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The Warrior

THE MAGAZINE FROM THE LMS-PATRIOT PROJECT



MAY 2025
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2020 AWARD FOR
COMMUNICATIONS

Editorial

Welcome to another edition of your quarterly magazine which contains the latest news about the Project and *The Unknown Warrior*.

The Project was pleased to receive many compliments regarding the introduction of the Glossary in the last issue, it is something which I believe has been missing from this publication. We've been good at explaining the state of the build but not the parts that comprise the build, so I hope that we have started a series of articles that help explain the myriad parts and processes that make a steam locomotive work.

We are in the early stages of planning this years' Members Day and plan to combine it with the AGM. If you have any thoughts or ideas regarding this event please do get in touch with your thoughts at the email address below or any of the contact details located throughout the magazine.

Thank you for your continued membership and support of our project, please enjoy this issue of The Warrior.

Pete Sikes, Editor

email: warrior-editor@lms-patriot.org.uk

FRONT COVER: No. 45503 The Royal Leicestershire Regiment at Acton Grange, Warrington in this undated view.

Photo: © Manchester Locomotive Society



THE GREATEST GATHERING

We are delighted to be able to confirm our attendance at **Railway 200 – The Greatest Gathering** weekend at Alstom, Litchurch Lane, Derby on 1st to 3rd August.

We will be having our Sales Stand and Project display banners at this event. Tickets have now sold out but if you were lucky enough to buy some, we hope to see you there at what is looking to be the biggest railway event of 2025.

Chairman's Thoughts

MAY 2025

My winter thoughts in Warrior 64 ended with the observation that we all long for positive news. It is now mid-May as I write, and we can finally see a new dawn as far as ending our hibernation at Tyseley is concerned. (My apologies for the mixed metaphors.)

Our Progress Report will bring you up to date as far as our print schedule will allow. In our regular liaison meeting with our Tyseley partner in April there was a clear change of emphasis with the news that a start of work was imminent, linked with news that a well-known 8P Standard Pacific had to leave Tyseley at the turn of the month. Sure enough, anyone surfing the web around 1st May was treated to the impressive sight of that very engine quietly slipping out of Tyseley by road transport – a good omen for us. Work is now starting.

You can also read in our Progress Report how we went through a number of strategic engineering issues with our partner at the same time in April, to clarify and decide the way forward. I am as sure as I can be that May 2025 will bring small beginnings for us, and that the working relationship will gradually and progressively develop.

We have in recent weeks assembled our accounts for the year ending 31st March 2025. All I want to say here is that I was simply staggered to see that we posted a record annual income for the project – the best since we got started 17 years ago. I have always felt I have no choice but to be realistic about our prospects: until last year,

our income trend had seen a steady decline in recent years, from the heights of 2016/17 to 2018/19, when the Great War Centenary was in full swing and we were still dreaming of completing our engine for Armistice Day 2018 and then 2020. And our membership demographics are against us. Yet now we have gone one better. Read all about that in our Finance report.

I am miles away from saying that the trend is reversed, there are some exceptional factors at play; but it's a nice place to be for the time being, on top of a healthy bank balance. Let's get spending – sensibly – at Tyseley.

Finally can I spare a thought for our treasurer, who it seems can't please everybody with his financial commentary. We can always learn from feedback, but let's not make the best the enemy of the good, I say. More than anything, I appreciate the fact that the reporting process keeps working, come rain or shine.

Thank you for your continuing support for our project.



COLIN HALL, CHAIR

chairman@lms-patriot.org.uk

TREASURER'S REPORT

NEIL COLLINSON, TREASURER

Quarter 4 to 31st March 2025 and the full financial year

First thought for the quarter: A splendid year for income so thank you again to all our donors/sponsors. Please keep the faith and encourage others to join us. We particularly need new members, as mentioned below, who will then hopefully become donors.

INCOME

Total income in quarter 4 is £62,000 (£77,000 for the same quarter in 2023/24) including expected £9,000 in Gift Aid. Total restricted funding was £1,385. The total income for the full financial year is £431,000. This gives approximately 178% overall against the budgeted income for the year. 160% was quoted in the April 2025 monthly bulletin. Apologies for this but the bulletin was drafted before the figures had been updated with the latest information. This included over £100,000 in income which was not expected (company sponsorship and legacies). The unadulterated income for the quarter of £62,000 was a quarter of the forecasted budget for the year.

Second thought for the quarter: The usual breakdown of our income follows

Total Membership income for the quarter, including Gift Aid came to £5,076. Income for the full year was £22,136 giving 89.3% against budget. The current number of members is 784 and we need to increase this figure.

Total donations for the quarter were £45,000, £3,000 more than the apportioned quarterly budget of £42,000. Total donations, sponsorship and legacies for the full financial year was £313,000 or 186% of the annual budget set.

Regular Donations The total amount coming in from regular donors for the quarter was £21,838 or £88,000 for the year. Slightly down on the budget set. The average amount per donation in Quarter 4 was £24.68. Regular monthly donations coming from 296 donors at the end of March were £7,301.20, membership subs were paid by regular donation in Quarter 4. The usual chart below provides a breakdown.

	2024/25 Donors			2023/24			2022/23		
	New Donors	Lost Donors	Total (£) for Quarter	New Donors	Lost Donors	Total (£) for Quarter	New Donors	Lost Donors	Total (£) for Quarter
Quarter 4	0	5	£21,838	1	6	£21,873	3	9	£22,966
Quarter 3	4	5	£22,140	1	3	£22,313	3	5	£22,845
Quarter 2	2	3	£21,706	0	3	£22,238	0	5	£23,201
Quarter 1	2	3	£22,462	1	13	£22,596	2	14	£23,226

Other donations (non-regular) See table for the breakdown.

Quarters 1 to 3 cumulative, quarter 4 and full year-to date comparisons

INCOME	Annual budget 2024-25	Q1-Q3 actual 2024-25	% of annual budget	Q4 actual 2024-25	2024-25 full year results	% of annual budget	Annual budget 2023-24	Q1-Q3 actual 2023-24	% of annual budget	Q4 actual 2023-24	2023-24 full year results	% of annual budget
Membership	£24,776	£17060	68.9%	£5,076	£22,136	89%	£24,905	£18,060	67%	£5,430	£23,490	94%
Donations/Sponsorships	£168,301	£267,303	157.7%	£45,411	£312,714	186%	£170,426	£188,517	111%	£60,005	£248,522	146%
Compensation	–	£8,566	–	–	£8566	n/a	–	–	–	–	–	–
Sales/Events	£20,500	£19,671	96%	£6,361	£26,032	127%	£18,650	£12,267	43%	£1,909	£14,176	76%
Other (interest)	–	£6,522	n/a	£2,193	£8,715	n/a	–	£4,545	n/a	£1,641	£6,186	n/a
Wheels settlement Asset sale	£27,500	£24,750	90%	£2,750	£27,500	100%	£33,000	£27,500 + £1,037	83%	£8,250	£35,750 +£1,037	108%
Loans	–	£25,000	n/a	£25,000	£25,000	n/a	–	–	0%	–	–	0%
TOTAL	£241,078	£368,872	153%	£61,791	£430,663	178%	£246,981	£251,926	101%	£77,235	£329,161	133%
EXPENDITURE												
Locomotive	£94,927	£37,337	39%	£3,604	£40,941	43%	£128,542	£240,712	118%	£15,534	£256,246	202%
Tender	£1	–	–	–	–	0%	£5,000	–	0%	–	–	0%
Boiler	£40,000	£98,058	245%	£10,488	£108,546	271%	£30,000	£31,518	105%	£23,208	£54,726	182%
Insurance	–	£5,327	n/a	–	£5,327	n/a	–	–	n/a	–	n/a	n/a
Other Engineering	£1,000	£1,337	134%	–	£1,337	134%	£8,000	£3,617	45%	–	£3,617	45%
Crane repayment	–	-£3,941	n/a	-£736	-£4,677	n/a	n/a	-£1,359	n/a	-£1,509	-£2,878	n/a
Sub-total	£135,928	£138,118	102%	£13,356	£151,474	111%	£171,542	£274,477	77%	£37,233	£311,711	184%
General expenses	£48,150	£40,407	84%	£14,026	£54,433	113%	£49,150	£36,478	74%	£9,699	£46,177	94%
Loan(s) interest	£57,000	£56,613	99%	£575	£57,188	100%	£28,000	£6,469	23%	£20,625	£27,069	97%
TOTAL	£241,078	£235,138	98%	£27,957	£263,095	109%	£248,692	£231,760	92%	£67,557	£384,957	156%

Sales and events income A cracking year in most areas. A total of £26,000 and 127% of the budget set. Commissions were particularly beneficial with only a nominal budget set at the beginning of the year as it was a new venture.

Other funding It is worth mentioning that the wheels settlement is now complete.

Third thought for the quarter: My summary chart can be found on page 5 of this report, even though I have consolidated the first 3 quarters into one it had to appear in landscape format.

BANK BALANCES AND BANKING UPDATE

No explanation needed here except to comment on the fact that we continue to be one of the best financially supported projects of its type.

Bank Balance Comparison		
	Q4 (2024/25)	Q4 (2023/24)
Opening Bank Balance – 1st January	£389,796	£255,682
Closing Bank Balance – 31st March	£434,068	£268,892

As illustrated above, our bank accounts show a balance of £434,000 at the end of March, with an additional £3,452 VAT and £7,573 Gift Aid claimed to the end of March, giving a total of £445,000 to take forward to the next quarter. £9,000 has been received as deposits against the loco model. There are outstanding invoices for £18,000 at the end of March which will be payable in April.

You will have read elsewhere about my long-term desire to open alternative bank accounts for the project. This has been successfully achieved at last with The Co-op Bank, and we made our first payments into the new current account towards the end of April. It appears to be working well. It was not without the usual traumas incurred when trying to open new bank accounts. Many hurdles to jump over.

The main benefits to the project are highlighted in Linda Westerman’s ‘From the office’ report elsewhere in this newsletter so I will just highlight a couple of others, including:

- We can also pay in cash to the branch. Since HSBC closed their counter service, cash had to be paid into a directors personal account and then transferred online to CAF. Not ideal but we had the necessary paperwork/audit trail to cover this situation.
- The second account I opened is an interest-bearing notice account. It gives me the opportunity to switch funds to obtain the best rate.
- We can also draw cheques on the new current account free of charges.
- We will still require two of the four authorised signatories to sign off online payments or append their signatures to the occasional cheques that we issue.

As Linda has also mentioned there will be no changes to the published account that you, as members and donors’ use. Likewise, we will continue to make online payments via our usual channels with CAF, which also require two signatures.

5551 ENGINEERING EXPENDITURE FORECAST	Q4 – 2024/25			Q1 – 2025/26			Q2 – 2025/26		
	January 2025	February 2025	March 2025	April 2025	May 2025	June 2025	July 2025	August 2025	September 2025
	£	£	£	£	£	£	£	£	£
Current Bank Balance	£389,796	£415,807	£420,024	£434,068	£442,088	£449,085	£432,242	£407,900	£366,457
Income (Budget) excluding Gift Aid	£18,182	£18,182	£18,182	£16,236	£16,236	£16,236	£16,236	£16,236	£16,236
New Bank Balance	£407,978	£433,989	£438,206	£450,304	£458,324	£465,322	£448,479	£424,136	£382,694
Other Expenditure (Budget – excludes loan repayments)	£4,013	£4,013	£4,013	£4,679	£4,679	£4,679	£4,679	£4,679	£4,679
Loan Repayments	—	—	—	—	—	—	—	—	—
Engineering Expenditure	£6,600	£5,040	£6,288	£9,211	£4,560	£28,400	£47,600	£53,000	£53,000
Gift Aid Return	£7,573			£7,573			£4,960		
VAT Refund (Estimated)	£5,394			£3,452			£6,741		
Forecasted Bank Balance	£410,332	£424,936	£427,905	£447,439	£449,085	£432,242	£407,900	£366,457	£325,014
Revised Bank Balance assuming interest on 75% of Boiler Loans is donated back plus Gift Aid	£412,402	£427,006	£429,975	£449,509	£451,155	£434,313	£409,970	£368,528	£327,085
Actual Bank Balance (last day of month)	£415,807	£420,024	£434,068	£442,088					
Actual Income in Month	£35,783	£11,293	£21,170	£22,345					
Actual Outgoings in Month	£9,755	£7,085	£9,226	£14,320					

Fourth thought for the quarter: It has also been mentioned that whilst I provide detailed analysis on income, the detail on expenditure is only a summary and very brief.

There are several reasons for this:

1. As treasurer, my priority is reviewing the income in detail and setting a budget projection based on it. This is why I like to share it in detail.
2. Comments on the expenditure (or lack of it) for engineering matters in my report are covered elsewhere in detail so I feel that there is no need to repeat them.
3. I also only give a summary of overheads, but I did invite you, as members, to drop me an email for more details if required.
4. Despite my efforts to break up the detail with 'My thoughts', when it gets to the expenditure, I feel that you may need a break, so I keep it brief.

EXPENDITURE

Engineering Other than commenting on the fact that most of the expenditure during the year was on the boiler, the other figures reflect what has been said in the engineering report. Sufficient to say that the total engineering spend is £151,000. *Apologies for the erratum in Warrior 64. The analysis for engineering showed a total of £188,000, but the summary showed £118,000. Many thanks to the member who pointed this out, see my fifth and final thought below.

Overheads You will no doubt note that our total spend on overheads was 113% of the budgeted figure. The main areas resulting in this overspend were bought in sales items and trustee expenses. With regard to the former, the best sales income ever justified it and the donations of trustee expenses claims made in quarter 4 will not appear as donations until April (the new financial year).

Final thought for the quarter: Both the proofreader and I are on yellow cards.

Best wishes as always.

NEIL COLLINSON, TREASURER treasurer@lms-patriot.org.uk

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www.easyfundraising.org.uk/causes/lmspatriotproject

5551
CLUB

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MIDLAND REGION



IMAGES FROM THE TRANSPORT TREASURY ARCHIVE

Dick Riley's visits to the Midland lines were rare compared to the Southern and Western which thus makes this album all the more interesting. The London Midland Region is represented with a variety of motive power from mighty Duchess and Princess class engines down to the humblest of shunters, many taken so the background and landscape can be appreciated in addition to the principal subject matter. Produced and compiled by The Warrior editor Pete Sikes.

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PROJECT PROGRESS REPORT

BY KEITH RICHES, PROJECT DIRECTOR AND THE ENGINEERING TEAM

WORK STARTS AT TYSELEY

Although the locomotive frames have been in position for some time and the first work package identified and the order placed, we have not made any progress with the build. Tyseley Locomotive Works (TLW) have had some difficulty releasing any resources to our project. This has been due in part to additional work on *71000 Duke of Gloucester* and in part to unplanned work arising on Vintage Trains's own operational rolling stock.

However, the good news is that with the *Duke* having successfully moved to the Severn Valley Railway, work is now starting on our locomotive. Before refitting the hornguides to the frames, TLW are now working on securing the middle cylinder to the frames with fitted bolts.

REVIEW

While waiting for work to start, the engineering team have taken the opportunity to carry out an engineering strategy review with TLW. At this critical point at the start of TLW's practical engagement in the build process, we needed to be clear on our objectives and the way forward.

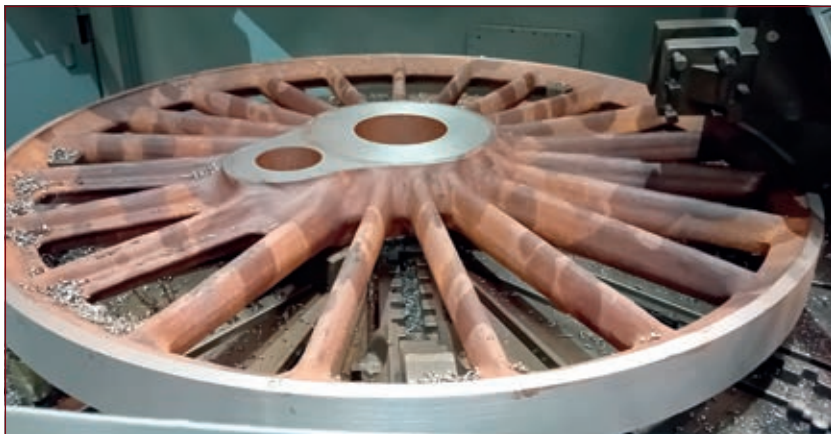
A special meeting at Tyseley in April confirmed that the locomotive is being built to main line standards but that the first two years of running heritage only will allow us to gain operational experience and assess the

business case for and practical feasibility of main line running.

Allowing three years for the modifications, additions and certification required indicates main line running would not start before year 5 subject to feasibility.

Against this background the meeting agreed with TLW on the current engineering build requirements for:

- The Outside Cylinders (replacement for main line)
- The Tender (Fowler design, higher water capacity)

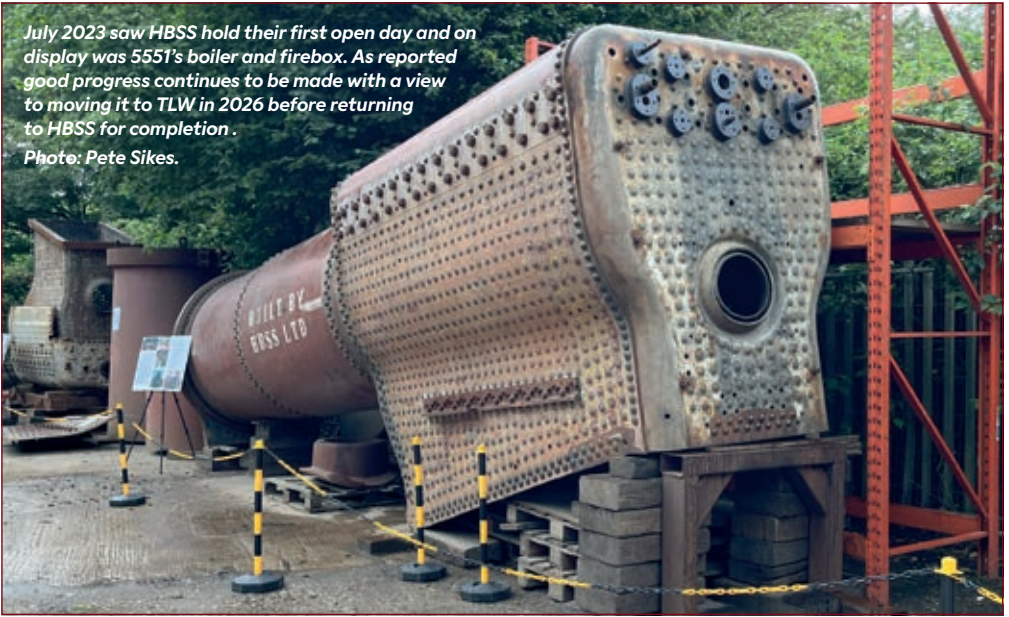


An image from November 2024 of one of the driving wheels undergoing the first stage of work at Riley's. Work will resume now that their premises move is complete.

Photo: Keith Riches.

July 2023 saw HBSS hold their first open day and on display was 5551's boiler and firebox. As reported good progress continues to be made with a view to moving it to TLW in 2026 before returning to HBSS for completion.

Photo: Pete Sikes.



- The Bogie (standard Patriot design)
- The Braking system (vacuum initially)

The time line and plan will be revised to reflect the agreed way forward and will be published shortly.

ENGINEERING UPDATE LOCOMOTIVE

Work on our wheel sets is due to recommence at Riley's as they have progressed their factory move. Riley's are looking to complete the wheels by September/October, which we are happy with as there is plenty of work scheduled to take place on the frames which will need to be completed in the time before delivery.

BOILER

As reported in Warrior 64 good progress is continuing to be made by HBSS.

Meanwhile at the April strategic review meeting with TLW, we considered the timing for completion of the boiler construction at HBSS. We agreed that a break point was

needed in the programme to ensure that pressure testing could take place as close as possible to the completion of the locomotive, thus giving us the opportunity to optimise the certification timing.

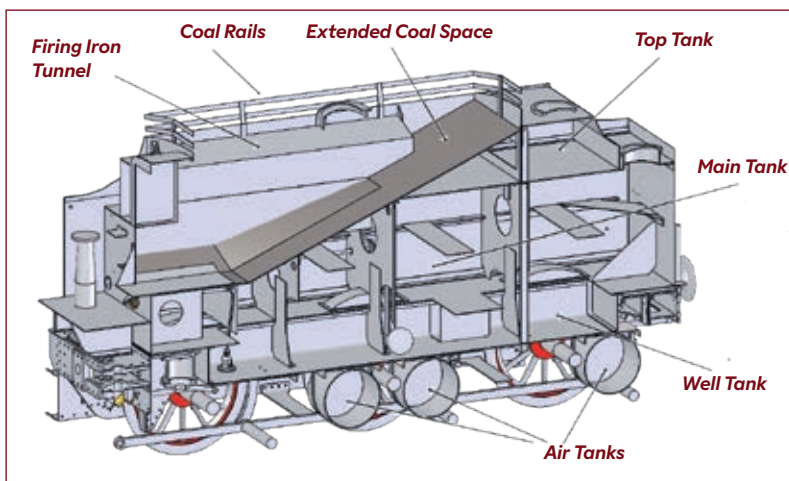
We agreed that the existing programme of work should be completed, except for fitting of the tubes and the installation of the J-Pipe (the latter to allow access for inspection). The boiler would then be transferred to TLW in 2026 to allow for essential boiler/chassis interface work, while stored under cover on the frames.

The boiler would then be returned to HBSS at the appropriate time for the fitting of the tubes, hydraulic testing and certification. With storage under cover it should be possible to delay the final completion and certification by 12 to 18 months.

We will be holding a technical meeting with HBSS as soon as possible to confirm details of our requirements going forward.

TENDER

Discussions have been held with Leaky Finders and it is hoped that a meeting can be planned during May/June to decide on actions to be taken to move forward with the next stage of the build.



CAD cross-section illustration of the plan to increase the water capacity in 5551's tender.



The tender frames freshly painted at Leaky Finders.



The tender wheel sets at West Shed before their journey to Tyseley, where they will be refurbished.



Just in the nick of time to include in the magazine, Keith Riches managed to get this image taken on 19th May after a scheduled Engineering Meeting at Tyseley, and it's one that we're all very pleased to see. It is of the middle cylinder final fit, with all holes reamed and each fitted bolt machined to size.

Photo: Keith Riches

PATRIOT VOLUNTEER WARRIORS UPDATE

Due to volunteers being busy or away on holiday there has been a bit of a slowdown of work on our components. However, Project Director Keith Riches has been busy emptying our newly acquired larger container in which we intend to instal lighting and electrical points.



Top: A start was made to clean up the Reverser. The pictures show it prior to work starting and a nice clean finish after a few hours graft.

Left: More before and after images, this time of the Valve Liners.

All photos: Anthony Pilkington

Are you free on Thursdays?
If you would like to get involved with the Patriot Volunteer Warriors at Tyseley Locomotive Works please contact us by calling 01785 244156 or email: volunteer@lms-patriot.org.uk



Another late photo heralds more good news. Our boilermaker HBSS took delivery of our boiler tubes (including a spare set), ready to fit when needed.

ILLUSTRATED GLOSSARY

TEXT AND IMAGES, KEVIN WEST, PROJECT DESIGN ENGINEER

In the last issue of *The Warrior* I promised to follow up with a look at the Locomotive Chassis in a little more detail.

The locomotive chassis is the base structure that most steam locomotives built for service in the UK were built around. I say most, as in the very early days of the railway locomotive, the machine was a very basic boiler on wheels. The boiler itself was the main structural member onto which everything else was attached. The Liverpool & Manchester Railway *Rocket* is a classic example of this, with the running gear and cylinders mounted directly onto the boiler shell.

By the late 1840s most locomotives were being built around a separate chassis and boiler. The basic chassis design of Plate Frames, Buffer Beams, Stretchers and Drag Boxes remained the same until the end of steam. So now we will look at each basic component.

THE FRAMES

The Frames are typically flat steel plates that run vertically the length of the locomotive. Most standard gauge locomotive will have a pair of frames mounted inside the wheels. Outside frames were used on standard gauge locomotives until the late 1800s and are





common on narrow gauge locos, the 'Quarry Hunslet' tanks being a classic example. The Great Western had several classes of 'double frame' locos such as the City class 4-4-0s of which 3440 *City of Truro* is a survivor. By the early 1900s inside frames became the norm for UK main lines. The plates are shaped, machined and have holes for mounting the associated chassis parts.

The frames on the Patriot were made from 1 inch thick steel.

Other frame types include bar frames, made as the name implies by assembling a frame structure from sections of bar material. This method was used extensively in the USA, but saw only limited use in the UK. Latterly in the USA a number of their huge locomotives utilised a cast steel chassis which combined the frames, stretchers and sometimes cylinders into one huge, complicated casting.

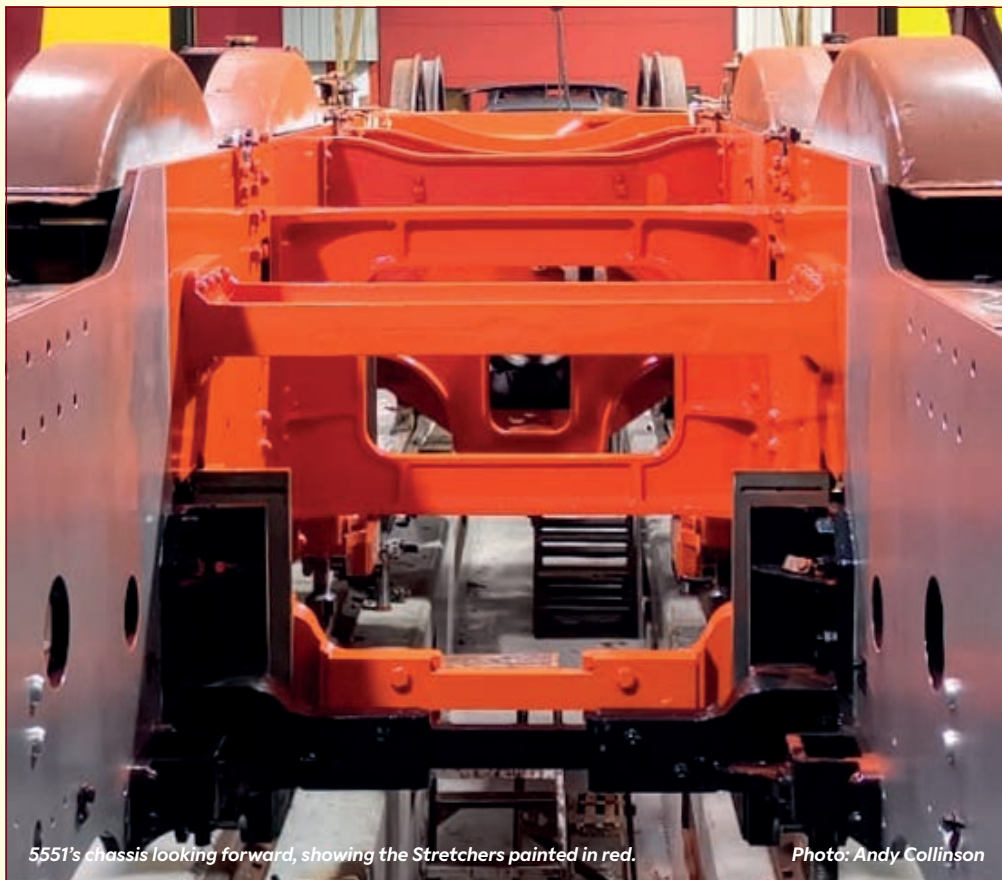


STRETCHERS

Between the Frame Plates are fitted Stretchers, used to strengthen the structure, keep the frames aligned and straight and also to provide locations and mountings for other components. These stretchers can be castings as on the Patriot, although the GWR fabricated stretchers from plate and angle section steel.

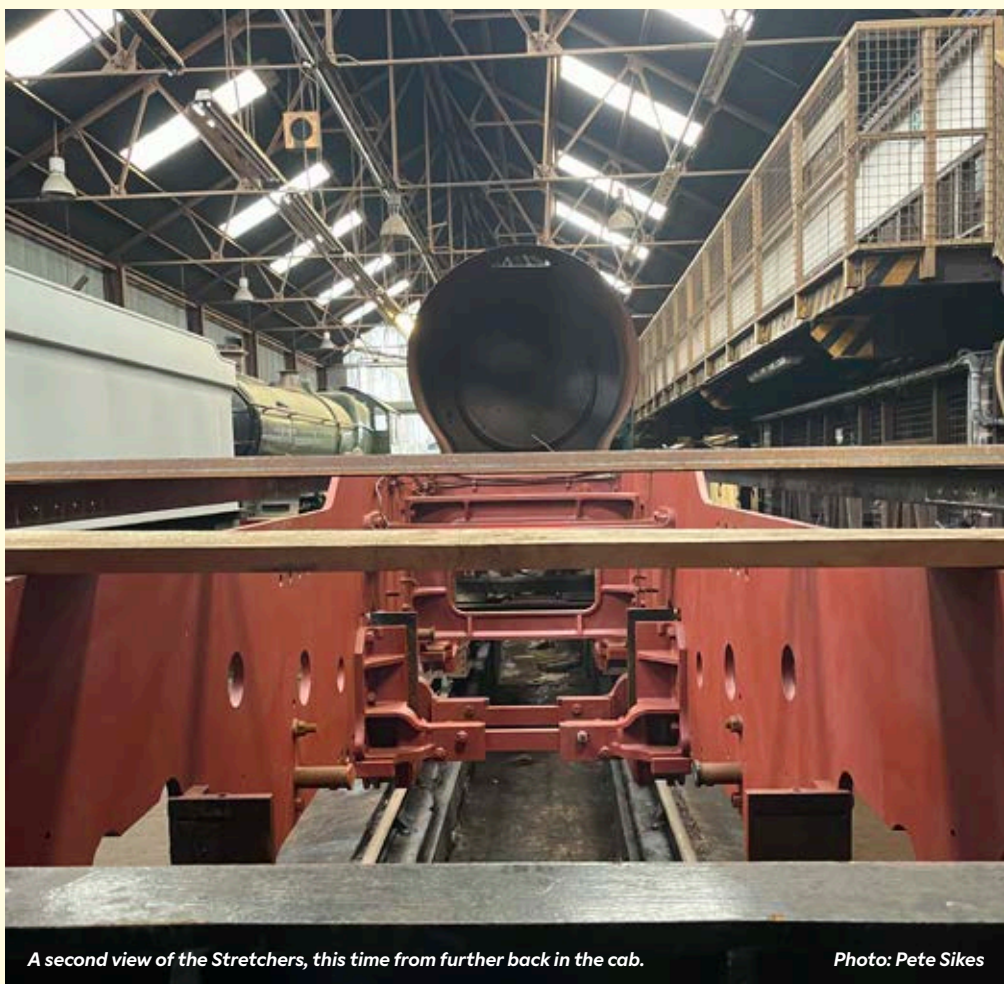
On the Patriot we have six Stretchers along the length of the locomotive chassis. From the rear working forward the first is located just above the centre Driving Axle. This Stretcher is mounted horizontally as a frame stiffener. Moving forward we come to a huge vertical stretcher, almost the depth of the Frame plates. These two Stretchers together provide rigidity, both horizontally and vertically to the chassis in the area of most stress between the two driven axles. On the Patriot the drive from the Outside Cylinders is onto the Centre Driving Axle and the Inside Cylinder drives to the Leading Axle.

Just forward and above the leading axle is the third Stretcher. The lower edge is shaped to provide clearance for the Inside Connecting Rod and off the front face is mounted the Intermediate Reverser Shaft for the Inside Valve Gear. Next comes another huge Stretcher,



5551's chassis looking forward, showing the Stretchers painted in red.

Photo: Andy Collinson



A second view of the Stretchers, this time from further back in the cab.

Photo: Pete Sikes

the full depth of the frames, plus a section that hangs down between the frames to support the rear end of the Inside Cylinder Slide Bars. The mountings for the Inside Expansion Link are mounted on the rear face.

The final conventional Stretcher is next, mounted horizontally towards the top of the Frames. At the rear of this Stretcher is the mounting for the Boiler Front Tube plate, the main Boiler mounting position. Underneath are supports for the Inside Cylinder Valve Rods guides.

The final Stretcher is mounted below the Inside Cylinder. Called the Bogie Centre Pin Casting, it is fitted to the bottom edge of the Frames and provides the location of the Bogie Centre Pin to support the front of the locomotive and helps guide it through curves.

As the structure needs to be rigid and not regularly dismantled for servicing, the Stretchers were riveted to the Frames.

RIVETS

A Rivet is a plain shank fixing device used to permanently fit parts together. The parts to be joined are drilled to a given size and the rivet inserted into the hole. The head of the Rivet is normally domed, and is held hard against one surface with a Riveting Doll while the length of shank protruding from the other side of the joint is hammered or formed with a percussion gun to a similar dome, thus making the joint.

The Rivet can only be removed by cutting off the head, therefore destroying it.

Rivets can also be fitted hot. In this case it is heated to a cherry red colour before being fitted into the hole of the joint and the end formed. The metal expands as it is heated, as the rivet cools down it contracts and ‘pulls’ the joined parts together for a tighter joint. Hot riveting is commonly used in boiler making.



A rivet removed from 5551 during remedial work, shown at actual size with the domed head diameter being approximately 47mm.

Photo: Pete Sikes

BUFFER BEAMS

Buffer Beams are the horizontal plates mounted at each end of the Frames. Their main functions are to mount the Buffers between each vehicle in a train and provide a location for



A view of the Outer Front Buffer Beam Mountings. Photo: Kevin West



A view of the structure behind 5551's Front Buffer Beam.

Photo: Kevin West

the coupling that joins adjacent vehicles in a complete train. As the Buffer Beams are the same thickness as the Frame Plates they are relatively weak so require strengthening.

The mounting of the Front Buffer Beam to the Frames plates on the Patriot is a complicated assortment of strengthening pieces formed into a U-shape from thick steel plate and triangular shaped gussets which help both transmit the load from the Frames to the Drawhook (coupling), and distribute any shock loading resulting from heavy contact on the buffers from another vehicle.

The hind (rear) beam of the Patriot is mounted to the frames by a Drag Box.



5551's new Front Buffer Beam, manufactured and fitted by Simon Scott at West Shed.

Photo: Pete Sikes

DRAG BOX

The Drag Box is a large steel structure, either cast or fabricated, that is riveted between the Frame plates at the rear of the frames. The function of the Drag Box is to distribute all the loads and stresses from the power of the locomotive through the Drawbars to the tender and onto the train.

On the Patriot the front end of the Drag Box also provides a location for the Boiler Slide. This bracket ensures the rear end of the boiler stays central on the locomotive as it expands and moves backwards whilst in steam.

In the next issue of The Warrior we will look at the running gear associated to the chassis, such as Axle boxes, Horn Guides and Springing.

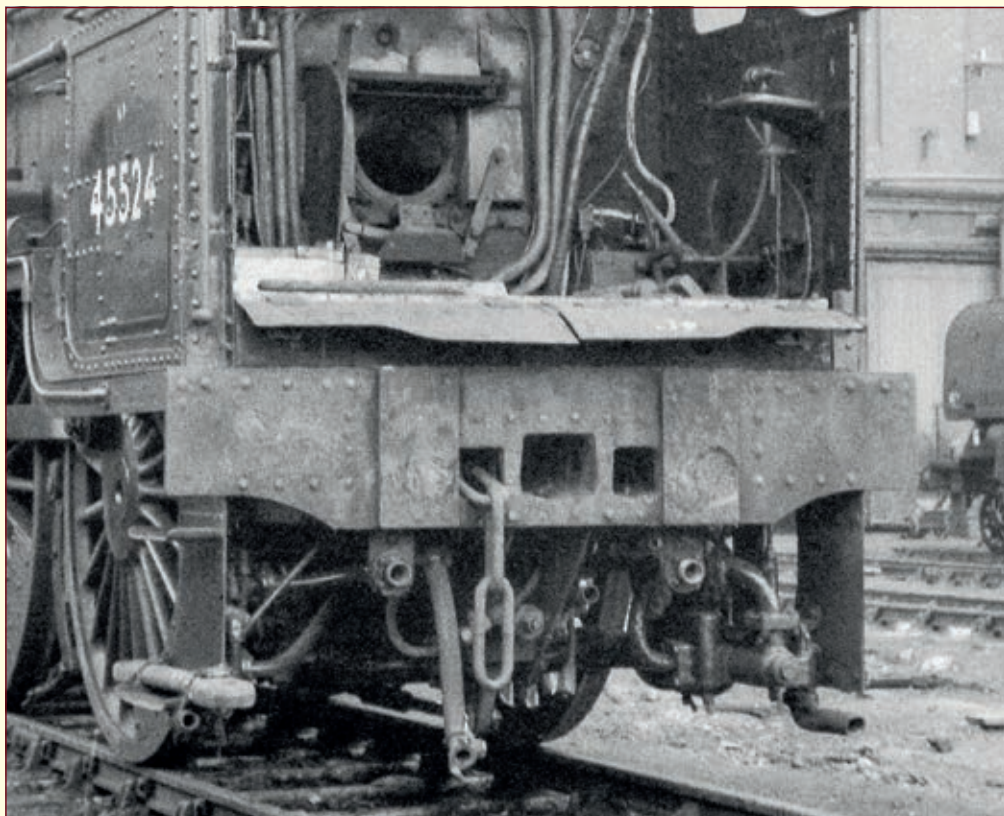


Hind Beam and Drag Box as seen on the loco as it awaits its move inside the workshop at Tyseley. Photo: Pete Sikes.



Above: Hind Beam and Drag Box positioned in the Frames at Llangollen. The authors Gauge 1 model of No. 5519 Lady Godiva is standing where the Boiler Slide will be mounted. Photo: Kevin West

Below: The Hind Beam as seen on a completed Patriot – No. 45524 Blackpool pictured at Crewe Works on 24th April 1960 (for the complete photo see front cover of Warrior 63). Photo: Robert Anderson © The Transport Treasury



FROM THE OFFICE

OFFICE DETAILS

LMS-Patriot Company Ltd.,
Civic Centre, Riverside,
Stafford ST16 3AQ.

01785 244156 or 07801 945689

email: membership@lms-patriot.org.uk

We have made various appeals for new volunteers to help in the Stafford office but so far none have come forward. Roger Bateman is a member of a railway interest Facebook group which covers the Stafford area. They published an article written by Roger, about The Unknown Warrior which we hoped would generate some new enquiries, but no one has been in touch so far. If you know of anyone who may be interested do please let us know.

You will be aware that celebrations are taking place this year to mark 200 years of railways in the UK. During the first weekend of August, Alstom in Derby are having an open weekend and all the tickets were sold sometime ago. Our sales/promotional stand will be there. It will be a wonderful showcase of all things railway and it is an opportunity to introduce *The Unknown Warrior* to people who have not previously heard about it. We are hoping that we will be busy in the office afterwards processing new membership applications.

During the last few years we have been asking you to try and avoid sending cheques to pay for membership, donations and merchandise. This was due to the fees charged by CAF bank for processing them. Also, they do not have a physical presence on the High Street so paying in had to be done by post or via special envelopes deposited at a Post Office.

After many months of research our Finance Director has now been successful in opening a Company Account with the Co-op Bank. They have a branch with a counter service just down the road from our office in Stafford. The new account will run in addition to our accounts at CAF Bank so there will be no change regarding standing orders etc. As the Co-op Bank has offered us free banking,

one benefit to members is that we can once again accept cheques which can be paid in without generating any charges.

Over two years ago we gave members the option to receive the quarterly magazine by email. Initially around 5% took up the offer which helped us save on our printing and postage costs. The number has gradually increased and in recent weeks we have seen a few more members asking for this option. The email version of this issue will go to almost 11% of members, so quite an improvement.

Understandably, reading a magazine on a computer screen or via a tablet or phone is not to everyone's taste so we have no plans to discontinue the printed magazine. However, should you prefer to receive *The Warrior* by email in future, just send us an email or give us a call to let us know. Of course back numbers of all issues can be found on the website for access at any time.

As always, if you have any questions concerning your membership do not hesitate to get in touch either by phone on 01785 244156 (there is an answerphone facility, and we will try and get back to you within a couple of days) or email membership@lms-patriot.org.uk.

Linda Westerman, Office Manager

2025 EVENT

LMS-PATRIOT COMPANY MEMBERS' DAY AND AGM

SATURDAY 20th SEPTEMBER

TYSELEY LOCOMOTIVE WORKS

**SAVE
THE
DATE**

After listening to feedback regarding both Members' Day and Annual General Meeting it has been decided to combine these two events. An outline of the day was discussed and agreed. Although we are still in the process of organising the event we hope to have access to the workshop in the morning so that you can view progress of the build of 5551 and ask any questions you may have as we plan to have our CME, Simon Scott present.

We will then break for lunch, at 2.00pm our AGM will commence.

There will be no charge for members* but booking is essential so that we can plan adequately.

Once the day has been planned we will be in touch via our Members email, with letters being sent to those who prefer that method of contact.

**If you request to bring a non-member (friend or family member), there will be a nominal charge.*

LAST FEW LMS BESPOKE NUMBERS REMAINING

For a donation of £80 change your membership number to one of the remaining Patriot LMS loco numbers. We will then issue you with a new membership card and a certificate with your chosen number, plus the donation you make goes towards your ticket for the first train.

Numbers are sold on a first-come, first-served basis, those that remain are listed below. BR numbers in Locomotive Green or Lined Black and LMS numbers are available in either Crimson Lake or Lined Black as per the examples shown below.

Any bespoke numbers that become available through non-renewal will be offered for sale again. It is also allowed to pass your bespoke membership number on providing the person you pass it onto remains a member and renews their membership.

45519

5500

45551

5524

45509	45532
5505	5535
5508	5539
5516	5540
5523	5545
5530	5547
5531	5549
5534	

Call the office on **01785 244156** to order your bespoke number

No. 45519 *Lady Godiva* storms away from Chesterfield Midland in 1959 and passes Horns Bridge signal box with a Newcastle-Bristol express. The photo is taken from the old Lancashire, Derbyshire and East Coast Railway (LD&ECR) railway bridge.

Photo: © Cliff Woodhead



SALES REPORT

SALES@LMS-PATRIOT.ORG.UK
EVENTS@LMS-PATRIOT.ORG.UK

There have been no sales stand events during April and May but the team have been kept occupied with other tasks.

Our member, Roy Hennefer, asked us to collect a donation of railwayana which we will take to auction, consisting of a finial, a lamp and a children's Hornby clockwork train set. These will go to David Hughes, who assists with all donated items, around the time this bulletin goes out.

We have also had placed in our care a Patriot headboard, this is not for sale as yet, just for David to assess a value and the likelihood that it is a replica. The owner is in two minds about what to do with it.

Web sales have been slower than usual in April so the team have taken the time to do a full stocktake of items at the office and Surestore (our safe storage space).

Pete Sikes prepared for us a wreath which was laid at the ANZAC Ceremony on Sunday 27th April, thus remembering the soldiers of the First World War who came from Australia and New Zealand. This service is held every year at the Commonwealth War Graves cemetery on Cannock Chase, Staffordshire. This is the site of a First World War training camp.

As mentioned April and May were quiet months for attending shows and events. This was mainly due to problems staffing the stand, holiday commitments or unsuitable venues. However, June starts a busy summer show period and I would ask you to check the events chart and help out where you can.

See the events chart opposite to see if you can come and help out. Some of these shows are provisional upon volunteers giving their time to help man the stands. Please make contact on **events@lms-patriot.org.uk** if you would like to join us on the sales stand.

KIND REGARDS, ROGER BATEMAN/JANET ELSON • sales@lms-patriot.org.uk

ARE YOU LOOKING TO DONATE OR SELL YOUR MODEL RAILWAY?

If you are thinking of selling your model railway, or you are a member of a model railway club and know of others who are, then why not consider selling it to us?

Model railway sales have been a great source of income for the Project on our sales and publicity stand. While we are extremely grateful, and love the fact that many of you have made generous donations over the years, we have decided that we are also happy to give quotes to buy collections. Please note though that we are still happy to receive donations.

All profits from the sale of models go directly to The LMS-Patriot Project.

PLEASE GET IN TOUCH AT

sales@lms-patriot.org.uk or call 01785 244156

2025 SALES EVENTS CALENDAR

Event	Date	✓ = Booked P = Provisional
Statfold Barn Steam Event	Saturday 7th June Sunday 8th June	✓
Amerton Railway Rail 200 Gala	Saturday 21st June Sunday 22nd June	✓
Railex Buxton	Saturday 5th July Sunday 6th July	✓
The Great Gathering Alstom Derby (Litchurch Lane) (Entry by ticket only – event sold out)	Friday 1st August Saturday 2nd August Sunday 3rd August	✓
Soar Valley Model Railway Club, Model Railway Exhibition, Loughborough	Saturday 16th August Sunday 17th August	✓
Gauge 'O' Guild Bingley Hall, Stafford County Showground	Saturday 6th September Sunday 7th September	P
Leigh Festival of Model Railways & Transport Modelling Leigh Sports Village Leisure Centre	Saturday 13th September Sunday 14th September	✓
LMS-Patriot Project Members Day and AGM Tyseley Locomotive Works	Saturday 20th September	✓
Stafford Railway Circle Annual Model Railway Exhibition Bingley Hall, Stafford County Showground	Saturday 27th September Sunday 28th September	✓
GCR Autumn Gala Quorn & Woodhouse	Thursday 2nd October Friday 3rd October Saturday 4th October Sunday 5th October	P
Warley at Statfold	Saturday 11th October Sunday 12th October	✓
Bluebell Railway Giants of Steam 2025 <i>A celebration of new build steam</i>	Friday 17th October Saturday 18th October Sunday 19th October	✓
Rail-Ex Taunton 2025 Taunton School, TA2 6AD	Saturday 25th October Sunday 26th October	✓
GCR – The Last Hurrah Quorn & Woodhouse	Saturday 15th November Sunday 16th November	P

MEMBERS' CORNER

Please note that the views expressed by contributors are not necessarily those of the Project.

THE RED ROSE

Dear Sir,

Plenty of interesting material again in Warrior 64, thank you.

I was particularly drawn to the photo on page 29 of 45521 on THE RED ROSE, a train that I saw regularly after school. I would cycle like a bat out of hell from school at 4pm to Tiverton Street near Edge Hill sheds to watch THE RED ROSE on its final couple of miles before coming to a stop at Lime Street.

There is no date to the photograph, although I suspect that it was before my time as the cycling lion emblem was giving way to the ferret and dartboard version by the time I started spotting, and also the coaching stock was mostly maroon. I think I may have been nine or ten when I was allowed out to watch the trains alone.

I also enjoyed reading Janet Elson's article on the



'The Red Rose' arriving at Crewe with rebuilt Royal Scot No. 46157 The Royal Artilleryman in charge.

Photo: © Transport Treasury

Valentine tank and I was wondering how the flotation equipment was inflated on a landing craft; portable generator perhaps?

**KIND REGARDS,
COLIN HUGHES. MEMBERSHIP NO. 0326/02**

CONGRATULATIONS

Dear Editor,

Having enjoyed the magazine for quite a few years, may I offer you my congratulations on a job well done. It is definitely a first class journal in every way – presentation, text, photographs, size, everything.

I particularly admire the engineering reports quarter by quarter, well explained, good photos, problems highlighted, nothing hidden, and now the new illustrated glossary to help members who may be less familiar with the intricacies of locomotive construction. If only public museums offered as much technical background to their exhibits! Please pass my compliment to Kevin West.

May I also applaud the way in which the accounts are tabulated and explained, fully transparently, not just once a year but again quarter by quarter.

There can be few large projects that have suffered so many externally-imposed major set-backs, one after another, and still come through fighting positively. But that is what a Patriot Warrior was originally about, and clearly still is!

WITH KIND REGARDS, GEORGE DICKINSON, MEMBERSHIP NO. 1233/00

Thank you to all who contributed their articles that appeared in Warrior 63, we are grateful so many of you decided to contact us. Remember that you can send anything Patriot, memorial, war or railway related and photos are always good to receive (if you do send photographs please supply a return address). Preferably send your contribution by email to office@lms-patriot.org.uk or post directly to the office:
Linda Westerman, LMS-Patriot Company Ltd., Civic Centre, Riverside, Stafford ST16 3AQ.

NEW MEMBER

Dear Pete,

I'm a recent member of the project having joined at KWVR and I also make a monthly donation of £10, not very much I'm afraid but hope it helps.

Your volunteers on the stand were so pleasant and helpful that I'm looking forward to meeting the rest of the group.

I must say it's a very impressive magazine and the article by Kevin West is perfect for someone like me who knows next to nothing.

Looking to hopefully get more involved in the future.

KIND REGARDS

JOHN DICKERSON , MEMBERSHIP NO. 1943/03

WORKING WITH STEAM

Dear Pete,

I started work at Wakefield shed at the very tail end of steam in 1966. We had two 5Xs, Nos. 5694 and 5739. The staff never used the 4 prefix or called them Jubilees, they were always called 5Xs. I had helped changing springs on 5739 and machined the valve eccentric on 5694.

In January 1967, the bulk of the fitting staff moved to Healey Mills, leaving a skeleton team at Wakefield until mid-summer. I knew that Leeds Holbeck still had three 5Xs working and I managed to get a footplate pass to ride over the S&C from Mr. Tom Greaves, the Leeds Division Traction Engineer. I wrote up an account of one of the memorable trips, I also have a photo by John Whitely of us at Ribbleshead. I know that it's only one of Mr. Stanier's taper boiler efforts, but would you be interested?

Working at Healey Mills, the Rose Grove 8Fs then had to use the Craggstone triangle to turn ready for the trip home. I lived at Craggstone and often scrounged a lift with them. We had a funny incident with a lump of coal and a Alsatian dog!

BEST WISHES,

DAVE CARTER, MEMBERSHIP NO. 0448/01

Ed: Thank you Dave, I am interested in hearing an account of one of your memorable trips and will be in touch so that I can publish it in a future edition of The Warrior.



LMS Jubilee Class 4-6-0 No. 5739 Ulster on an Up express arriving at Crewe in June 1947

Photo: © LMS-Patriot Project

FOND MEMORIES OF 45509

Dear Pete,

Buxton, 4th March 2025

I have today received the February 2025 edition of The Warrior. So far I have only spent a couple of hours enjoying it. There is much pleasure in store.

I congratulate you on the quality and interest which the magazine provides. The centrepiece of the colour picture of No. 45509 is a particular bonus.

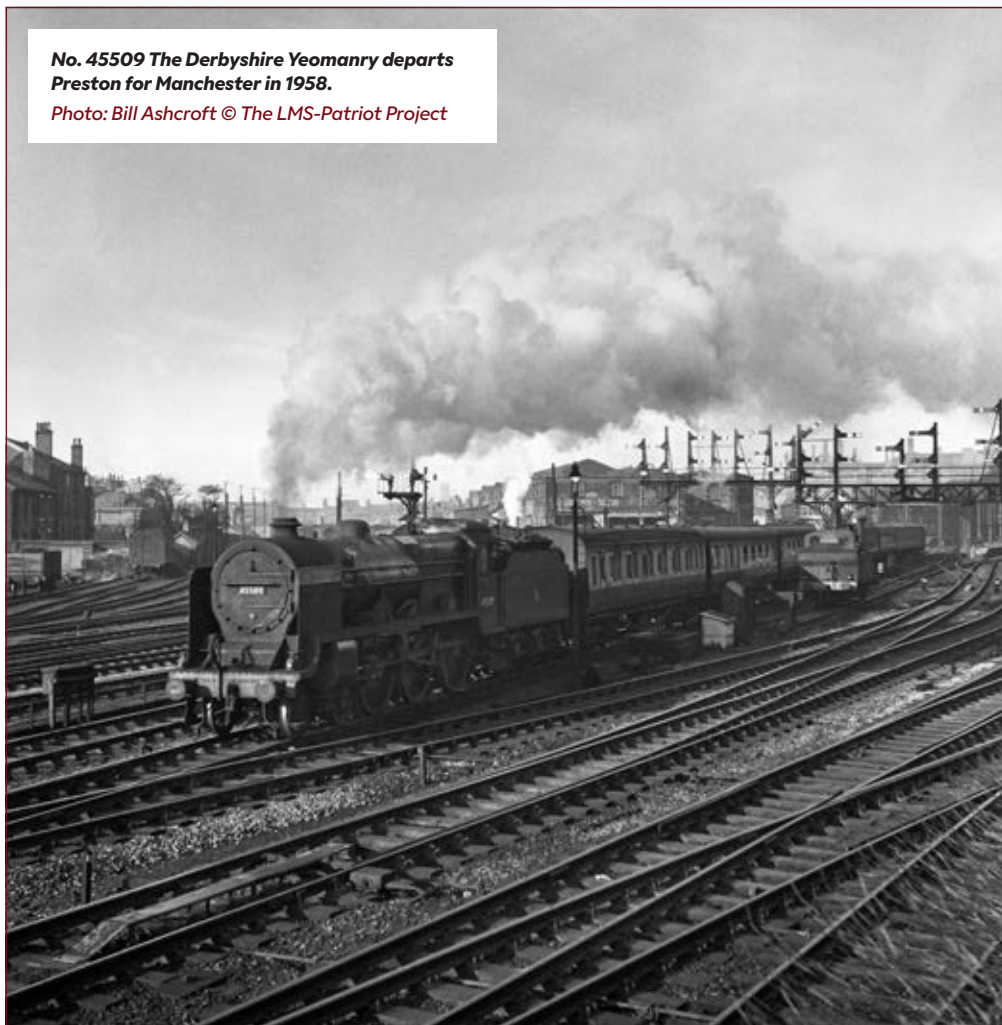
This was the first named Patriot which I saw. At Dore & Totley (4 miles south of Sheffield) on the Midland Main Line to St. Pancras. Having lived in Derbyshire for 60 years after leaving Sheffield I have learnt how much the Derbyshire Yeomanry Regiment is esteemed.

THANK YOU

JOHN RIDER, MEMBERSHIP NO. 195/07

**No. 45509 The Derbyshire Yeomanry departs
Preston for Manchester in 1958.**

Photo: Bill Ashcroft © The LMS-Patriot Project



ANZAC DAY SERVICE



Project Director Janet Elson, who hails from New Plymouth, County of Taranaki on the North Island, New Zealand attended the annual ANZAC Service on Cannock Chase on 25th April and laid a wreath, which had 5551's crest as its centrepiece. The ceremony is performed in the cemetery where numerous NZ soldiers are buried. They would have been in the training camp up on the Chase in WW1.

ANZAC Day is the equivalent to 11th November to Australia and New Zealand as it is the anniversary of the Gallipoli Landings on 25th April 1915. Memorial wreaths are laid by the Australian and New Zealand High Commissioners and also represented are the Defence Forces. Also laying wreaths are the Lord Lieutenant of Staffordshire and the local Mayor's and MPs. The standards are led in by the representative of the Staffordshire Regimental Association with the mascot, *Watchman V*, a Staffordshire Bull Terrier. His rank is Sergeant and he has his own on Facebook page!

In the bottom right photo Janet is standing between two re-enactors who are wearing Australian and NZ WW1 military costumes.

REORGANISATION OF CREWE LOCOMOTIVE WORKS, L.M.S.R.

ONE LARGE SHOP EQUIPPED WITH THE LATEST APPLIANCES REPLACES NINE OLDER ERECTING SHOPS

PROCESSING OR 'BELT' SYSTEM OF BUILDING AND REPAIRING LOCOMOTIVES INTRODUCED

PRODUCTION AND TRANSPORT METHODS REORGANISED – TIME FOR A HEAVY LOCOMOTIVE OVERHAUL
REDUCED TO A MAXIMUM OF 12 WORKING DAYS.

THE PROGRESS OFFICE – A CONTROLLING FACTOR

Having thus briefly outlined the main principle involved, in so far as the physical factors are concerned, it will be of interest to devote attention to the control of the system and the manner in which correct inter-departmental functioning is assured. If such a system as this is to be successful it must necessarily rely basically upon a clear understanding between those in charge of the numerous departments concerned, and this, as a matter of course, applies to all grades, i.e., the managerial staff, foremen, leading hands, and, indeed, everyone concerned with the task in hand. Careful records must be kept of what is being done, and daily programmes of work arranged for. The whole of these important functions are vested in a special department known as the Progress Office, those in charge being responsible under the Mechanical Engineer and Works Manager for planning all the numerous operations and seeing that they are carried out strictly in conformity with the system laid down. Thus the whole of the operations heretofore referred to are based upon a definite system of work processing. The Progress Office controls the shopping of the engines, inspection, manufacture of the parts required and the repairs to be carried out, careful records being kept of every phase of the work. A short meeting takes place daily in the Progress Office, this being attended by certain foremen under the chairmanship of a Progress Department assistant. At these meetings the agenda covers the supply of all material and the conveyance of the Works Manager's instructions to the various shops. Any difficulties arising in connection with the supply of parts are discussed and measures taken to overcome them. This ensures a free and open discussion among the foremen of the shops concerned, so that any matter arising can be thrashed out on the spot and disposed of. The minutes of the meetings

are published daily, each shop in the works receiving a copy. Certain out-station sheds attached to the Particulars of Work Chief Mechanical Engineer's Department also receive copies of these minutes, which daily show the number of engines to be taken in for the various belts on the following day. Upon receipt of these engine numbers, the machine and other part shops at once notify the various leading hands as to the dates on which the particular materials for which they are responsible will be required. This information is entered up on a progress sheet supplied to each leading hand, and from which the foremen of the shops can ascertain whether a particular job is behindhand or not.

THE SHOPPING OF ENGINES

The starting point at which the scheme comes into operation is that of keeping track of the condition of all locomotives belonging to the division in service. The length of time from the last heavy repair until the engine is considered for the next overhaul is fixed—for the larger passenger engines at 12 months, and for freight engines at from 18 to as much as 30 months – and a sheet is issued under the heading of "Shopping of Engines", on which is set forth the various classes of engines and the periods allocated as the minimum bases for heavy overhaul periods. It is not, however, drastically laid down that at the end of that time the engines must necessarily come into the shop for repair on the belts. Special forms are issued to the running sheds, and on these the condition of a given engine must be entered up two months before it is due, not definitely for actual shopping, but for the "proposal for shopping", which, in other words, means that at ten months from the time a passenger engine left the shops either as new or after heavy repairs, a careful investigation must be carried out as to its condition and a report made to enable the progress office to decide whether or not, according to the information given, the

engine can be relied upon to continue in service after the prescribed period. Two forms are sent out, one relating to the frames, cylinders, wheels and motion, and the other to the boiler. The forms when completed are sent to the mechanical engineer, and from these reports the engine referred to is definitely scheduled for shopping, or alternatively, allowed to continue in service for a further period. Two months prior to the conclusion of the further period the same procedure is repeated, and at the expiration of that time, or even later, it is often found that the locomotive is still fit to continue working. This arrangement not only ensures that the last available mile is got out of the engine, but also makes certain of a thorough and systematic periodical inspection. It is of interest to note that 10,000 locomotives on the L.M.S. Railway are being regularly watched in this manner.

THE RECORDING SYSTEM

Paramount filing cards are utilised for recording the T proposals and re-proposals of engines for repairs, one of these cards being reproduced below. It relates to an 'Experiment' 4-6-0 type passenger locomotive numbered 887 under the old classification, and 5496 under the new or grouped classification. The card indicates that the engine is located at shed No. 19, the date of the initial proposal for shopping being shown and also the subsequent dates entered up after the shopping reports have been considered, whilst finally the date decided upon for actual shopping, due to the condition of the engine, is indicated. The numbers on the left-hand side and top of the card indicate the various classes of engines, whilst the entries on the right-hand side show the general class of engine and particulars of heavy renewals required, i.e., cylinders, boiler or tyres. The card is gang punched where necessary. The card reproduced shows that the engine belongs to class 6A and that it requires heavy repairs to cylinders, boilers and tyres, this being perhaps an extreme case. It will be further noticed that the engine completed no less a mileage than 66,278 since the last heavy shopping, and it has been 're-proposed' twice, the result being that although due for shopping in May 1927, it remained in service until 3rd January 1928, being

The image shows a 'Paramount' filing card, a type of ledger used for recording engine repairs and shopping. The card is a grid with various fields. At the top, there are fields for 'ENGINE NO.' (887), 'NEW' (5496), and 'DATE' (Sept 19). Below this, there are fields for 'STOPPED AT SHED' (1913.27), 'LOC. LIST' (191224), and 'MILEAGE' (66278). The card is divided into sections for 'DATE SHOPPING', 'DATE REPAIR', and 'REPAIRS'. The 'DATE SHOPPING' section has entries for 'MAY 1927', 'OCT 1927', and '2 AUG 1927'. The 'DATE REPAIR' section has entries for '14 MAR 1927' and '2 AUG 1927'. The 'REPAIRS' section has entries for 'RE-PROPOSE FOR' (OCT 1927, 2 JUN 1927) and 'TO BE SHOPPED AT' (below 2 AUG 1927). A large 'HEAVY' stamp is visible in the center. There are also handwritten notes and dates, including '1 SEP 1927' and '2 SEP 1927'. The card is gang punched along the left edge.

returned to service after test runs on the 23rd of the same month. On the decision being reached to shop an engine, notification is sent to the General Superintendent, Derby, through the Motive Power Department, of the withdrawal of the engine from service, and the General Superintendent is again notified through the same channels when the repairs have been completed and the engine is again available for work. It will be noticed that the paramount card shows the dates on which these notifications were sent in each case. Each week a summary is made of those engines agreed for shopping and typed copies of this summary are sent to the various shop foremen, who then know what engines are coming along, also whether new parts are required, such as tyres, cylinders, motion details, etc. Weekly lists of the engine requirements necessary to keep the belts active are sent to the Motive Power Superintendent, these relating to requirements for the following week, and he selects from those engines already agreed for shopping by the Mechanical Engineer's Department, the selection being based on the classes of engines which can best be spared in accordance with the exigencies of traffic at the time. This list covers the number of engines required each day to feed the erecting shop.

SEQUENCE OF OPERATIONS

Summarised, the sequence of events is as follows:

1. Two months before the expiry of the 12-month period (for passenger locomotives), the Motive Power Department, after an examination, sends a report to the Mechanical Engineer's Department as to the condition of the engine.

2. The Mechanical Engineer sends out a Boiler Inspector to examine the boiler and make a report as to the condition of the same and what will be its probable life without further repairs.
3. The Mechanical Engineer's Department then examines both the Motive Power Department report and their Boiler Inspector's report, and either accepts the engine or re-proposes it for a further period.
4. The list is circulated throughout the works departments so that every individual shop foreman is aware of what engines are coming in, and by reference to the previous list – supplied when engines were agreed for shopping – the foreman can ascertain what heavy parts are required.
5. Steps are then taken to see that the necessary cylinders, tyres, etc., are ready for the engines as required.

Engines from the various running sheds are worked to the Crewe sheds and brought into the works strictly in accordance with scheduled arrangements. On arrival in the works yard, the tender, where such is fitted, is taken off the engine and sent to the tender shop, where the heaviest repairs possible to a tender must not exceed four

days. This means that the tender can, at the end of that period, be returned to traffic, that is, several days before the locomotive itself is ready. It has been the policy at Crewe for long past to have fewer tenders than engines, thus not only avoiding loss of mileage and consequent revenue, but also avoiding congestion of the yards, and the loss represented by a considerable amount of demobilised capital. Locomotive tenders are repaired, as in the case of the engines themselves, on the belt system. If any delay should take place in the supply of the material to the belt, this is immediately reported on small slips, one copy being sent to the Works Manager direct, and another copy to the Progress Office, where the point raised is dealt with at once, the office finally reporting the whole of the circumstances to the Works Manager, who connects this report up with the slip previously sent direct to him by the erecting shop, the matter then being taken up with the person primarily concerned.

RIGID INSPECTION METHODS

In order to ensure that each engine is given a thorough and complete repair, a rigid system of inspection has been put in force making possible rapid decisions as to



Webb 0-4-2WT Crane Tank No. 3249 in ex-shops condition at Crewe on 20th August 1939.

PHOTO: GEORGE BARLOW © THE TRANSPORT TREASURY

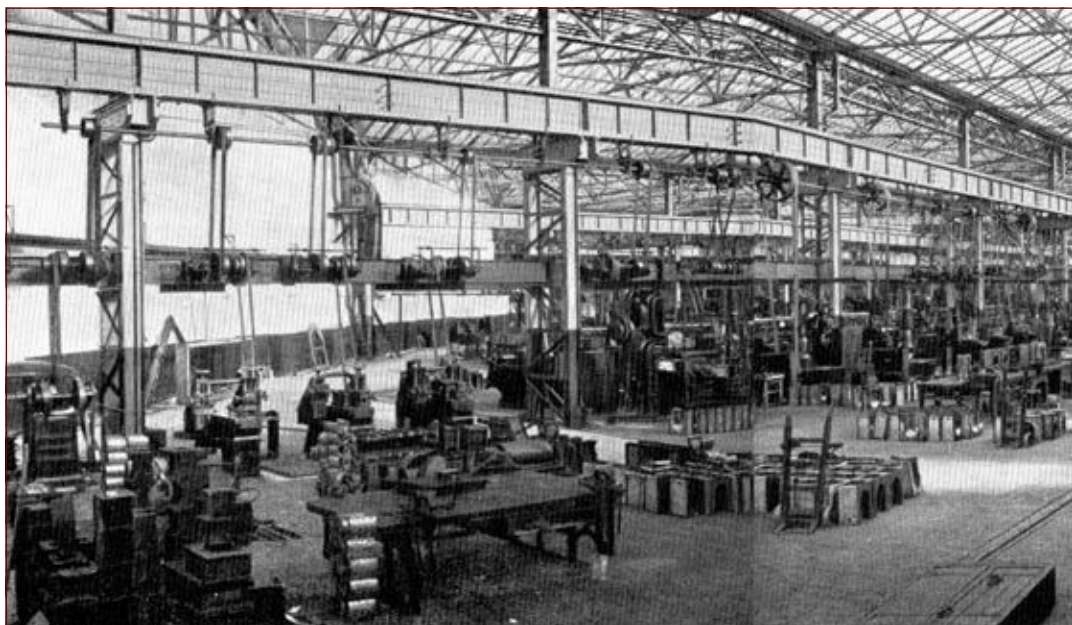


Built for the Caledonian Railway at St. Rollox Works, Glasgow in 1895, Class 264 0-4-0ST No. 56027 is seen working as the Crewe Works pilot. It was transferred to Crewe from Preston in January 1957 and worked there until withdrawal from service in October 1960. Note the coal stored on the cab roof. PHOTO: ALEC SWAIN © THE TRANSPORT TREASURY

the actual repairs to be undertaken; also ensuring that no part whatsoever goes into service in a defective condition. In accordance with this system of inspection, special men are engaged solely in examining boilers, cylinders, motion details, frames, axles, wheels, etc., each being a specialist in his own sphere. The inspectors are supplied with forms on which they enter details of the work required on the particular items. These are sent to the foremen of the various shops and the job cards for the men are made out and checked, these cards being compiled from the inspectors' forms by men working under the foremen, thus ensuring that only such work as is really necessary is actually done on the locomotive parts. The results of the inspector's examination of various parts are entered up as a continuous record, the entries being made by the inspector who examines the part, and signed by him, so that the responsibility for the examination is definitely fixed. Similarly, any particular repair carried out at the previous overhaul can be followed up and whether such repair proved to be thorough or expedient ascertained. From these records

much valuable information is obtained as to the advisability of repairing, or, alternatively, renewing various items of construction.

The inspectors' reports, or as they are termed, "Inspection and Repair Notes", cover the whole range of the locomotive and its parts, separate forms being entered up under the headings of Welding – Frames – Wheels, Driving, Intermediate and Trailing – Spring Gear – Connecting Rods – Coupling Rods – Slide Bars – Motion Details – Reversing Gear – Piston and Valves – Cylinders – Brake Work, and Tender Details. It is possible to obtain without any difficulty from these various inspection and repair notes or forms a knowledge of the parts to be renewed or repaired, the information being classified under the headings – Item – No. to be Renewed – No. to be Repaired – Remarks – Amount of Piecework Prices. The number of the engine and its class are given, and on some of the forms the number of the belt on which the work is to be done. The forms used for the wheels provide for entries relating to journals, crank pins, etc.



The machine shop area at the west end of the new Erecting Shop (No.3 on works layout – see part I, Warrior 64).

A similar series of forms is used for recording the actual work done on the engines covering the whole of the range indicated above on the inspectors' forms. Some of the latter series are accompanied by sketches graphically indicating repairs, and as an example the set before us at the time of writing contains sketches of main frames on which some minor welding operations have been carried out, the location of these being ascertainable at a glance and their character briefly set out on the drawing. These reports are signed by the persons responsible and give the date on which the work was done, the number of the engine, the shop, the original date of construction, and the foremen's signatures.

Limits of wear are strictly laid down and are worked to by means of limit gauges by the inspectors, so that a uniform standard of repair is maintained. The limit system is based on the "Unilateral" principle, with the hole as a base, plus allowance on the standard and minus allowance on the shaft. A standardised supply of limit gauges is available.

A very complete range of standard graduated sizes of motion pins, valves, etc., is in operation at Crewe. All motion pins are machined in graduations of 0.005 in. between sizes, so that the largest diameter of pin when worn is merely ground to the next size below and

becomes available for further use in another engine. The whole of the inspection and the issuing of the necessary instructions for repairs is carried out within the first two days of the engine being taken into the shop. Simultaneously with the stripping-down operation, parts taken off the engine are placed in pans or containers alongside the engine. These pans are placed in the bosh cleaning plant, after which the parts are inspected and sent to the various repair shops for repair or renewal as the case may be, being returned, as already stated, to the belt stage at which they will be mounted on the engine two hours before they are required.

The method followed by the inspectors is an extremely thorough one. All rods and motion parts are examined minutely for flaws by tapping the rod or part with a light hammer, the purpose being to set up vibration, which causes oil to exude from any fracture which may exist. The parts having been taken off engines newly arrived from service, naturally carry a film of oil, and after the first tapping, the part affected is wiped dry and again tapped, when even a minute or hair crack will be at once discovered by further oil showing on the surface. All rods containing flaws are replaced by new ones, and although the method is such an apparently simple one, it is found to be entirely effective – indeed, it is rarely if ever that



even a small defect escapes notice. Wheels undergoing inspection are allowed to fall from a height of about 10 inches on to a track in the shop. They are pushed along a rail bearing platform, and the jolt from the higher to the lower level sets up vibrations throughout the whole of the wheels, thus producing the same effect as the hammering just described, in that it brings out any oil to indicate the location of a fracture. The whole of the journals and crank pins are examined for flaws and measured over for wear. If fit to run again, the size of the journal and pin is taken by micrometer, and the sizes handed to the machine shop foreman, so that the rods and axleboxes can be bored to suit. The whole of this inspection is, as previously stated, completed during the initial period of two days, namely, while the engine is at the stripping positions. So thorough, indeed, is the inspection, that rod examination alone represents a continuous process, and when it is remembered that rods belonging to as many as 30 to 33 engines are examined every week, some idea of the magnitude of the task can be gathered. A certain amount of machining work is carried out in the erecting shop, where a machine section is installed, this including tyre turning, journal skimming, and work on axleboxes, coupling and connecting rods. In the axlebox department, the

principle in force is that axleboxes once picked up off the ground are not put down until completed, passing from machine to machine on a runway, the machines being so arranged that the operations follow in correct sequence, all being at the same level.

Locomotive cabs, bunkers, tanks and panels are built and repaired on the belt system, being moved on trolleys at definite periods and passing from gang to gang at stated times, the work being so co-ordinated that each particular item is repaired, and, in the case of tanks, tested in sufficient time to be at its allotted stage in the correct order. The belts for tanks, cabs, etc., are located in the old erecting shop, No. 9, now referred to as Erecting Shop North, which lies parallel to the new shop, and the parts stripped from the engine are conveyed by the traverser to the old erecting shop. They are there examined and repaired and passed along parallel with the pits in the new erecting shop, and again enter the shop on the centre road where they meet the engine to which they belong and are mounted in position. These parts are transferred from the belt to the centre bay of the erecting shop by means of bogies moving along a path which extends the whole width of the old and present erecting shops, and the old machine shop at the east end of the building.

The repair of locomotive tenders is carried out in a separate building, again on the belt system. Two belts, each consisting of eight tenders, are in operation, the tenders being brought in on the traverser and taken out in the same manner. A move along the belt takes place every four hours, and 11 repaired tenders of all classes are obtained each week off each belt, this number being sufficient to meet normal requirements.

PROGRESS BOARDS AND FORMS

Among the forms used in connection with the progress system is one showing the position of engines under and awaiting repairs. This is supplied to the Works Manager from the Progress Office and reviewed by him weekly. The Progress Office makes up a return from special boards, on which are shown the daily movements of the locomotives, so that no engine can possibly be lost sight of. Discs are hung on these boards, each disc bearing the number of the engine which comes under the Chief Mechanical Engineer's department, various columns being provided with headings such as 'Stopped at Sheds', 'Awaiting Repairs in Yard', or 'In Shops under Repair'. The discs progress with the movements of the engines

themselves, and it can therefore be seen almost at a glance exactly where a particular engine is at the moment.

A boiler progress board is also employed in the office for showing the position of the stock of spare boilers, i.e., whether awaiting or under repairs, being mounted on frames or placed on the reserve stock, and this ensures that the location of every boiler can be readily seen and such boilers as may be required in the immediate future given preference. On this board, progress tickets take the place of the discs, and these tickets are changed daily in accordance with the actual state of the boiler concerned. The entries on the tickets give the number of the boiler, the number of the engine from which it came, when the repair began, when completed and so on, and a summary made from these boards is sent to the Works Manager each week.

WHAT THE SYSTEM HAS ACHIEVED

The results obtained from the 'reorganisation' of Crewe Works as described above were summarised by Mr.

Beames in his paper on the subject before the Institution of Mechanical Engineers, as follows:

1. Reduction of transport costs.
2. Decreased manufacturing costs of steel, locomotives, boilers, and all components.
3. Increased output of repairs and renewals, with decrease in overtime and night-shift working.
4. Decrease in time locomotives out of traffic, and consequently, lower stock of locomotives required.
5. Reduction in quantity of portable tools and in labour costs
6. Lower supervision costs in erecting shop.
7. Decreased cost of electric current and of gas.
8. Greater ability to cope with the increased size of locomotives and the extra requirements due to the grouping of the railways.

In addition, it may be remarked that the adoption of the system has reduced very considerably the number of engines engaged in shunting operations within the works area, the actual figure being at least 20 per cent, whilst the number of wagons employed for conveying material



Webb Class 2F 0-6-0 Coal Engine No. 58328 hauls a freight through Crewe Works Yard on 12th August 1952.

PHOTO: ERIC SAWFORD © THE TRANSPORT TREASURY



A view of Crewe Works on 13th April 1946 with 1891 built ex-LNWR Webb Class IP 2-4-2T No. 6605 prominent in the foreground. PHOTO: GRAHAM ELLIS © THE TRANSPORT TREASURY

has been reduced by 60 per cent. There has, further, been a reduction in the number of men employed – not, however, by discharges, but due to the fact that the necessity of replacing those who have retired or for any other reason have left the company's employment has disappeared, it having been anticipated all along that with the development of the system less labour would be required.

It is an outstanding factor that, whilst the scheme undoubtedly benefits the railway company, the men themselves earn higher wages, and it was, and is, the company's desire that the men should share in the advantages gained. Further economy is represented by the fact that the work flows all in one direction – namely, from east to west – raw materials, etc., entering at the east end and progressing through the various departments until reaching the point at which they are required for assembly on the engines on the west end, the idea being to ensure that there is no turning back at any point. The complete engines traverse the works area from west to

east, passing out into service in the yards at that end. It might be inferred that a system of this kind, whilst greatly facilitating operations in the erecting shop; would, owing to the time limit placed on every stage of production, lead to greater hustle in the machine and other part shops – or, in other words, whilst the erectors have an easier time, the fitters and machinists have to work at higher pressure. This, however, is not the case, one explanation being that a job once taken up is pushed through to a finish without being allowed to stand down for indefinite periods, as was previously the case. Another point to be remembered is that in the machine and fitting shops, the individual parts of engines are dealt with, as in the erecting shop are the locomotives themselves, on the processing, or belt system. It is a case of quicker and better organised, rather than more work, advantage being gained by the subdivision of labour, so that what might have taken one man a fortnight to complete is now put through by four men in a fraction of the time.

Fowler Class 6P 4-6-0 No. 45500 *Patriot* at
Birmingham New Street on 19th October, 1959.

Photo: A. Baldwin/Rail Archive Stephenson



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2
NEW



3



4



5



6



7



8



9



10



10



10



11a



12a



13a



14a



11b



12b



13b



14b



15



16



17a



17b



18



19



19



23a

23b

SALE



25



24



26



SALE

27



28



20a



20b



21

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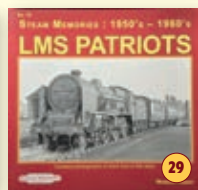
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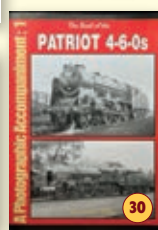
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No. 45533 **Lord Rathmore** on a Leeds Express at Gledholt, near Huddersfield on 26th October 1952.

Photo: Eric Blakey © Transport Treasury

