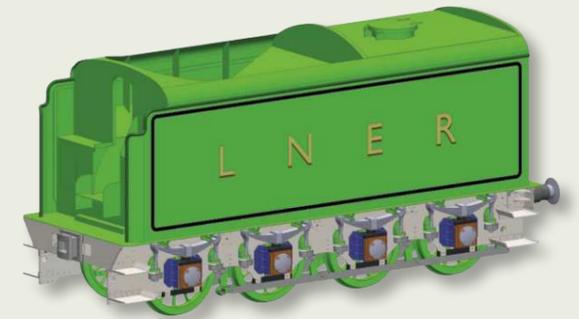
Substantial progress has been made on the tender with the erection of the tender frames by ID Howitt of Crofton (now over two-thirds complete), the construction of the tender tank by North View Engineering Solutions Ltd of Darlington (structurally complete, delivered to DLW in March, primed & undercoated 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.

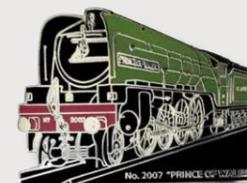
The tender tank is a fully welded structure made from weathering steel (as used on motorway bridges and the Angel of the North) to provide improved resistance to corrosion. The main visible differences with the new tender when compared to that of *Tornado* is the curving inwards of the side sheets at 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 early February, The Tender Club had recruited 93 members of its 250 members target meaning that only £139,500 (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 glamorous 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 -

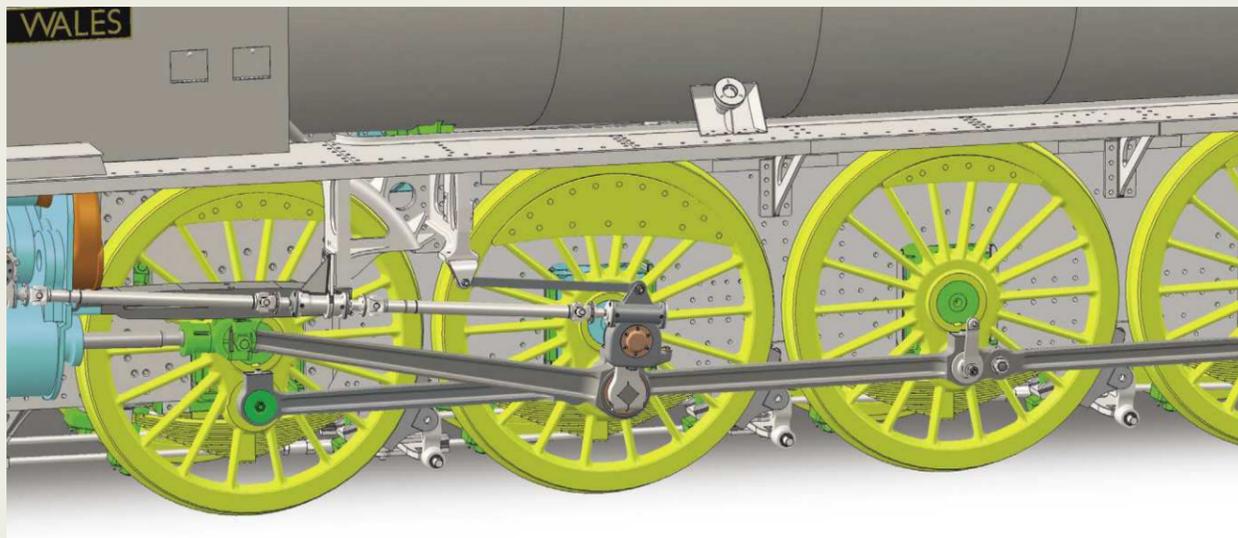


The Boiler Club, The Mikado Club, The Cylinder Club, The Motion Club, The Tender Club - All Club Badges £5.00 each (Badges shown actual size)

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 the end of July 2020 we had recruited all 175 members to The Motion Club, with £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 for 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 and one was exhibited at Darlington Locomotive Works during last year's Convention. These were joined by two more coupling rod forgings and as you will read elsewhere in this issue of *TCC* all four are being machined over next few months. Orders are 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 have reached 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



Julian Birley

LNER No. 163 stands in the snow outside the NRM.

Winter 2001 - *The Pioneer* for winter 2001 reported Mark Allatt's drive to increase Covenantor numbers, the aim being to recruit another 300 supporters to the cause and by the time issue No. 36 appeared 100 extra names had been added to the list. On the construction front, David Elliott was grappling with the manner in which *Tornado's* hornblocks could be finish-machined and much progress had been made in assembling the locomotive's bogie. Just as important as physical construction, further progress was being made with Railtrack's Vehicle Acceptance Body (VAB), accumulating all the vital paperwork required for main line certification and deciding which elements had 'Grandfather Rights' and which required additional certification or derogation.

Winter 2006 - North View Engineering made progress on the valve heads and spindles and machining the valve spindle crosshead guides was completed in February at DLW. During the autumn the Trust was making great progress with the valve gear and motion components. The valve heads and spindles were now completed and in the works in Darlington. A pallet of components including front boiler support, regulator castings, regulator stuffing box, water gauge assemblies, fusible and washout plugs, and one blow down valve was despatched to Meiningen. The rocking grate mechanism was ordered from North View Engineering.

Winter 2011 - *Tornado's* imminent change to BR Green livery meant we couldn't resist a brief flight of fantasy with our locomotive as her designers intended. Andrew Hancock of Simply Stripes Signmakers of Spennymoor supplied and fitted the vinyls to give No. 60163, sorry, No. 163, a brief spell in LNER livery! Following this the locomotive was taken into the engineering bay at the National Railway Museum to be stripped for her winter overhaul and to allow the boiler to be removed for its return to Meiningen for rectification work. Work commenced on rubbing the rest of the engine and tender down for a new coat of paint.

Winter 2016 - After an outstanding season during 2015, *Tornado* made an early start in 2016, hauling 'The Belmond British Pullman' on 6th February and 'The Red Rose' on the 14th of the same month. Meanwhile at DLW and other locations, significant progress continued to be made with the construction of No. 2007, stays began to appear between the frame plates, a pattern for the chimney had been made by South Lincs Patterns, the cab had been bolt-assembled and lifted onto the footplate and Boro' Foundry had completed machining and drilling the tender frame plates. In other news David Champion was appointed Trust President and in *TCC* No. 41 he paid fulsome tribute to Dorothy Mather. **TCC**



A1SLT

Déjà Vu? *Tornado's* (first!) boiler under construction at Meiningen.

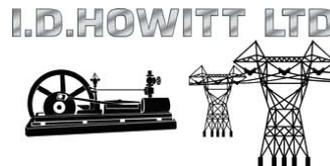
The AI Steam Locomotive Trust is pleased to display the logos of organisations giving us their ongoing support. Their contribution is gratefully acknowledged.

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* All information correct at the time of going to press early March 2021. For up-to-date information and dates please check the website www.alsteam.com.

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● e-mail: enquiries@alsteam.com ● website: www.alsteam.com ● tel: 01325 460163

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.

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