



“Rebuilding the past for the future”



# “LISTER”

The Project 22 Journal

Autumn 2018

Issue: D6303

# Journal Overview



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Cover: D6303 Cornish main line by Carlyon golf course between Par & St Austell

PROSPECTIVE: THESE FOOT NOTES EXPLAIN THE RELEVANCE OF THE ARTICLE TO PROJECT 22

## Welcome

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Welcome to D6303, our Autumn issue of 'Lister'.

So much has happened since our last issue, I can now call this section from “The Chair” As I took on the role of Chairman of Project 22 in February 2018. David Forster has been in this role since the beginning and has now taken the role of vice chairman. We have done this because we like to share things around and give the committee chance to try other jobs.

Progress has been steady as much of the background work progresses. We decided, as mentioned in earlier updates to concentrate on the practical aspect of the project. This would be design and development of the locomotive.

## NEWS

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Our main areas of activity have focused on:

- \* CAD design
- \* Purchasing drawings
- \* Research into documents and manuals
- \* Compiling a components list
- \* Locating critical components

## COMPUTER-AIDED DESIGN (CAD)

In September 2017 we gained a new committee member, Andrew Thomas who is a full-time CAD engineer working in an industrial business. Andrew has taken on the role at Project 22 as Head of Design Engineering.

Andrews work is intense and time-consuming and provides Project 22 with the critical drawings needed to gain the costings for specific aspects of the project. More details of this will be published in our next issue of Lister.

## PURCHASE OF DRAWINGS

Doug Parfitt, our Project Manager has been working for 3 years to list and locate the relevant drawings needed to provide Andrew with data needed to produce the CAD drawings.

We have a fully-catalogued list of all drawings needed and are methodically locating them and purchasing both hard and electronic copies. It will take another 3 years to collect all the drawings we need, which are purchased in order of priority.

Getting drawings is not as straight-forward as it seems. We have listed those we need but it takes several weeks to locate batches of 20 at a time.

## RESEARCH INTO DOCUMENTS AND MANUALS

In addition to the multitude of blueprints we need there are many other documents needed such as component manuals, brake and wiring diagrams. Much of this information is available from the National Railway Museum, and regular visits have been taking place with many more planned for the 2019.

## COMPONENT LIST

A critical area of development is the completion of a complete component list for a D6300 locomotive. The list will identify the components used in the original locomotive and cross-reference with those available and compatible that can be recovered from existing locomotives, where components may be available from preservation groups or industries in the UK. This list will also identify what new components can be used as replacements, an option preferred by Project 22.

This is a massive job which is progressing slowly.

## LOCATING CRITICAL COMPONENTS

As we have already located and purchased an NBL MAN power unit, the next task is to find a transmission. We have located several around the world. This is the “holy grail” of the project - the Voith L306R.

Due to the complexity of negotiations we choose to not provide any detail or specific information until we have some actual information to share, other than saying we have located two transmissions that could be made available to us in the future, and we are confident that we will secure one for Project 22.

## THE FUTURE

There are many other projects going on within the group and we are still spending many hours slowly moving forward. Our policy is still to keep our heads down and work on the important design and development work before we rush out making announcements. Project 22 will come back to the public eye when we are prepared.

We think our decision to reduce the level of marketing was the right move, as we were very much in danger of peaking too soon. Project 22 become very public before it even got started, which gave the impression that it was for more mature than it was. It is going to take us a few years before we realise the real potential of the project. Slowly but surely a strong sustainable structure is developing. We still have a long way to go before we can really start the actual stages of costing the build in real terms and setting out to raise the funds needed to build and maintain a locomotive.

We still need to recruit working members who can help use reach our aim, of the first stage of assembly by 2022. There are many projects as shown above where we need more people to help. We are not at the stage of needing a great deal of manual help, but this project is bigger than the six active committee members currently working on the project.



D6631 D6636 Exeter May 1971 Mike Symons Tom Cullimore collection



D6352 Swindon 1971 Mike Symons Tom Cullimore collection

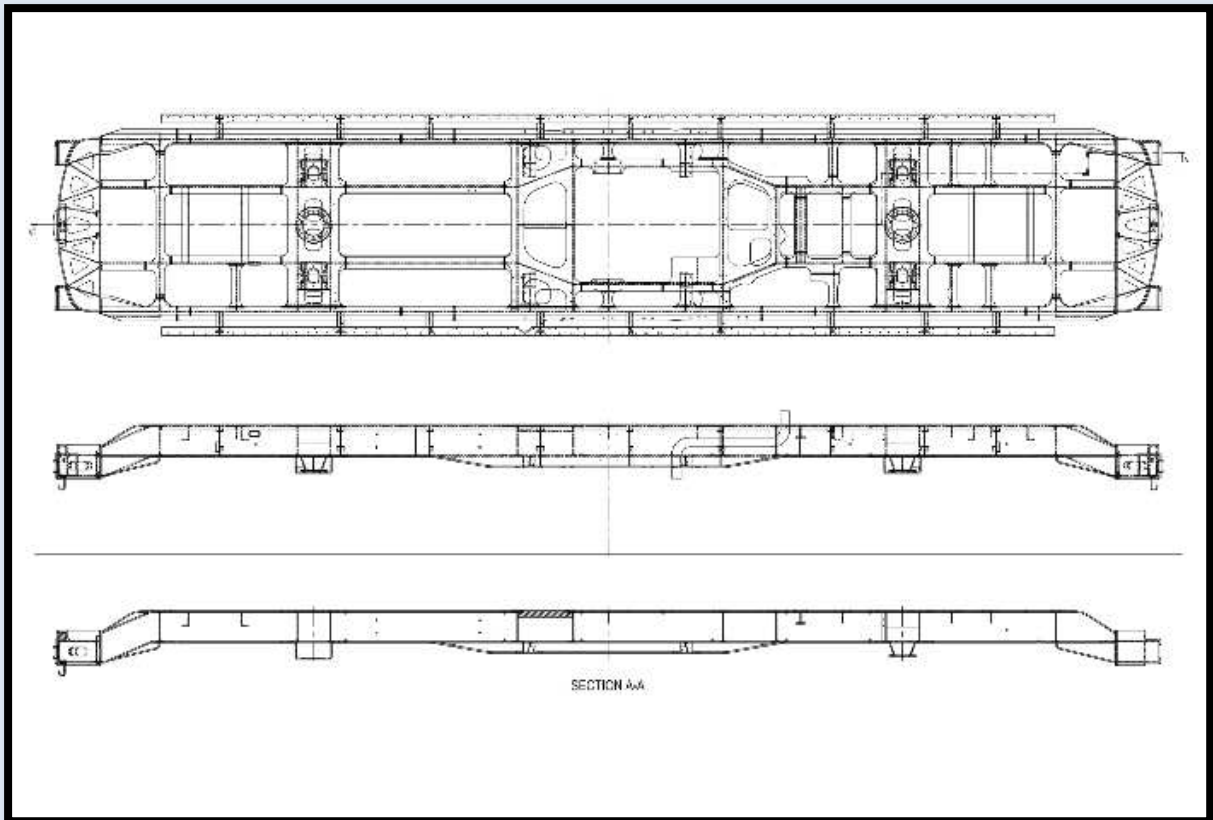
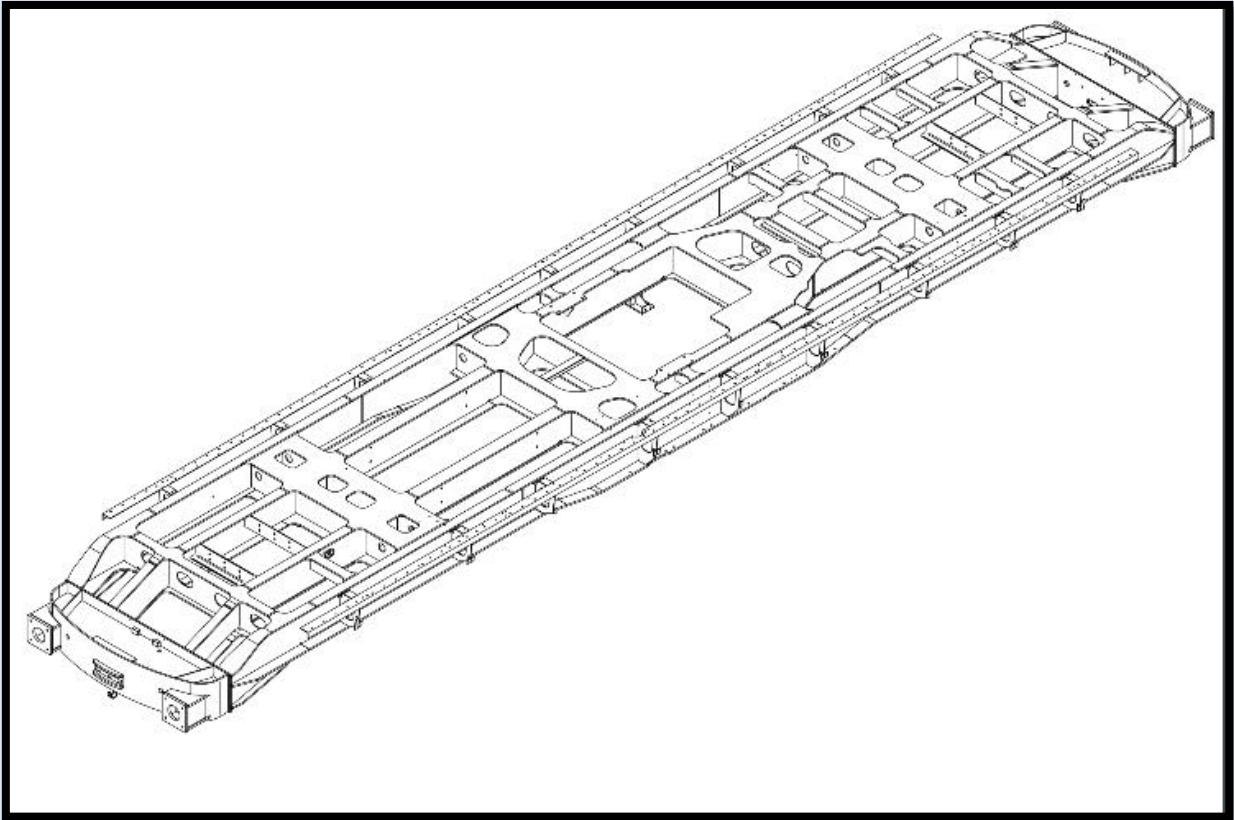
## **Andrew Thomas Joins the team**

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Throughout the last few months, and unnoticed by the vast majority of followers of Project 22, a recent addition to the P22 Committee - Andrew Thomas - has been steadily turning blueprint-like plans into CAD (Computer Aided Design) work and has made great inroads into the task. Andrew - whose day job is doing similar work for his employers - has been peering at indifferent copies of plans; replicating them on computer and bringing together these "components" to build 3-D frames of a Class 22 loco. Telling us something about himself and his aspirations for Project 22, Andrew writes:

I have always liked first-generation diesels - particularly diesel hydraulics - and especially when in their earlier liveries. Rail Blue and sectorisation identities really don't work for me. I find rarities such as the Clayton, Co-Bo and Class 15 particularly interesting, and I guess a Class 22 will fall into this category; it would be great to see all four together sometime in the future. Being a keen fine-scale 3mm railway modeler, a couple of years ago I built an etched nickel silver kit for a Class 22, and through doing research to produce a "later nose end version", with as-built route indicator boxes that was not catered for in the kit, I developed an interest in a loco that up until that point I did not really know much about. Regularly attending diesel galas, I can normally be found with my head hung out of a carriage window, as close to the loco as possible.

I am perfectly happy to walk to the back of the train as it approaches the end of the line and stand at the end window all the time until the next working to ensure I have the window next to the loco for the return trip: on Westerns making sure that the exhaust outlet from the nearest engine is on my side. One day I may be privileged to lean from the rear cab window of D6358, smelling the exhaust from our engine as it jerks and sways along the track of a heritage line.





Since completing my apprenticeship 36 years ago, I have worked in various drawing offices, across a range of industries including jig and tool, wheelchairs and mobility scooters, forklift trucks and, for the last sixteen years, mezzanine floors. When I started working I used a drawing board, and as computers were introduced, changed to 2D CAD. I now use 3D CAD; a skill that is proving invaluable for the efficient construction of D6358.

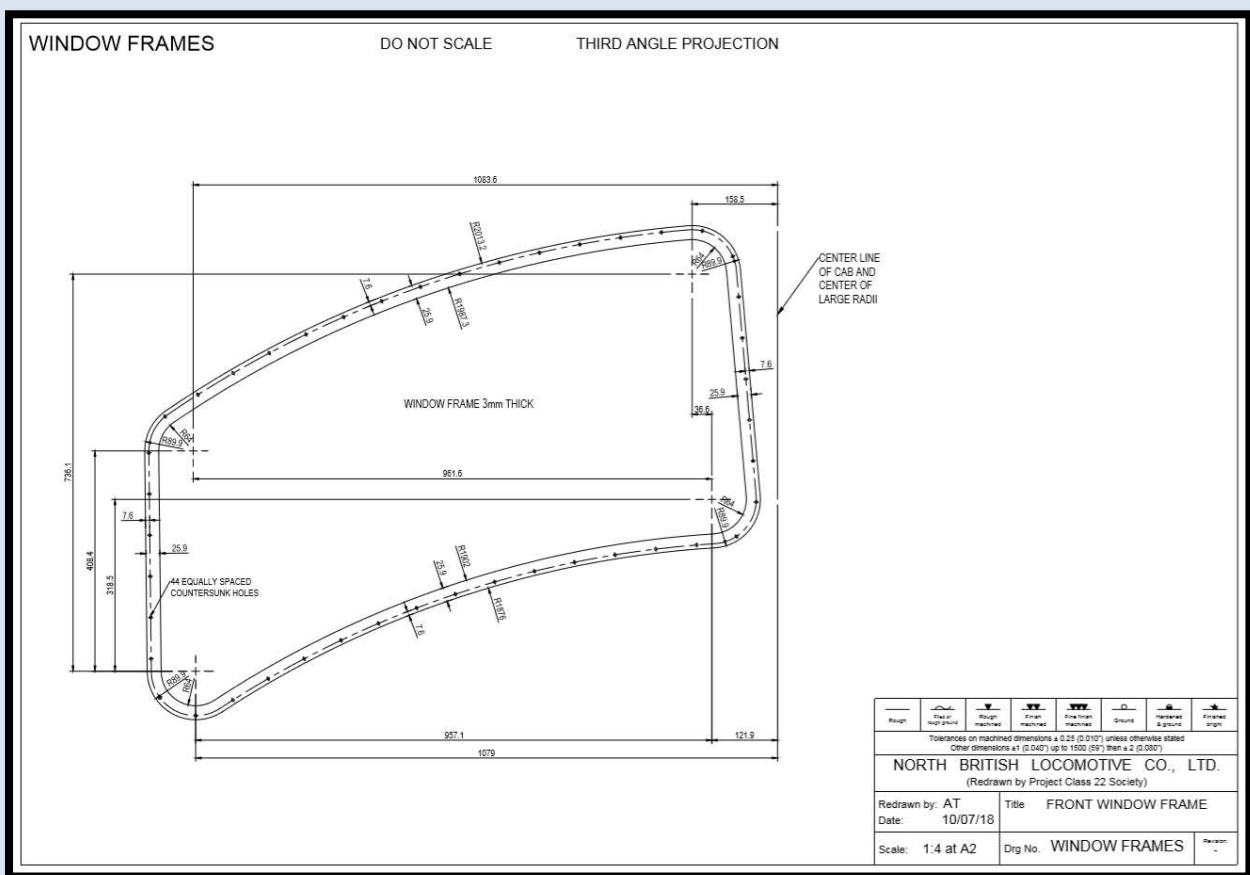
So far, while modelling and detailing the mainframe assembly in CAD, the only real problem that I have encountered is the very poor quality of a few of the drawings. We are in the fortunate position that virtually all of these plans still exist, though they can be hard to read due to their age. Another challenge will be that once we get onto the aluminum castings for the cab, I may have to teach myself how to use the 3D surfacing modelling side of AutoCAD. All of the parts tackled so far have been modelled using solids, and this technique may not be suitable for the flowing surfaces of a casting.

Drawings of NBL Class 22 locomotives are mainly in the form of detailed general arrangement (GA) views, where each of the parts is dimensioned as an assembly rather than having an individual drawing for each component part. Problems can arise when trying to interpret these, because some views are 'part sections' and I have to assume that - for instance - the part of an upper plate that is not visible in the part section is identical to the part that is visible. Making such an assumption normally works, but not always. For the North British Locomotive Company this was not a problem, because they also had templates for flame-cutting the plates to shape, so the GA drawings were not their sole source of information.

In P22 we have taken the decision that when re-drawing the originals, they are first modelled in 3D CAD, and from these, GA drawings are created. Producing separate drawings for each piece part, along with a 3D view of the assembly, will greatly aid our future fabricators. By combining each of the CAD models of individual GA drawings into a full model of the mainframe assembly, it enables us to check that all parts line up with their mating parts on adjacent GA models, and discover any inevitable misinterpretations of the original drawings in order to correct errors before any steel is cut. The CAD models also identify variations on the original drawings that were never corrected, as the shop floor at NBL

probably just marked up their copy of the GA drawing when they found an error and worked to these ‘marked up’ drawings for future production.

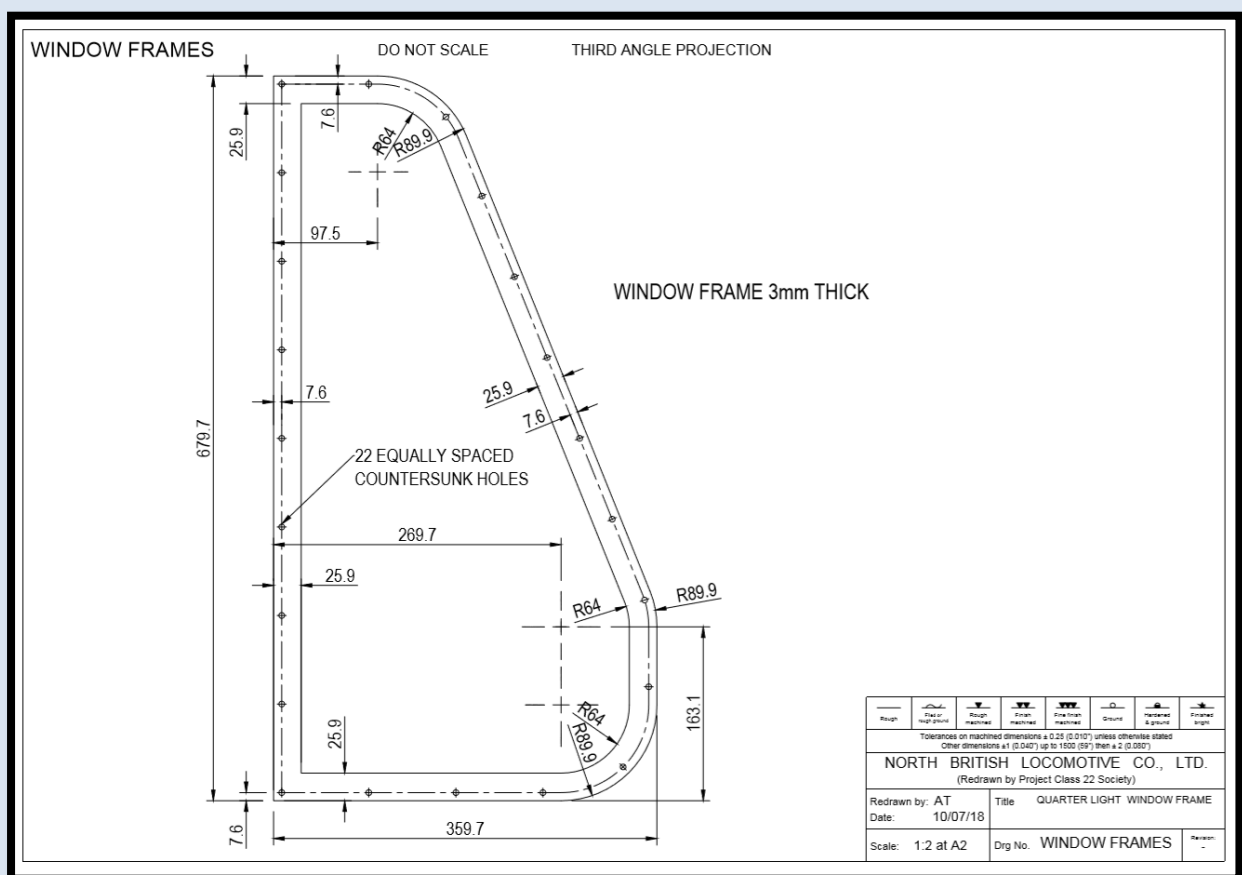
There are other advantages to modelling the parts in 3D CAD, as modern Computer Numerical Control (CNC) machines can use the CAD data from the model to cut the profile of plates and position the drilled holes, along with setting their diameter, and forming the bends. Our fabricators, who will have none of product knowledge, jigs or fixtures that the North British Locomotive Company



had built up over years of manufacturing, will be able to look at the 3D CAD model to gain a fuller understanding of how the parts fit together.

Cabs on a Class 22 are built up from various aluminium castings, bolted together rather than the normal practice of being steel sheet welded over a frame. By modelling these in 3D CAD it should be possible to use the CAD model to produce the patterns that will be required to produce these castings.

We are at present about three quarters of the way through modelling and re-drawing the mainframe assembly, so much has been achieved, but a lot remains to be completed, too. When 6358 finally runs under its own power I will have a great sense of achievement in the fact that with the skills that I have built up over my working life I have been able to make a significant contribution to getting the loco built. I do not have the free time at weekends to volunteer at a preserved railway but the CAD work for Project 22 can be done to suit me when I have time available, a few hours of an evening, or at various times during weekends. I hope others can contribute their specialist skills to the project in similar ways, when opportunities present themselves.



PROSPECTIVE: This is one of our most fundamental areas of progress. Andrew has brought a skill to the Project that has saved us a large amount of the design budget

## Featured Locomotive: D6303

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D6303, D6305-Laira-Jun-1967 Gordon-Edgar

D6303, was the fourth of the pilot scheme of six locomotives delivered to Laira from NBL in Glasgow 22/5/1959 with the progressive running number of 27668. D6303 was fitted with Bogies 6300/7 & 6300/8, NBL-MAN L12V18 / 21A Engine No.176, Voith-NBL L306r Transmission No H7/5 and Spanner 'Swirlyflo' Boiler No J1806.

D6303 was delivered to service in all over green, without any yellow ends. It had the 'eyebrows' fitted and bottom mounted wipers. D6303 was sent to Swindon and gained SYP (SL/SW/2953) to both A & B ends on 21/6/63. She gained flush fitting head code boxes at some point and was painted into BR Blue with SYP during her overhaul 21/12/66-01/04/67.

6303 was a Laira engine all her working life, visiting Swindon works on numerous occasions for Light classified repairs and other selected issues on dates:

22/03/60 - Engine changed to No.141.

05/05/61 - Transmission H7/12 fitted.

14/11/61 – Transmission H7/6 fitted.

21/06/63 – Engine No.263 & Boiler J1802.

06/04/64 - Transmission 6278.

22/04/64 – Engine No.472 fitted (Laira).

28/05/65 – Boiler No. J1808 fitted (Laira).

01/04/67 – Engine No.337 & Bogies 6300/3 & 6300/4.

17/05/67 - Bogie No.6300/1 & 6300/2 (Laira).

Withdrawn 26/05/1968 with Engine 337, Bogies 6300/1 & 6300/2, Transmission 6278 in situ and Boiler removed.

**Interesting points on D6303: -**

29/08/60 - Noted being hauled through Exeter by 6300 with 6332.

D6303 was transferred from the Works to Swindon stock shed between 26/08/61 and 31/10/61 to release space within the Works whilst awaiting a replacement transmission from Scotland.

Transmission No. H7/12 was returned to N.B.L. Co. under guarantee and No. H7/6 was supplied by N.B.L. Co.

Badminton trial run on 10/11/61.

Stoke Gifford trials on 13/11/61 and 14/11/61 and handed over to the R. & M. Dept.

25/05/65 – Mileage recorded as 144,360.

30/10/65 – Mileage recorded as 154,680.

D6303 was withdrawn 26/05/1968 as non-standard, stored at Laira 5/1968-12/1968 then moved to Ebbw Junction and stored until movement on to J. Cashmore in Newport for scrapping. This was completed by January 1969.



D6318 and D7002 arrived at Swindon for striping. Chris Hatton



D6322 and D6319 on delivery run at Preston. 28-3-60. Adrian Vaughan

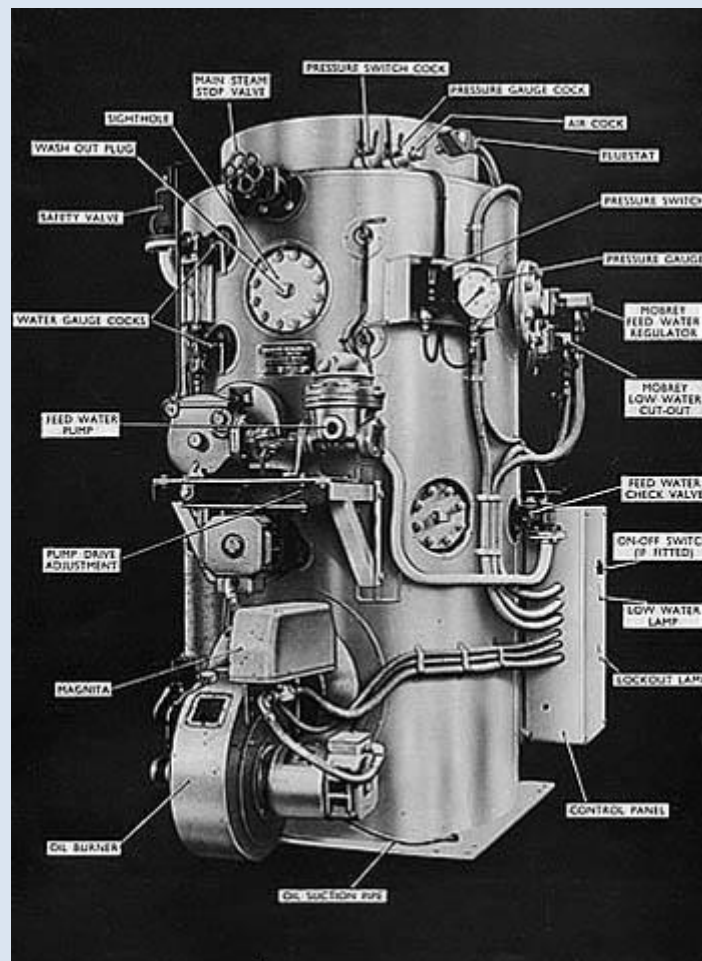
## Class 22 Major Components

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### *Focus: The Spanner Boiler*

#### **SPANNER Mk 1 BOILER. A BIT OF HISTORY & HOW IT WORKS**

Spanner Boilers Ltd hail from Bracknell in Berkshire and were responsible for producing 3 types of boiler for British Railways: Mk 1, Mk 2 & Mk 3.



The Mk 2 & 3 were smaller than the Mk 1 version and were fitted to Deltics and class 47s respectively. The Mk 1 boiler was installed in all class 30/31 (or Brush Type 2) as well as Class 28 (Co-Bo) and some early NBL locos e.g. class 21/22/29.

Later, some boiler vans used Spanner Mk 1's removed from locomotives. Spanner used 'Swirlyflow' tubes for their vertical oil-fired Mk 1 which as the name implies, makes the hot exhaust gases swirl round in the tube, keeping the heat longer in the tube, therefore being more efficient. Two other companies 'Clayton' and 'Stones' also produced boilers for British Railways.

Once the boiler switch is closed, the water pump will run and will draw water from the tank and commence filling the boiler. Once the water level reaches the low water cut -out, the Mowbray float switch contacts will energise the burner motor. A fan is attached to the burner which blows air into the furnace to feed the fire. The fuel pump is also driven from the same shaft. The fuel atomiser and electrodes are situated within the burner. The burner is a converter and produces 240V AC which gets stepped up to 10Kv AC in the transformer which produces a spark across 2 electrodes which instantly ignites the atomised fuel being sprayed.

The heat produced from the furnace passes through the tubes, heating the water which soon turns to steam. The water pump continues to run until the feed water regulator Mowbray float switch is operated which stops the pump running. This float switch operates the water pump accordingly as the level rises and falls with the low water cut -out switch shutting down the boiler if for instance, the pump fails or there is insufficient water in the tank. The flue stat situated in the chimney stack will shut down the burner within a few seconds if it cannot detect heat. Under normal conditions when it does detect heat, it will operate to switch off the spark at the electrodes, the flame (now established and kept going by the fuel and air) will continue to burn.

Once the steam pressure has risen to 60 PSI, the pressure switch operates to switch off the burner, likewise when the pressure drops to 40 PSI it will run the burner again. The safety valve will lift at 75 PSI. The boiler if maintained correctly will generally 'look after itself' when running however a careful eye needs to be kept. Water level can be monitored with the side glass and should there be an urgent requirement to shut down the boiler, this can be safely done with a switch in each cab.

At the end of operation, once the steam pressure drops to 10-15 psi, the boiler must be 'blown down' to remove sediment from the water space. This is achieved by opening the blow down valve. Once all the steam has vented, the boiler switch is opened to affect a complete shutdown.



## Class 22 Chronicles.

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This is the first in our series of stories by our member D6312 as he recalls working with the NBL Type 2.

### **Class 22 in the blue Pullman shop**

At Old Oak Common in the blue Pullman shop I am working on an NBL type 2 locomotive, D6351. A report of an engine stopping fault, one of the most common faults being engine fuel dilution. This is due to the poor fuel injectors not spraying but just dribbling, a lube oil sample is taken, and I tested in the test room.

I will explain how this is done, two glass test tubes, one with new Shell Talona 972 engine oil. one with the locomotive engine oil. Heat up both in hot test bath to the working temperature of the engine, put some ball bearings in each tube place both tubes on the rack with a mirror underside and watch the ball bearing run down the tube, both should be side by side. If the dirty oil one runs away in the tube the loco oil is contaminated. I report back to the supervisor full fuel dilution on D6351.



A full injector change, oil change and oil filter change must to be carried out before D6351 can return to service.

Some 24 hours later I started the NBL Type 2 and check all the newly fitted injectors for any leaks before refitting the 12 rocker covers and joints, the oil pressure is steady at 60 lbs.

Meanwhile a call is coming that the down early South Wales Blue Pullman power car W60094 has shut down en-route and will be coming into Old Oak Common for investigation.

These units are also powered by a M.A.N power unit like the NBL type 2, but the German quality built. Arrangements are made for the return leg to be locomotive hauled by a Western hydraulic with the spare steam stock brown amber Pullmans. The NBL Type 2 D6351 is now ready for traffic as the blue Pullman arrives and is stabled in the workshop the next road over. By mid-morning, I'm given the same task, following D6351s departure.

Time is now ticking away through my early turn shift and I will only be able to get the lube test done and give the results to the supervisors' office which organises positive full fuel dilution.



Pullman at Old Oak Common: Roger Goodrum

The Blue Pullman will now come top priority to re-enter service in the next day. It is now up to the next two shifts to put this M.A.N power unit back to running order for the at midday departure of the Cardiff the very next day.

## Our Compatriots

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*Western Locomotive Association*

*“Buying a Western” by Richard Holdsworth*



D1013 Exeter St David's on 1B65 Trevor Ermel

***NOW THIS IS WHERE YOUR PROBLEMS BEGIN!!***

### **Part Two of Saving Western Ranger**

When you buy an object like a locomotive from British Rail, you get a letter which goes something like this: “Welcome. You have bought a heap of rubbish... no don't expect any help from us!” And signed by the Chief Mechanical and Electrical Engineer (CM&EE) of the Western Region.

Well, that's what I got anyway. Our veritable CM&EE went on to say, basically, that D1013 was unsound at any speed and that I should put out of my mind any thought of using it on his rails. This surprised me, to put it mildly. Was it not Ranger with Fusilier that had hauled 700 enthusiasts on the farewell tour and had 1013 and 1023 not got us up to ninety miles an hour in the process? If this was so, as I said in my reply, how come the loco has changed from a full-blown main

line express loco capable of such speed and entrusted to so many passengers... to something that is now lethal? And all in a matter of days.

The CM&EE's quick retraction didn't help. What he was really trying to say, he said, is that in private hands he could not guarantee 1013s road worthiness and, therefore, any travelling on his metals would have to be as a "dead" loco and hauled by one of his fine machines. A nice about-turn but the message was clear – don't darken our doorsteps with your worthless bit of metal despite the fact that you had paid us several thousand pounds for it and it had been roadworthy at the time.

The welcome on the Dart Valley Railway was equally unwelcoming. When Heather and I turned up with Ranger, the General Manager, Barry Cougar, asked, "What are you doing here?"

It was an awful day. Teaming with rain and his welcome did nothing to dispel the air of gloom. Graham and Phil hadn't been able to get time off to help and it was just Heather and I who took delivery of our new acquisition. Funnily enough, we were accorded class 47 number 013 that hauled 1013 out of Newton Abbott shed and down to Paignton that day. But it didn't stop Mr Cougar enquiring what we were doing being hauled into his station. In fact, Courier was already on the Dart as a result of WLA negotiations with Mr Cougar himself... I had enquired whether he would accept a second Western, the usual argument being deployed, two being better than one.

The answer was an emphatic "yes." So, what was he doing on this wet and windy day looking up at Heather and me in the cab of Ranger and asking why we were there? As Phil Harper said afterwards, "There's none as strange as folk."

### **Cold Shoulder**

This "cold shoulder" continued. We all found the Dart Valley a hard place to bring up two complicated children such as Westerns. Crew training was a prime example; Graham volunteered to do this (the men on the Dart were good steam loco drivers but knew nothing of diesels). But Graham immediately phoned me

in a fine stupor, “I’m driving training, Rich. And Courier won’t start... the batteries are flat. And Dart Valley management are in a right old flap!” The answer was simple, borrow Rangers batteries and Graham humped the heavy batteries out of Ranger and installed them in Courier. An example of how co-operation was vital in these early, difficult, days. Graham and Phil still worked at Swindon before Swindon was turned into a supermarket car park and the lads saw what was going on and informed me of the run-down and this run-down concerned class 52 parts, from the smallest to the very largest. Many were put out to tender (engines, for example) but other major parts were “up for grabs” and Dick Holdsworth was not slow to look after our needs, aided and abetted by my two men on the “inside.”

We needed at least one transmission while a bogie was, obviously, another essential part that would never, ever, be repeated. I can’t remember the details, but I do recollect tendering successfully for a spare transmission; you could get a service record for such parts although if it was the only one available you had to take pot luck and pray it was in some sort of working condition. That is what happened with our spare bogie... I got the nod it was hidden away somewhere at Swindon and if 1023 was going to the National Collection, it could be snapped up as a reserve for Fusilier. However, I could have it as long as we grabbed it (and paid for it) there and then and this is where my contacts in the transport industry came in handy as I knew a guy with a low-loader and he was dispatched to Swindon to bring back our lumbering piece of kit with immediate effect. I say “lumbering” because when we unloaded it, this 20-ton gargantuan piece of machinery looking like it had come from War of the Worlds thundered across our yard without the slightest indication it would ever stop! Fortunately, our bogie came to a halt inches short of a row of completed Volksie campers! Phew! My Foreman wasn’t impressed nor was the guy with the low loader... one axle had gone through the bed of his truck!

While there was a shortage of bogies and transmissions, there was no shortage of Maybach MD655 engines. In fact, a walk down to the end of the Swindon dump revealed the most depressing sight for a Western enthusiast as there was row upon row of Maybachs in various stages of repair - or disrepair - a scene reminiscent of some giant's scrapyard. Some upright, some on their sides, even some in perfect condition disproving British Rails claim the locos had run out of engines! Another tender form and with the help of my men on the inside, an engine in fair condition with an appropriate price was selected and off went the piece of paper. At this point, dear reader, I have to say a little native cunning comes in handy in such matters and suffice it to say one very good engine soon became our property. In the end, the engines that did not find buyers were to be cut up and that's where I felt it time to pick up the phone once more. The conversation with the man on the other end of the line at Swindon went something like this.

"I better get my engine out of the yard before it's cut up."

"You've had your engine."

"Well there's one down the yard with my name on it."

"That's because you put it there..."

I did my best to sound offended. "Haven't I spent thousands with you already?"

The man from Swindon relented. "Okay, but if it's not out by the end of the week it gets cut it up along with the others."

I didn't need asking twice. We were in next day, collected the second Maybach (and lots of other parts too – don't tell anyone) and were on our way!

### **Trouble on the Dart**

I said how our arrival at the Dart Valley railway didn't inspire us and it continued that way. We organised a wonderful Western running day and attracted hundreds of visitors helped by a special that came down from Paddington. I'm sure the elders at the Dart had never seen anything like it before. Yet they were not impressed, or, at least, they never let on. We had worked like hell to get Ranger into good condition... in fact I called upon every friend I knew to come down and

help rub her down and then get her painted. And, of course, helped by the faithful WLA members. But still Mr Cougar wasn't impressed.

Remember, Ranger still had the dead batteries and nearly didn't make it back to life. Swindon came to the rescue with a battery charger (we "borrowed" one and as far as I know they never had it back) but 1013 had not been run up since BR days and with the damp from the Dart Estuary getting to her bones, she refused to fire on a single cylinder.

One whole weekend passed, and we returned next Saturday to give it one last go. Graham and Phil worked feverously, and I looked on in despair. At long last, after much cranking and acrid smoke seeping out of the exhaust, first one, then another, cylinder fired, I thought 1013 was going to shake itself to pieces. Eventually we were on all 12; Maybach magic - Ranger was back from the dead and even Mr Cougar couldn't stop us thundering out of Dartmouth station, up the hill, through the tunnel and down into Paignton ostensibly on a driver training run. Beers on me that night. I was a much-relieved man.

But the fact remained, the Dart was not the place to be. Running days were severely restricted. Then we couldn't start up after 7.00pm. Local residents complained, we were told. The final straw was when I was banned from the riding in the cab of my own loco – it was against railway rules. Negotiations were started with a number of other private railways – our successful running days had attracted interest from around the country – and Michael Draper at the Severn Valley Railway came over with the best offer to secure our future. Support was forthcoming, running days guaranteed and he actually offered to PAY us!

If we moved, we would lose the services of Mike Woodhouse, but we had gained new members and one that stood out was Derek Wright. A great bonus finding him as he told us he had experience of Maybachs in the Royal Navy. Such experience doesn't grow on trees. There were numerous other helpers who

became involved and I apologise if I don't list you all here – but the memory isn't what it was.

But losing Mike Woodhouse was a blow. One example was when I discovered that Ranger had been on a three-monthly axle exam with the suspicion that one axle was flawed. BR had become paranoid about cracked axles since 1023 had suffered such a fate coming out of Oxford one evening and ultra-sonic testing had become part and parcel of life with the Westerns.

Axles, or running gear, were a major source of headache in those early days; to Graham and Phil's horror, once Courier was rolling, there was the unmistakable thud, thud, thud of a "flat" spot on one wheel as a result of heavy braking. But Rangers possible axle problem was dispelled when the Swindon man who knew axles inside and out came down and, with the aid of his ultra-sonic kit, declared, "That's not a flaw... just a reading from a scraper ring that's become stuck on the axle for years..." Goodness, what relief.

But 1062s flat couldn't be solved so easily. There was (and possible still is) only one tyre turning lathe that could handle a Thousand's "joined together" axles and that was at Cardiff Canton and we planned to go that way when getting up to the SVR. But getting up to the SVR meant getting off the Dart and that was not going to be easy... the intricacies of the railway network came into play and while a BR loco could haul us as part of an un-balanced working, the signalman controlling the Dart wasn't given clearance by – guess who – and there we sat while the days turned into week and weeks threatened to become months. Enter Harry Hamer, a Knight in Shining Armour...





D6303 and D6300 at Saltash on 27th September 1959. Peter Gray



D6333 at Hemyock on the milks 1970. Exerail

[www.class22newbuild.co.uk](http://www.class22newbuild.co.uk)