

# THE MIKADO MESSENGER



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



Welding the boiler throat plate at DB Meiningen - DBM/A15LT

Welcome to edition No. 75 of The Mikado Messenger, our monthly eNewsletter which aims to provide a regular progress update on the construction of new Gresley class No. 2007 *Prince of Wales*.

As you will read elsewhere in this issue of The Mikado Messenger, significant progress is being made on all current areas of activity including both of our new boilers, where assembly of the first boiler is underway, the heavy motion and the cylinder block.

Due to the ongoing COVID-19 situation, our staff are still working from home or at Darlington Locomotive Works (DLW) where they are taking all the necessary precautions. The Works remain closed to volunteers, non-essential staff and visitors. We hope you understand that these circumstances are beyond our control and the restrictions are very necessary at this challenging time. We are reviewing all our activities on a frequent basis to protect everyone involved with the Trust and to secure our long-term future. Please keep an eye on our website and Facebook pages for updates, call 01325 460163 or email [enquiries@p2steam.com](mailto:enquiries@p2steam.com) if you have any questions.

**FUNDRAISING UPDATE**

**A P2 for the price of a pint of beer a week:** over 940 supporters have signed up as Covenantors for No. 2007 *Prince of Wales*, from as little at £2.50 per week, and are now kindly donating over £205,000 annually including Gift Aid. If you haven't yet signed up as a Covenantor we would encourage you to get on-board. You can find more information [here](#).

**The Boiler Club** has reached 213 members, leaving just 87 spaces available - passing the two-thirds milestone. As substantial progress is now being made on our boilers, we would urge those who haven't yet contributed towards the purchase of No. 2007 *Prince of Wales*' boiler to join us. This is the single most expensive component on the locomotive and the boiler for No. 2007 is due to be delivered to Darlington Locomotive Works (DLW) in 2021. More information about The Boiler Club can be found [here](#).

**The Tender Club** is still filling up slowly, with 91 places taken - over one third of the initial target. In order to keep on schedule to complete No. 2007 within three years, we need to complete the manufacture of the tender frames. Our target for The Tender Club is 250 members, contributing £1,500, so if you would like to contribute towards the tender more information can be found [here](#).

We launched **The Turbogen Club** in July 2020 and the fundraising campaign has already 'generated' 25 members - over half of the initial target. Our target for The Turbogen Club is 40 members, contributing £1,000, so if you would like to contribute towards the turbo-generator more information can be found [here](#).

Our newest fundraising campaign, **The P2 Support Coach Appeal**, was launched in August 2020 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. We have already recruited 37 supporters - over a third of the initial target - and if you would like to contribute towards this appeal more information can be found [here](#).

**The Motion Club** has now reached our initial 175 members target. You can find more information about The Motion Club [here](#) - help us to fund the manufacture of No. 2007's motion!

**The Pony (Truck) Club**, has attracted substantial interest and has galloped past its initial target. You can find more information about The Pony (Truck) Club [here](#) - help us to fund the manufacture and certification of No. 2007's pony truck.

You can sponsor components of No. 2007 *Prince of Wales* from as little as £30, ranging up to £15,000! The **Dedicated Donations** scheme has already raised over £400,000. If you would like to sponsor a component, please email [dedicated.donations@p2steam.com](mailto:dedicated.donations@p2steam.com), detailing the amount you would like to donate and/or if you had a specific part of the engine in mind, we will then send you some component recommendations to suit your donation.

To-date, over £2.5m has been spent and more than £3.0m raised of the required £5m to complete No. 2007 *Prince of Wales* within the next three years.

If there are any surplus funds left when our fundraising clubs have fulfilled their nominated purpose, we will use the money to buy other components for the Gresley class P2 that the charity would not otherwise have.

## ENGINE FRAMES UPDATE



Internal air reservoir and train brake pipes - A1SLT

**Summary:** engine's frames erected; all major frame stays, brackets, horn blocks, axle boxes & buffers cast and fitted using around 1,000 driven bolts.

**Progress update:** the entire smokebox (cladding, smoke box barrel & door) has been dismantled and moved away, to allow access to the front part of the space between the frame plates - the whole set of various copper pipes which form the air reservoir and train brake runs are being trial fitted.

**Next steps:** silver soldering of all fittings to fabricate segments of copper pipe runs; welding pipe clip retaining back plates onto frame plates; manufacture & fit sander air pipes including auxiliary devices such as sand traps.

**Fundraising:** The Founders Club was established in September 2013 to give the project a racing start and get it to the point of erecting the engine's frames with a target of raising £100,000 plus Gift Aid from 100 supporters each donating £1,000. The Founders Club closed in July 2014 having attracted 360 members and raised around £450,000.

## PONY TRUCK UPDATE



Pony truck frame machining, at NVES - A1SLT

**Summary:** redesign of the pony truck, using side control springs, has been completed; order for pony truck frame fabrication placed with North View Engineering Solutions (NVES) in Darlington; pony truck wheelset and cannonbox delivered.

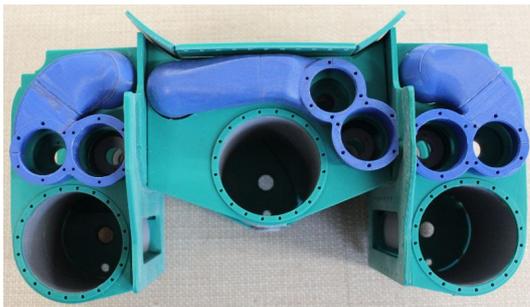
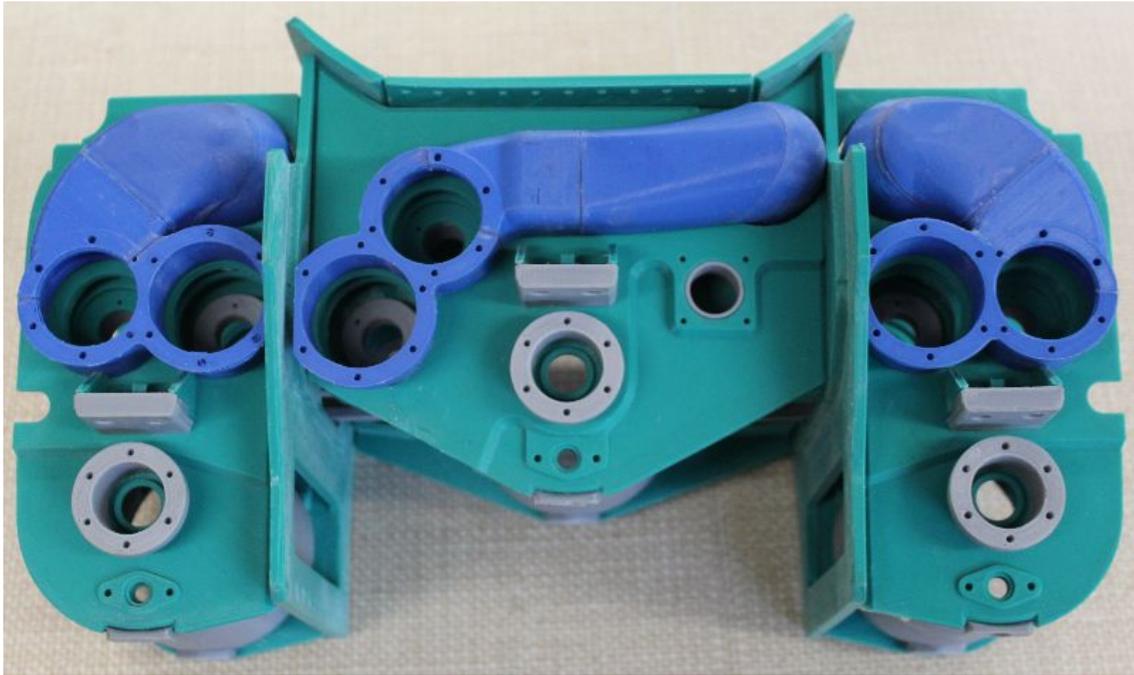
**Progress update:** NVES is in the last stages of pony truck fabrication; manganese steel liners, side spring pads and vertical spring locating hollow spigots have been welded on and the whole fabrication set up on a horizontal borer; the manganese steel liner will be brought to a correct dimension and the whole fabrication will be assembled and rechecked for a dimensional compliance; NVES completing final machining of the 11-14% manganese steel wear plates on the horn guides - this has required acquisition of additional tooling which delayed work until after Christmas which, coupled with Covid-19 measures, is causing further delays.

**Next steps:** completion of principle components machining; manufacture of spring gear details; final assembly of the cannonbox onto the wheelset; machining of the spring planks and bearer cup and spherical side bearers; arrival of pony truck at DLW and final dimensional check.

**Fundraising:** in April 2020, we launched a £20,000 appeal - The Pony (Truck) Club - to fund the construction of the leading pony truck for No. 2007 *Prince of Wales*. We set a minimum target of 20

generous supporters willing to donate £1,000 plus Gift Aid (in up to four payments of £250) but this mini-club has galloped away and already passed its initial target. We have therefore decided to extend the club by a few members to cover the considerable certification costs associated with the modified pony truck design. Please consider joining The Pony (Truck) Club in advance of the frame's delivery to DLW. For further information click [here](#).

## CYLINDERS UPDATE



Complete 1:8 scale 3D model of cylinder block - rear view (top image), front view (bottom left) and 1:8 scale inlet valve model outer view (with reference tea mug) - A1SLT

**Summary:** design studies into cylinder block manufacture and selection of valve gear complete; 3D CAD design of the cylinder block and valve gear substantially complete; further progress has been made in applying the weld details to the cylinder block inside exhaust passages with particular attention being paid to the order of fabrication to ensure that all welds can be completed properly.

**Progress update:** an encouraging number of firms have responded positively to our request for Expression of Interest (EOI) in manufacturing the cylinder block - these are being assessed; Frewer Engineering has conducted the first run of their Computational Fluid Dynamics (CFD) model of the cylinder block for both incoming steam and outgoing exhaust and the initial results are indicating that within the space limitations the steam flows are good with low losses within the ports and valves; Alan Parkin is producing several dozen 2D manufacturing drawings to enable the shortlisted manufacturers to submit firm proposals for constructing the cylinder block; Martin Shepherd has made good progress in

refining the detailed design of the cam boxes, including positions for oil fillers and drains and a simple sight glass which will enable the oil level to be efficiently checked, he has opened discussions with gear and screw manufacturers and is producing detailed manufacturing drawings of some of the internal components.

**Next steps:** refinement of detailed design following receipt of CFD results; completion of detailed manufacturing drawings, preparation and despatch to shortlist of full manufacturing specification and drawing set; further development of production drawings of cam boxes and manufacture of a prototype.

**Fundraising:** The Cylinder Club was founded in October 2017 to fund the redesign and manufacture of the cylinder block with a target of raising £100,000 plus Gift Aid from 100 supporters each donating £1,000. The Cylinder Club closed in March 2018 having achieved its target.

## BOILER UPDATE



A regulator stuffing box with its boiler flange (front of box) and a stuffing box fully machined to accept a gland (rear of box) - A1SLT

**Summary:** boiler design study completed, revised design approved by TÜV Sud notified body and sent to UK authorities for information and comment - no adverse responses have been received; forged foundation ring corners manufactured & machined and regulator castings delivered to DLW - all subsequently despatched to DB Meiningen (DBM); superheater header cast and machined; boiler cladding manufactured, trial fitted to frames and now in storage; boiler's order placed with DBM for delivery in 2021; minor re-design of the banjo dome to suit the P2 cladding completed by DBM; major progress on manufacture of the boiler and its components including the assembly of the barrel sections and marrying up to the inner firebox for the first boiler.

**Progress update:** construction progress at DBM means the delivery of the P2 boiler is on target for the end of 2021 - at DBM, all the basic components have been manufactured so uniting of the main sub-assemblies is underway and the first boiler is beginning to look like a boiler; DLW is manufacturing the regulator cross shafts and stuffing boxes which are required to set up the regulator mechanisms inside the boilers and to conduct the hydraulic tests; the regulator cross shaft has been welded onto the crank (which operates a link between a cross shaft and a regulator) and subjected to Non-Destructive Testing (NDT); the shafts are awaiting a special process of applying melted sifbronze onto the shaft's bearing surfaces and then they will be machined to a required dimension, inspected and sent to DBM; work on the stuffing boxes continues as the main connecting flanges have been fully machined, with all holes drilled and countersunk, using a specially designed tool to fit and work inside a stuffing box cavity. A video of Ed Laxton, our trainee machinist at DLW, carrying out aspects of this machining can be seen [here](#).

**Next steps:** full assembly of boiler barrels and firebox shells; complete machining of two sets of stuffing boxes and apply and machine sifbronze onto the bearing surfaces of regulator cross shafts.

**Fundraising:** The Boiler Club was founded in October 2017 to fund the design modification and manufacture of the boiler with a target of raising £600,000, plus Gift Aid, from 300 supporters each donating £2,000 in up to 16 payments of £50. As of today, The Boiler Club has attracted 213 members who have generously donated over £425,000, excluding Gift Aid. For further information click [here](#) - we must reach our 300 members target in 2021.

## WHEELSETS UPDATE



The wheelsets have been removed from the engine to allow access for fitting the extensive pipework systems - *CAG Photography/A1SLT*

**Summary:** study into ride and suspension completed using Vampire<sup>®</sup> software; crank axle re-designed to comply with modern standards, approved and manufactured; all engine wheelsets complete and trial-fitted to engine; cannon boxes ready for final fitment to intermediate and trailing coupled wheelsets.

**Progress update:** Ian Matthews has completed the additional machining of the lower coupled cannonbox halves to enable the spring links to be fitted - the castings being slightly oversize in this area have required additional machining; Ian has also altered the shape of spring links around their lower circumference so they are free to rotate when inserted into axle and cannon boxes - this is due to the nature of the corresponding castings; pony truck axlebox bearing spacers have been surface ground to the required thickness and are ready to be inserted into an axlebox assembly - once this task is complete, the axlebox will be re-measured for sideplay which is required for the bearings to maintain their service life.

**Next steps:** assembly of the intermediate and trailing cannonboxes onto their wheelsets.

**Fundraising:** The Mikado Club was founded in March 2016 to wheel the engine with an initial target of raising £200,000, plus Gift Aid, from 160 supporters each donating £1,000. This was extended in May 2017 (to also wheel the tender) to 200 supporters raising £250,000 plus Gift Aid. The Mikado Club closed in May 2018 having achieved its target.

# MOTION UPDATE



Progress at Stephenson (Engineering) Ltd: outside connecting rod forging underway; outside connecting rod forged; at DLW - intermediate coupling rod bushes with bored final white metal surface and keys; Ian Matthews achieving a mirror finish polish on a leading coupling rod - *Robert Stephenson/A1SLT*

**Summary:** all heavy motion ordered from Stephenson (Engineering) Ltd of Atherton; intermediate and leading coupling rods delivered to DLW in 2020 have been fettled and polished to a mirror finish; work continuing underway on other heavy motion; updated poppet valve gear design almost complete with first components in manufacture.

**Progress update:** new bronze white metal lined rod bushes delivered to DLW; inside connecting rod and strap and outside connecting rods have been forged; trailing coupling rods have been heat treated prior to machining.

**Next steps:** machining and heat treatment of remaining rods; new bronze rod bushes and crank pin pushes to be pressed into intermediate coupling rods; ordering of bronze rod bushes for leading coupling rods; altering the design of the oil lids and commencing their machining.

**Fundraising:** The Motion Club was founded in May 2018 to fund forging and machining of the heavy

motion, with a target of raising over £210,000 including Gift Aid, from 175 supporters each donating £1,000 in up to eight payments of £125. As of today, The Motion Club has reached the initial target of 175 members, who have generously donated over £200,000. For further information on how to become a member click [here](#).

## TENDER UPDATE



Tender frame at I D Howitt; the tender tank in green undercoat (at DLW); tender hornblocks fitted with temporary fastenings; Nigel Facer completes machining of final tender hornblock - *Nigel Facer/A1SLT*

**Summary:** axlebox and other tender castings produced by William Cook Cast Products; frames being assembled by I D Howitt; tank construction complete, painted in green undercoat by Ian Matthews and now stored outside under a tarpaulin to create more space inside DLW; tender wheelsets at DLW, having been assembled South Devon Railway Engineering and painted by Ian Matthews.

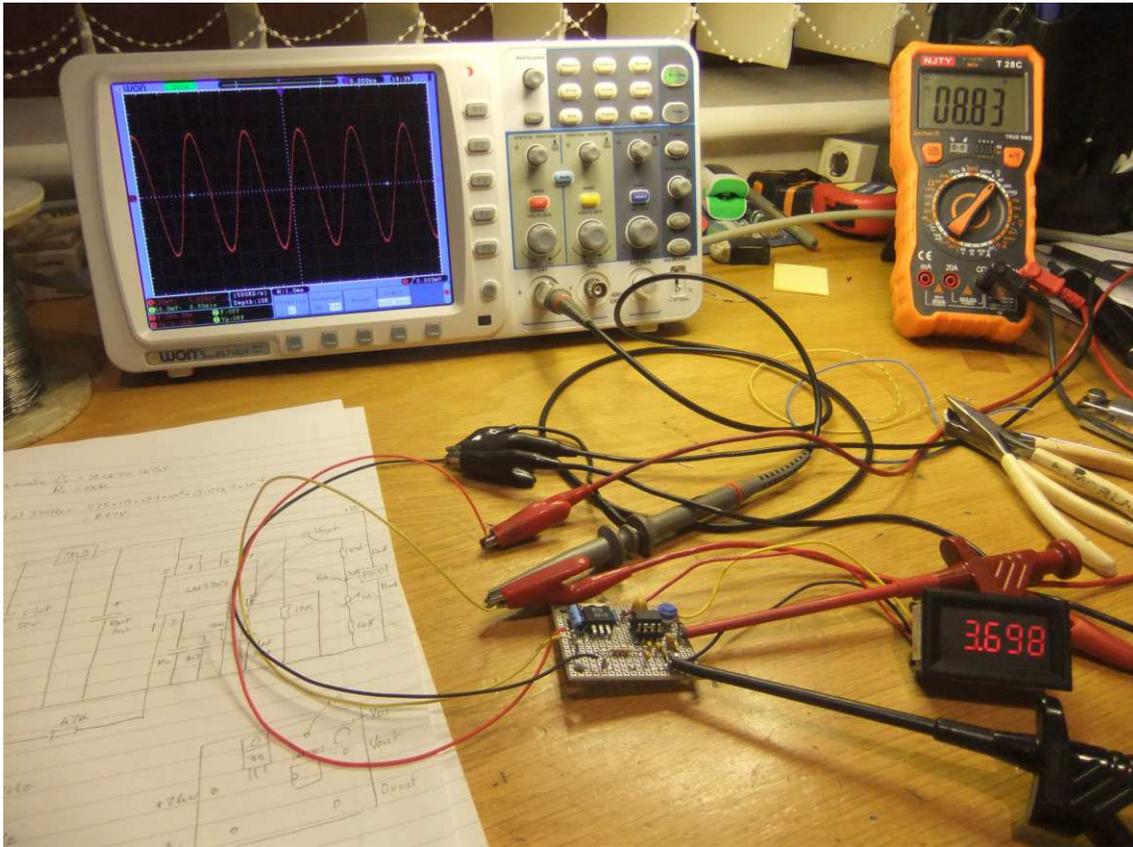
**Progress update:** following trial fitting of hornblocks, including opening out bolt holes to finish size, 11-14% manganese steel side liners have been machined to final size; hornblocks clamped into their final positions using wet assembly where both mating surfaces are coated with a generous layer of primer paint and clamped up with the paint wet - this reduces the chance of water penetrating between the hornblocks and the frames.

**Next steps:** fitting driven hornblocks; completion of the frames; continue 3D CAD work on tender electrical and pipework layout.

**Fundraising:** The Tender Club was launched in April 2019 to fund the construction of the tender, with a target of raising £450,000, including Gift Aid, from 250 supporters each donating £1,500 in up to fifteen payments of £100. As of today, The Tender Club has so far attracted 91 members who have generously

donated over £135,000 - we still have a long way to go to fund the tender's construction. For further information on how to become a member click [here](#).

## ELECTRICALS UPDATE



Prototype turbogen tachometer circuit under bench test - ready for performance evaluation and checking the speed of *Tornado's* turbogenerator - Rob Morland/A1SLT

**Summary:** further good progress on the design of the electrical system; draft Electrical System Specification, Hazard Log and standards assessment spreadsheet complete.

**Progress update:** a full draft of the Electrical System Specification has been completed; first drafts of the clause-by-clause assessment of relevant standards and the electrical systems Hazard Log have been produced - these documents will be reviewed internally before sending to Ricardo for initial design scrutiny; work continues on the headlamp optical system with an optimised design now defined and assembly of a prototype underway; further detailed design of the engine electrical systems is ongoing, including addition of CAT5e data cabling to the wiring loom schematics.

**Next steps:** the turbogen startup circuit will be tested on *Tornado*, once it is steamed on completion of annual maintenance in February - it will be modified where necessary and then incorporated into the Turbogen Switch Box schematic; continue construction and testing of headlamp optics and drivers will; internal review of the Electrical System Specification, Hazard Log and standards assessment results.

**Fundraising:** We launched The Turbogen Club in July and the fundraising campaign has already 'generated' 25 members - over half of our target. Our target for The Turbogen Club is 40 members, contributing £1,000, so if you would like to contribute towards the turbo-generator more information can be found [here](#).

# MISCELLANEOUS FITTINGS



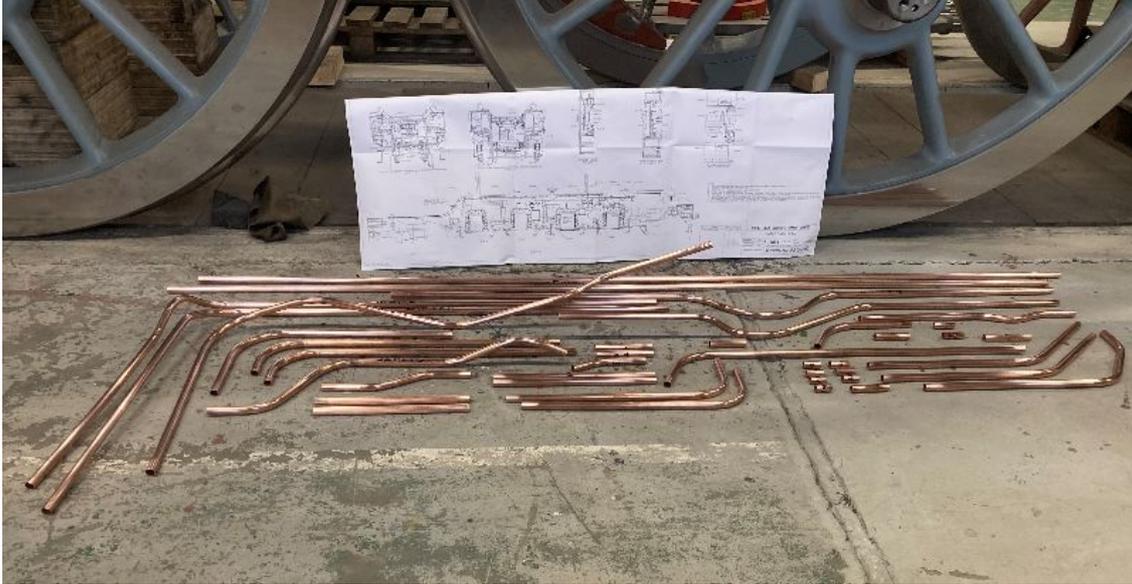
At DLW, CNC manufactured Y-shaped brake hangers; finished Y-shaped brake hangers awaiting fitting of mild steel bushes - A1SLT

## Running Gear

**Summary:** brake gear fully designed and mostly manufactured, drain cock linkage (based on A1 design) drawn; linkage components made.

**Progress update:** good progress is being made installing the cylinder drain cock linkage which has been adapted to the very reliable design on *Tornado* to replace the less reliable cable operated system used on the original P2s; receipt of the six Y-shaped brake hangers, from Triple T Engineering Ltd - we have started the assembly and trial fit of the brake system; after inspection, Ian Matthews fettled the brake hanger outer surfaces smooth and applied a layer of a protective primer; purchase of four air brake cylinders - they had been bought by the previous owner for an air brake conversion and were subsequently surplus to requirements and offered for sale. The new brake cylinders have been tested on air and are working properly, however a small amount of modification work is required to make them identical to those on *Tornado*. David Elliott captured his testing of the air brake cylinders in this [video](#).

**Next steps:** wheelsets have been removed from the frame, to enable the brake cross shaft bearing bushes to be completed and the brake shafts installed; cylinder drain cock linkage to be installed between the frame; measurement of the lateral clearance between brake cross shaft bushes and shafts to determine the actual side play and to adjust the bronze bushes; ordering material for brake hanger bushes, machining these a press fitting them into Y-shaped brake hangers; refurbishing newly acquired air brake cylinders - mainly consisting of inspecting a condition of internal rubber components and modifying a connecting rod bush.



Sander air pipes prepared for fitting - A1SLT

## Pipework

**Summary:** the design is well advanced and installation under way.

**Progress update:** Alan Parkin has continued modelling the pipework through the tender; production of 2D manufacturing drawings of the copper pipework through the engine have begun, the earliest of which for the air reservoir and air brake pipes are complete; quotes have been obtained for the metric copper pipe and Yorkshire GHD pipe fittings required for the entire air system and the steam heating pipe through the full length of the locomotive and these will be ordered shortly; thorough search through DLW has uncovered a small number of new unused GHD fittings and a larger number of used fittings originating from the build and subsequent modification of *Tornado's* pipework - these have been cleaned and refurbished where safe to do so and will save in excess of £2,000 in buying new fittings; Ian has worked on preparing the run of sander air pipes for fitting.

**Next steps:** continuation of 2D design of pipework details; ordering of long lead items; quotations are being sought for the imperial pipework for steam and water along with the materials to make the numerous LNER style pipe fittings.

## Fundraising

The Dedicated Donations scheme was founded to fund numerous components including the non-ferrous fittings and has raised over £400,000 to-date with new parts being frequently made available for sponsorship. For further information, click [here](#).

**P2 SUPPORT COACH UPDATE**



BR Mark 1 BSK E35457 at Grand Central Railway - A1SLT

In November 2020, BSK 35457 was moved from North Norfolk Railway to Great Central Railway. As soon as lockdown restrictions permit, we shall conduct a full survey of our new acquisition to plan the work we wish to undertake to improve the vehicle for our own use. The additional features we have on *Tornado's* Support Coach make operations and living on the coach so much easier and we will look to add these to BSK 35457 in time. A support coach is an essential vehicle for both the locomotive and the support crew, carrying all the tools and consumables needed to manage the locomotive on main line tours and on visits to preserved lines.

A unique opportunity arose for A1SLT to acquire BR Mark 1 BSK E35457 for eventual use as the support coach for No. 2007 *Prince of Wales*. 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.

**Fundraising:** The P2 Support Coach Appeal was founded in August 2020 to fund the acquisition and overhaul of a support coach for No. 2007 *Prince of Wales* with a target of raising £100,000 from 100 supporters, each donating £1,000 in up to eight payments of £125. As of today, The P2 Support Coach Appeal has attracted 37 members - over one third of the initial target. For further information on how to become a member click [here](#).



Progress on No. 2007 *Prince of Wales* - A1SLT

**TRAVEL WITH *TORNADO***



No. 60163 *Tornado* hauling 'The Ticket to Ride' on 19<sup>th</sup> September 2020 - Alan Weaver/A1SLT

We are very much looking forward to our 2021 programme of tours and welcoming passengers on board. Our new brochure has just been published with a variety of tours through the year. We hope you find something of interest.

#### Railtours 2021 Diary

- Saturday 13th February - [Valentine's Luncheon Circular Tour](#) - from York, Thirsk and Darlington - POSTPONED
- Saturday 13th February - [Valentine's Evening Circular Tour](#) - from York - POSTPONED
- Saturday 13th March - ['The Ribbleshead Rambler'](#) - Hull to Carlisle and return
- Saturday 27<sup>th</sup> March - ['The Fens and Fells Flyer'](#) - Cambridge to Carlisle and return
- Saturday 3<sup>rd</sup> April - ['The Aberdonian'](#) - Edinburgh to Aberdeen and return
- Monday 5th April - ['The Clyde Aberdonian'](#) - Glasgow to Aberdeen and return

- Saturday 10<sup>th</sup> April - '[The Caledonian](#)' - Birmingham to Edinburgh and return
- Saturday 8<sup>th</sup> May - '[The Cumbrian Explorer](#)' - Darlington to Carlisle and return
- Saturday 15<sup>th</sup> May - '[The Jorvik Express](#)' - Liverpool to York and return
- Saturday 22<sup>nd</sup> May - '[The Pennine Explorer](#)' - Leicester to Carlisle and return
- Thursday 22<sup>nd</sup> July - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Sunday 31<sup>st</sup> July - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Thursday 12<sup>th</sup> August - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Thursday 19<sup>th</sup> August - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Thursday 2<sup>nd</sup> September - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Saturday 11<sup>th</sup> September - '[The Aberdonian](#)' - Edinburgh to Aberdeen and return
- Thursday 16<sup>th</sup> September - '[Tornado and Flying Scotsman](#)' - West Midlands to Carlisle and return
- Thursday 16<sup>th</sup> September - '[Flying Scotsman and Tornado](#)' - Peterborough to Carlisle and return
- Saturday 18<sup>th</sup> September - '[Tornado and Flying Scotsman](#)' - Middlesbrough to Carlisle and return
- Saturday 18<sup>th</sup> September - '[Flying Scotsman and Tornado](#)' - Birmingham to Carlisle and return

Tornado Railtours trains can be booked through the links above, our [website](#) or by calling 01325 488215.

**DOWNLOAD THE 2021 RAILTOURS BROCHURE**



Facebook



Twitter



Website



Email

*Copyright © 2021 The A1 Steam Locomotive Trust, All rights reserved.*

**Our mailing address is:**

The A1 Steam Locomotive Trust, Darlington Locomotive Works, Hopetown Lane, Darlington. DL3 6RQ