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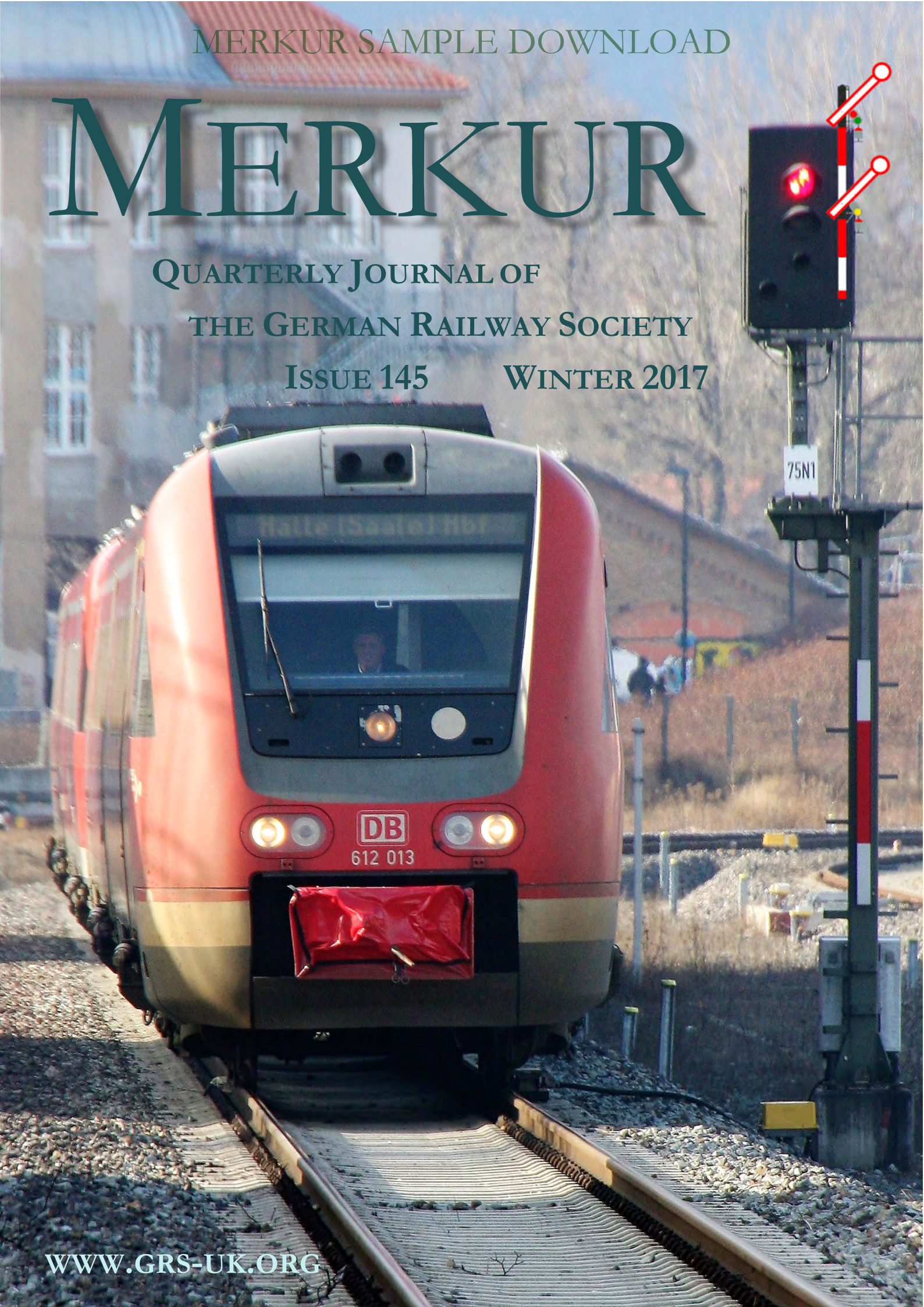

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Front cover: 612 013 on a service to Halle (Saale) Hbf on 18 December 2012. Photo by Andrew Armstrong
Rear cover: 132 069 at Bw Saalfeld in May 2017. Photo by Graham Lightfoot

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From the Editor: At our last Committee Meeting in London on 30 September it was decided that we would increase the number of pages in Merkur from 28 to 32. This has been achievable without any increase in postage costs.

Feedback from the last issue of Merkur was most encouraging and I am also pleased to report that most members receiving their copies of the magazine by email acknowledged its receipt. Please continue this practice as it helps both the Memberhsip Secretary and Editor know that we have your correct address details. Thank you.

Please continue to send me your articles and photographs for inclusion in Merkur. Portrait photographs are particularly welcome as they make excellent front and rear covers.

As this will be the last issue for 2017 and will reach you in time for the festive season may I take this opportunity to wish you all Frohe Weihnachten und alles Gute im neuen Jahr!

Doug Tompkins

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CHAIRMAN'S PROGRESS REPORT

BY ANGIE UPPHOFF

I will start my report with the very sad news of the passing of our long-standing member Bernard Pearce, on behalf of the Management Committee we give our sincere condolences to Bernard's family and friends.

Our Web Master Ben Weiner has made significant progress with the re-design and structural improvements to our website. Ben has designed a new, more relevant site and the key improvements are as follows:

- Reworked membership application form.
- Merkur index - it allows anyone to word-search the titles of every article in issues of the GRMS newsletter, Kurier Report and Merkur that are on-line. In the Members' Area the search is enhanced with links from the search results straight to the relevant document.
- New Booklets - These can now be purchased on our website, anyone wishing to purchase multiple booklets or from outside the UK please contact me and I will give you a price for the postage.

Once again I would like to thank all those members who have very kindly helped on the Society's stand, but as time passes transporting stock will not be viable and consequently the number of exhibitions we can attend will diminish significantly unless we find a Society Products/Local Publicity Officer. I respectfully request that you please consider helping your Society and volunteer for this crucial post.

Those members who would like to help on the Society stand at forthcoming exhibitions please contact our National Publicity Officer Cliff.

Please let me take this opportunity to wish you all a very merry Christmas and a happy and prosperous New Year.

Angie

Member Eric Bird demonstrates his layout on the GRS stand at the Peterborough show on 14 October

Photograph by Ben Weiner

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BOOK REVIEW

BY DOUG TOMPKINS

'THE GERMAN PACIFIC LOCOMOTIVE-ITS DESIGN AND DEVELOPMENT'

By David Maidment

Hardback format, 26cm x 24.5cm, 400 pages with more than 450 black & white and colour photographs.

Price UK: £50.00. English text.

Published by Pen & Sword Books Ltd, 47 Church Street, Barnsley, S70 2AS.

www.pen-and-sword.co.uk ISBN: 978-1-47835-249-5

The author, a GRS member, began his railway career in 1960 and for the last twenty or so years has been busy as a writer, activist in the voluntary sector, as well as a speaker in schools and at general interest groups etc. David received an OBE for services to the railway industry in 1996 and in 2012 he received a Life Achievement Award at the National Rail Awards.

In this his latest work he takes a look at the history and development of the German 'Pacific' locomotive from its beginnings at the start of the 20th century through the Länderbahn types to the later classes 01, 03 of the Deutsche Reichsbahn (DR) and Deutsche Bundesbahn (DB) and the DB Class 10. There are photographs of all the different 'Pacific' locomotive classes, many of which are in colour and all of these are of the highest quality. Many of these illustrations show the locomotive in close-up, which is particularly useful for the modeller. Detail differences are referred to as well as their areas of operation and there are also some timed runs given for trains worked by locomotives of classes 01, 03, 10, 18.6 and locomotive 18 201. Also included are a number of their working diagrams.

In chapter 17 a look is taken at foreign 'Pacific' locomotives that were used by German railways, such as the ex SNCF Chapelon Pacific No. 23 1E 18, and more recent Plandampf workings are described and illustrated in chapter 19.

The book contains a listing of all the relevant dimensions and weights of the 'Pacific' locomotive types complete with scale drawings. The book is rounded off by two maps of the German railway network pre 1945 and post 1945 with the two railway administrations, DB and DR.

At £50 this is not a cheap publication. Nevertheless it comes thoroughly recommended to all those with an interest in steam locomotives and their development in Germany and I think it is fair to say that such an extensive study of the German 'Pacific' classes has hitherto only been available in German from the likes of Eisenbhan-Kurier Verlag. All royalties from this book are being donated to Railway Children Charity (www.railwaychildren.org.uk).

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DB DIESEL LOCOMOTIVES-HYDRAULIC TRANSMISSION: HOW IT WORKS

BY DR MICHAEL GRAY

PREAMBLE

Before we knuckle down to the subject of DB (and other) Diesel locomotive hydraulic transmissions I think it's a good idea to look at why a transmission is needed in an Internal Combustion (IC) engine drive train (if you'll pardon the pun!). This might seem obvious, even silly, but it's not trivial.

A steam locomotive can pull away from stationary once steam is admitted to the cylinders, and no change in gear ratio is required as the loco works its train up to speed – the machine develops traction from the start. [The 'gear' change associated with a steam locomotive is to do with steam admission timing, and nothing to do with the transmission between the cylinders and the driving wheels]. But an IC engine doesn't do this – it develops power (and, as importantly, torque) only at speed, and if an excessive load is imposed at too low a speed the engine will simply stall, like your car.

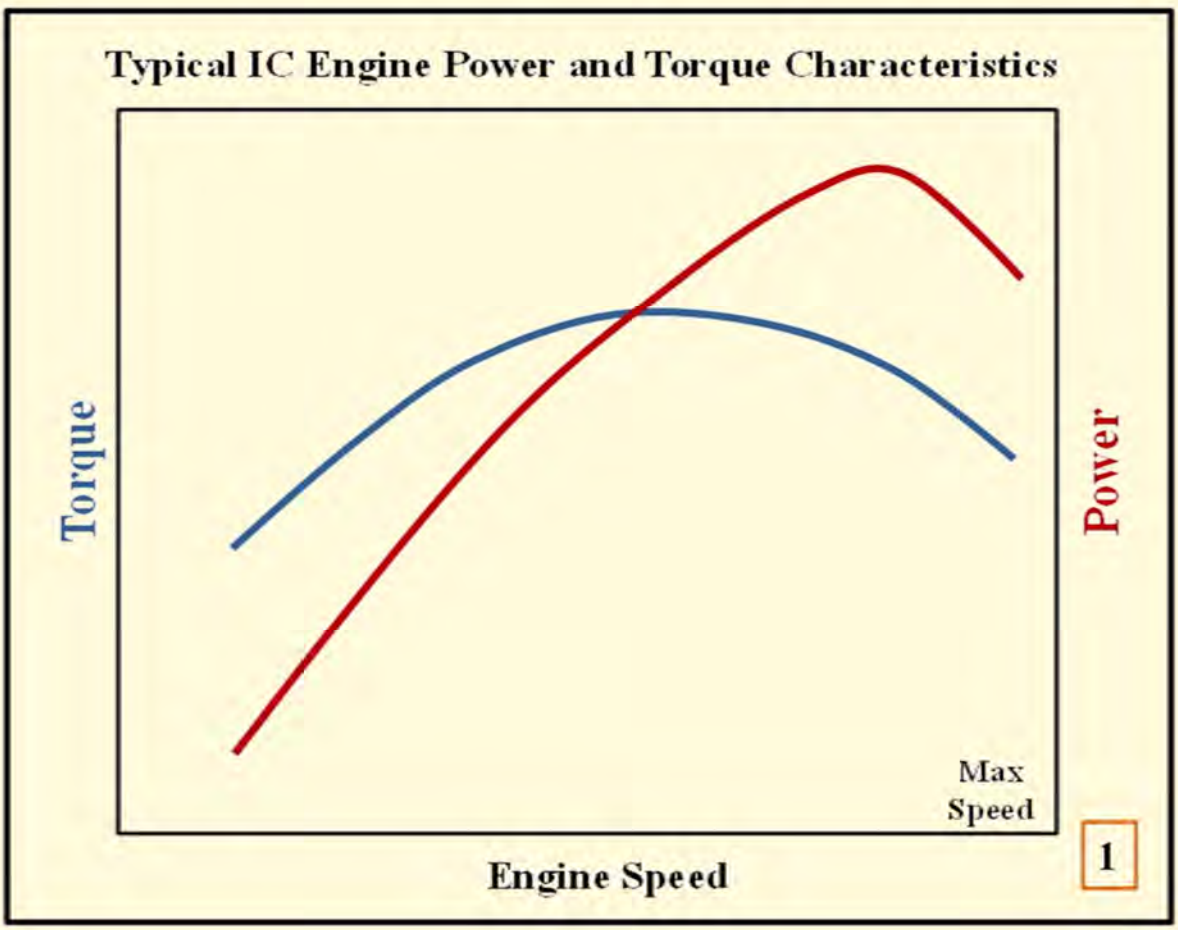

Fig 1 above is a very generic illustration of typical IC engine characteristics against engine speed. These will vary a good deal between different types and sizes of engine but the shapes are always similar.

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The key features are:-

1. Though the power rises with speed it peaks a little before the max speed of the engine. Max is ultimately determined by the mechanics of the engine – beyond a certain point it will simply and expensively break, or at least fall short of an economic service life.
2. More importantly the torque curve (essentially the twisting force) peaks at a good deal less than the max speed and is relatively flatter than the power curve.
3. Both power and torque drop rapidly as the engine slows – you very quickly run out of both if the revs drop.

Probably the most familiar way of imagining this is to think of what's happening when you drive a manual transmission car. You are using the 5 or 6 gear ratios in a modern car to keep the engine revs around the top flatter section of the torque curve, especially when accelerating. Obviously you need power but it is torque that drives the car forward, climbs hills etc., My 2 litre Diesel Astra idles at under 1000 rpm but it needs more like 1300+ to get going properly and typically motorway cruises at around 2000 rpm. Bigger heavier locomotive engines will idle more slowly and max (power) economically at about 1400 - 1500 rpm, typical of the types used in DB locomotives, and the German designs used on BR's Western Region.

TRANSMISSION TYPES

So, you're sitting at the end of the platform with the Maybach chuntering nicely and several hundred tonnes behind. You can't just ram the drive to the wheels into gear – nasty things will happen very quickly. You need a transmission system that loads the engine up gradually and at a ratio (and 'slip' condition) between drive wheels and engine that maintains the revs high enough to avoid stalling, while transmitting enough torque to the wheels to get the train moving. There are 3 common arrangements:-

1. **Diesel Mechanical:** Mechanical gearbox and clutch, similar idea to that in a manual car, though more heavily engineered.
2. **Diesel Electric:** The engine drives an electrical generator which feeds electricity to traction motors (or a single motor in some cases), which in turn drive the wheels.
3. **Diesel Hydraulic (kinematic):** The drive includes one or more fluid couplings or torque converters that use the difference in speed between the engine and the wheels (via the mechanical transmission) to generate torque and gradually load the engine. Several converters of different characteristics may be used to effectively 'change gear' (as in the Voith system) or a single converter can be used in combination with a mechanical gearbox (as in the Mekydro system).

The gearbox & clutch system is limited to smaller shunting type locomotives. The DE system is by now near ubiquitous, as it offers flexibility of control, especially in an era of AC drives and sophisticated motor speed control. But the Germans, great mechanical engineers that they are, went the Hydraulic route, mainly (I suspect) because they invented it. The original Hydrodynamic Converter patent, assigned to Hermann Föttinger, dates from 1905, although at that time the main applications were thought to be in marine engineering, gearing high speed turbines to slower running screws. Being a mechanical engineer myself, I find the mechanics of these drives fascinating, and hence, I suppose, the pleasure in writing this article.

I'll emphasise here that this is not a detailed account of all the various hydraulic drive arrangements employed by the German manufacturers in locomotives and railcar drives supplied to DB and overseas customers, and produced under license. The intent is to explain the essentials of how these transmissions work, and their main features, with reference to a few specific units. I have deliberately straddled the DB and BR (Western Region) types, partly to take advantage of a bigger information base. This does limit the discussion to some of the older types but the working principles are the same in later developments, which have focused on improving power transmission capabilities and raising power to weight ratios.

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And I'm mostly going to steer well clear of the still simmering debate on the pros and cons of the different drive types, and comparisons with DE transmission.

THE TORQUE CONVERTER

The Torque Converter (TC) is key to the action of hydro-dyanamic DH transmissions and is common to the two main types, so we'll look at that first. It's important not to confuse the TC with a Fluid Clutch (FC, or fluid flywheel as it's occasionally miscalled). A FC consists of 3 main elements, a driven impeller forcing fluid (usually thin oil) into the vanes of a turbine, all contained within a sealed casing. Simple momentum is exchanged and torque is transmitted, maximum if the driven element (turbine) is stationary (i.e. 100% slip) and zero if the two elements are at the same speed (0% slip). The transmitted torque is never more than the input torque, and when running steadily the slip is usually a few percent. It's commonly used in relatively light drives, eg. diesel railcars, often in combination with a gearbox, such as the Wilson epicyclic type.

If you used a fast running FC in a heavy loco drive you would need excessive gear reduction after the FC to obtain useful traction at sensible speeds. Mechanical losses would be unacceptable, and there would be design problems in fitting all the gearing together in a compact way. So a fourth element is introduced to the coupling; fixed guide vanes attached to the casing. These turn the fluid exiting the turbine around and direct it back into the impeller to give more 'grip' and impart more momentum. In this way the TC actually multiplies the input torque, now up to about 8 times depending on the details of the geometry.

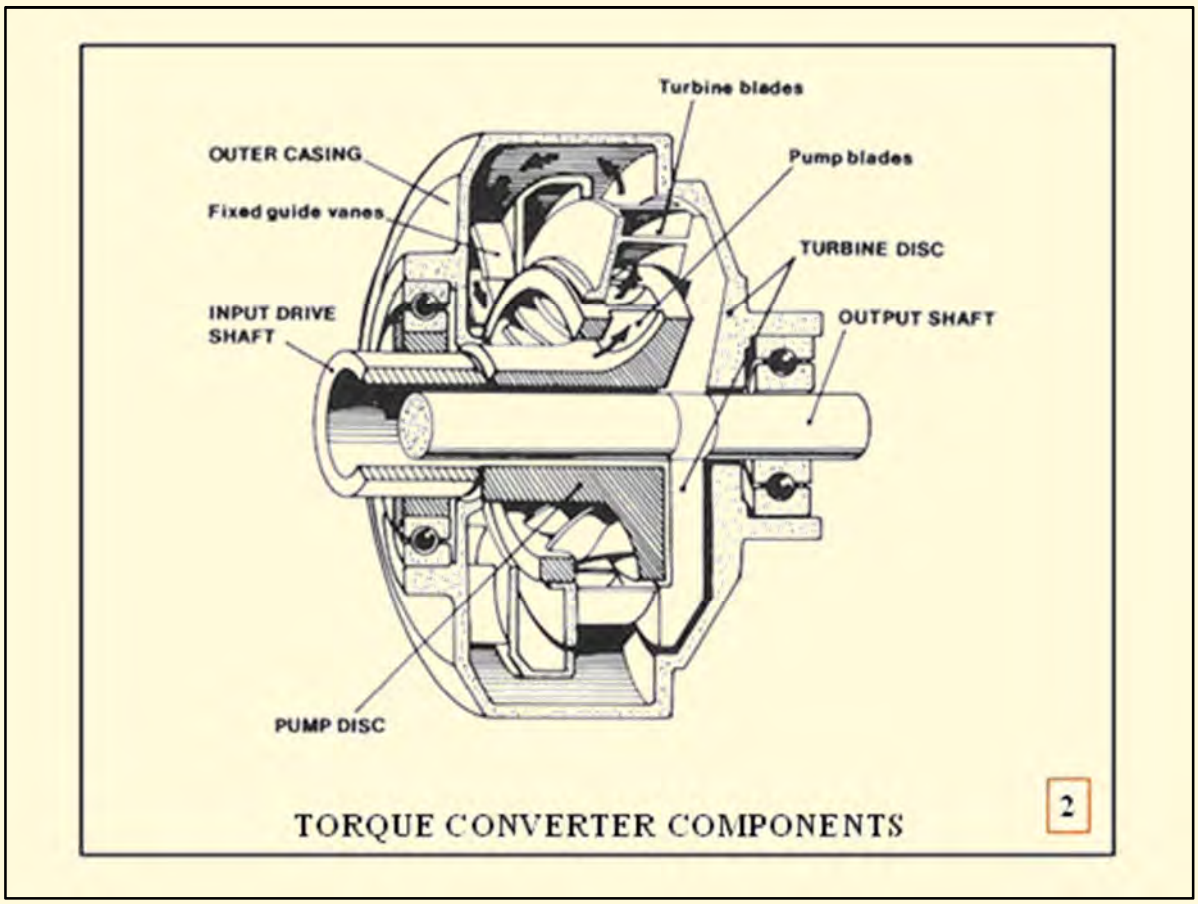

Fig 2 illustrates the arrangement. It is, in effect, a cunning multiplying centrifugal self-contained pump. Note that the momentum and torque transfer is derived from the **kinetics** of the fluid flow (the velocity at which the fluid moves between the different components) – there are other types of hydraulic transmission that operate using a plunger pump driving a motor at a distance through pipes or hoses, for example often found in agricultural machinery at much lower powers.

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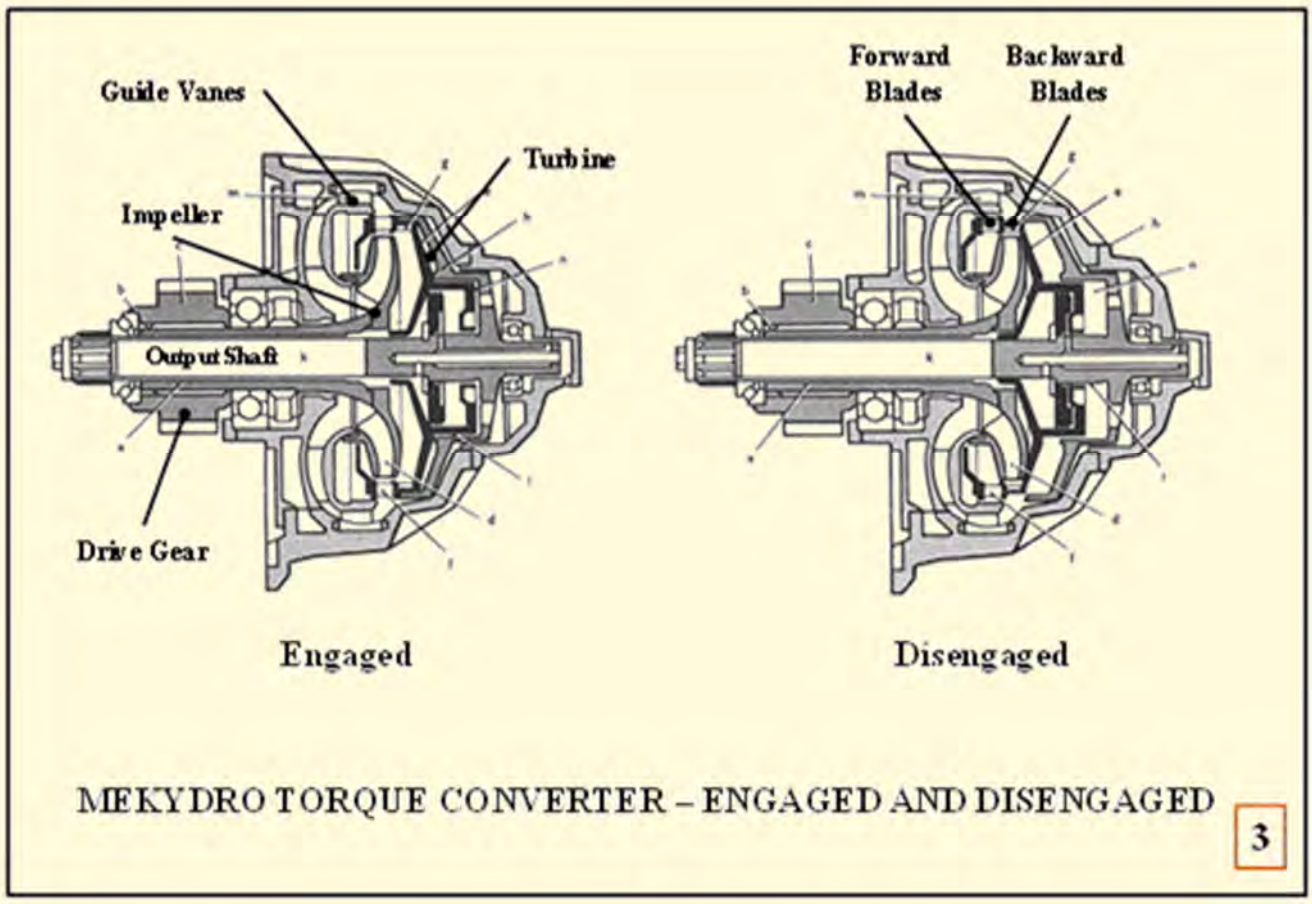

The Mekydro TC (Fig. 3) has an extra feature added to the 'plain' TC used in the Voith system. The turbine (black in the diagram) has two sets of adjacent blades, the main forward driving set and a less 'aggressive' backward set. The whole turbine can move to and fro in a splined casing attached to the output shaft. This lateral motion is achieved hydraulically. With the turbine retracted (LH diagram) the main forward blades are in the fluid flow loop and the TC is engaged in drive mode. With the turbine in the forward position (RH diagram) the backward blades are in the loop and the TC is retarded (slowed down though with a torque much less than the drive torque). This feature is necessary to momentarily unload the gearbox that follows the TC, to enable the gear change.

TCs are surprisingly intense – the running TC in the 1999 introduced Voith L620reU2 twin converter unit designed for large high performance locomotives, for example, is only about 434mm (17.1") diameter, yet is capable of transmitting 2700kW (3620hp). Such high power is enabled partly by reduction in power losses within the TC, improvements that have been aided by better understanding of the fluid flow patterns through the use of Computational Fluid Dynamics (CFD) analysis and flow visualisation, greatly enabled by ever increasing computing power over the last 50 years or so. That my own research back in the 1970s involved early CFD analysis (and monster slow running programs), though in a very different context, will give a clue as to my age. The thought of all the water (fluid!) under the bridge since then is quite appalling!!

VOITH TRANSMISSION

And now down to the serious business of getting power from the Diesel engine to the wheels. We'll start with the more common Voith fluid system.

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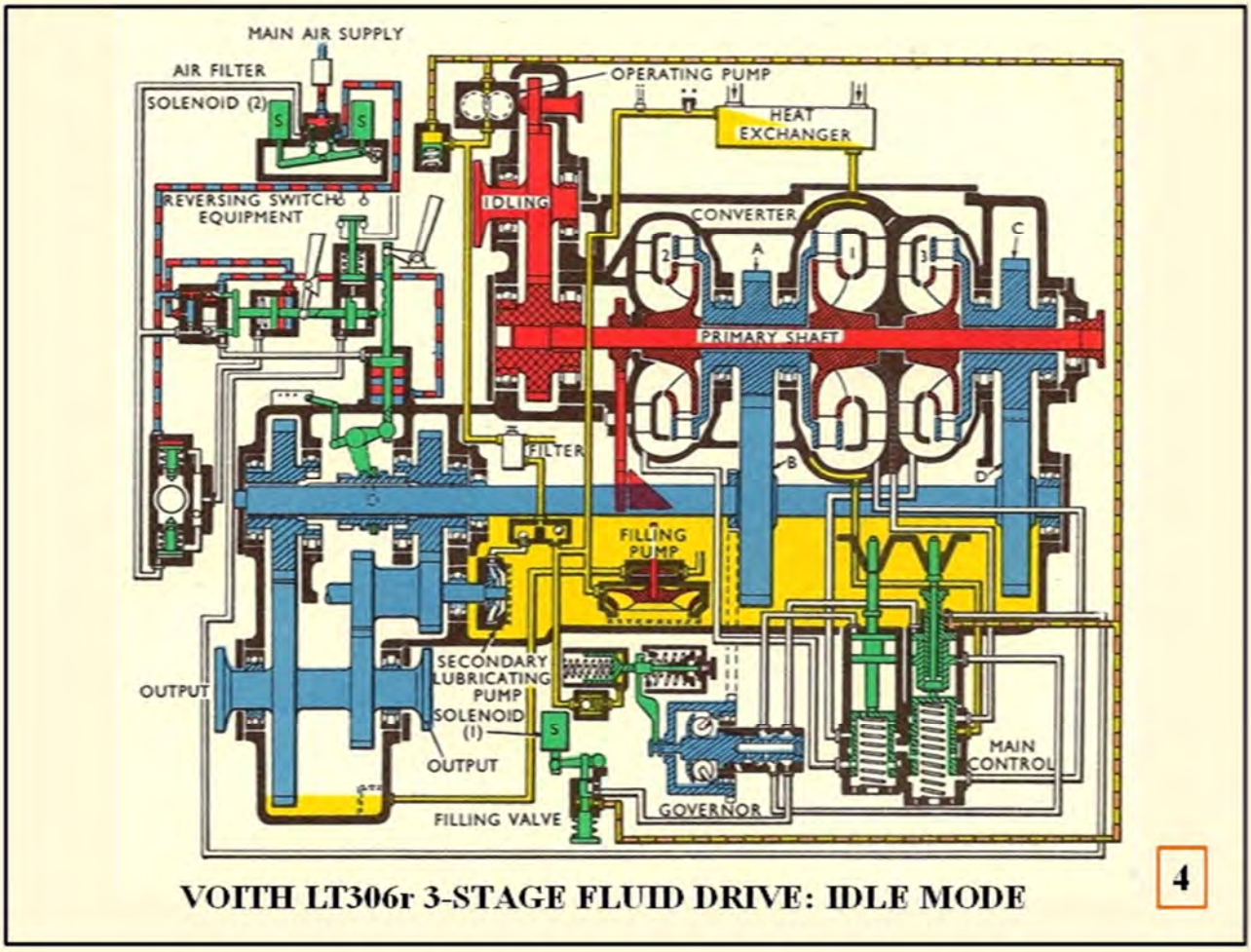

Fig. 4 is a section of the LT306r transmission in idle mode. This is the transmission used in the V200 and BR/WR B-B Warships from the 1950s, in those locos fitted with the Voith system. It might be worth mentioning here that DB worked closely with Voith and Maybach to ensure that Voith and Mekydro boxes were physically interchangeable in the same applications, eg a V200 might be fitted with either drive system, occasionally even one of each in the same locomotive, with two different make of Diesel engine to boot! In early development this posed Voith a significant design problem – the Mekydro system takes up less space than the Voith 'box' as the latter requires a large fluid sump to counter foaming caused by filling and re-filling the TCs.

There are a few features worthy of particular note:-

1. There are certainly plenty of gears but all the speed/torque change is achieved using the three TCs. In Fig. 4 all are empty, so no significant torque is transmitted. The box is in idle mode.

2. There is a step up gear (typically about 2:1) between the engine input shaft and the Primary Shaft of the gearbox. This shaft drives all the TC impellers. TCs work best at high speed (which is also key in restraining diameter) and the step up gear is beneficial even though the diesel engine is already a high speed type (~1500 rpm max).

3. The TCs always operate in the same direction. The reversing gear is after the TC cascade, through the mechanism at the lower LH corner of the box. The driven shaft (in blue) can be connected to either the LH or RH gears using a splined dog (clutch), in this case shown at the RH side driving the output shaft via a layshaft (which also drives the secondary lubrication pump). The reversing gear is shown controlled from a cab lever with an interlock to make sure the driver can change over only when the locomotive is stationary.

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4. The output shaft is double ended so the box can drive both bogies, as it would in, say, a V100 or V160 (and a Hymek). In a V200 (and the BR Warship and Western classes) the box 'drops' into the centre of the bogie (taking advantage of the DB virtual centre swivelling mechanism) and the drive is taken to the axles by short Cardan shafts.

5. The TC filling sequence (and the reversing gear) is controlled by a complex and interlinking system of fluid and solenoid valves, and a speed sensor (governor). Changing from one TC to another, as the locomotive gains speed or speed falls because of, for example, a climb under load is automatic.

6. Not so obvious in the diagrams is the very 'boxy' appearance of Voith (and Mekydro) drive systems. Illustrations on web-sites literally show a steel box-like shape with little clue as to the details and intricacies of the various control mechanisms, TCs and gearing within. An uninformed witness might be left guessing what this strange beast actually is! This is the L620 transmission, capable of transmitting 2700kW/3600hp with output flanges for transmission in both directions.

Below: DB V200.0 (from 1968 Class 220) No. 220 031-9 at Lübeck Hbf with the 12.23 to Lübeck Travemünde Strand on 01 June 1984. Photo by Doug Tompkins

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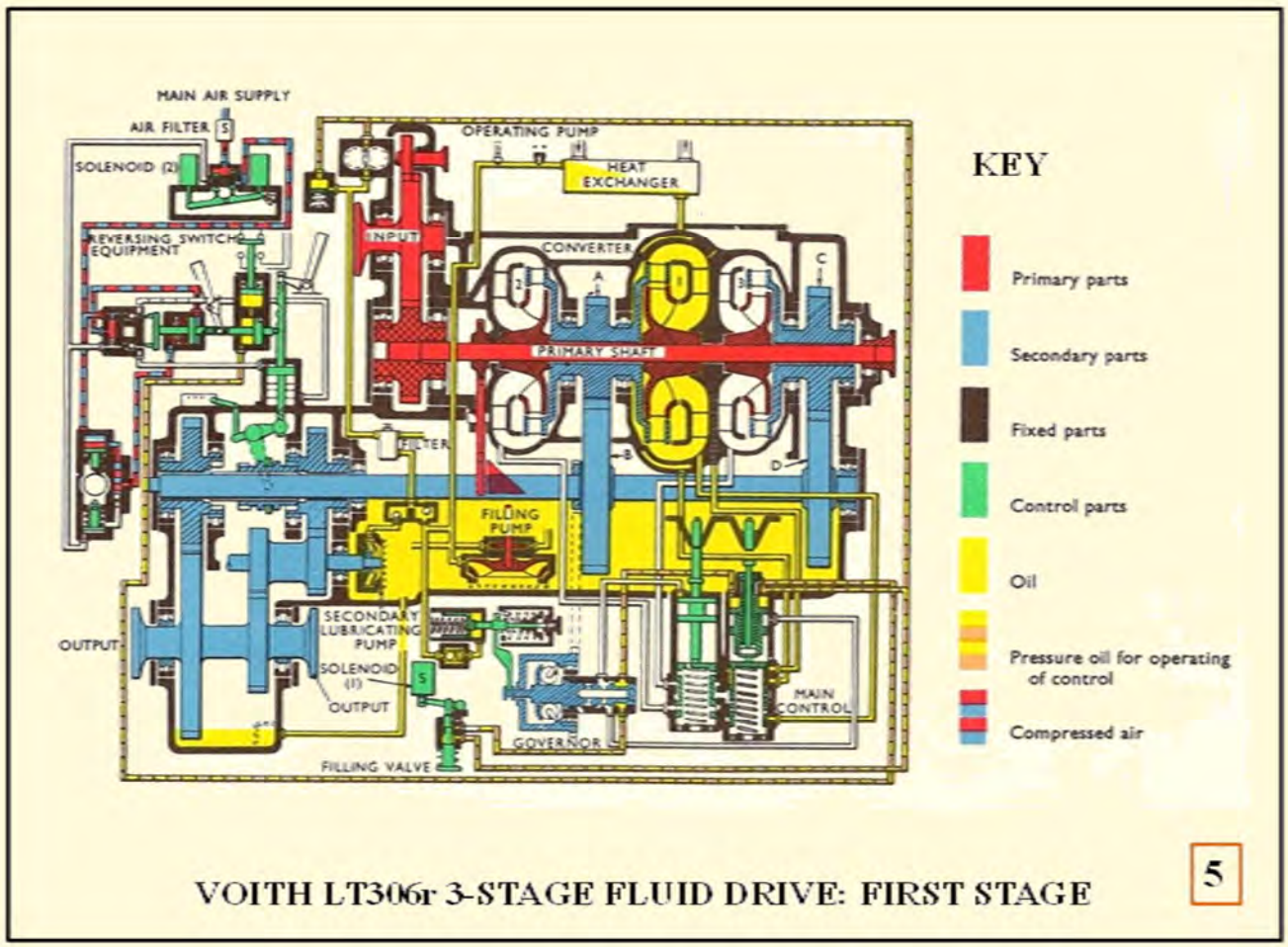

In Fig. 5 the first stage (largest diameter) TC has been filled with fluid and is transmitting torque (imagine the locomotive to be stationary or travelling at low speed). The turbine is fixed to gear A which meshes with B. Gear B is fixed to the secondary (blue) shaft which in turn transmits to the output flange via the reversing gear assembly (whichever way this is set). As the locomotive gains speed the governor senses this, empties the stage 1 TC and at the same time fills the stage 2 TC (which also drives gear A). At higher speed TC2 is drained and the final 'running' TC3 is filled as the locomotive rises to max speed, or at least cruising condition. TC3 drives gear C which meshes with D, so there is not only a change to the drive train from changing the active TC, but in this case also there is a speeding up within the gear train.

Transfer of fluid from one TC to another (via the sump) is automatic, smooth and continuous (in the sense that there is no loss of torque between 'gears'). Improvements in TC design and operating range have enabled a reduction from three TCs to two in more recent designs, but the operating principles are the same.

The Maybach Mekydro System

This section comes with a mental health warning – time to make a cup of tea (or coffee if you're feeling continental), sit down and do some deep breathing exercises before we jump into the complexities of the Mekydro system.

In contrast to the multi TC layout of the Voith system the Mekydro drive (Fig. 6) uses only one permanently fluid filled TC which then drives a relatively (!) conventional 4 speed mechanical gearbox. The gears are in constant mesh but are engaged (and disengaged) in proper sequence by our old friends, splined dogs, which slide on shafts and are moved by forks. You can't engage and disengage a heavily loaded gearbox (or you'll hear that crunching noise you occasionally get from your car if you get it wrong) so the function of the backward braking component of the turbine previously mentioned is to momentarily unload the 'box' while the gears are changed.

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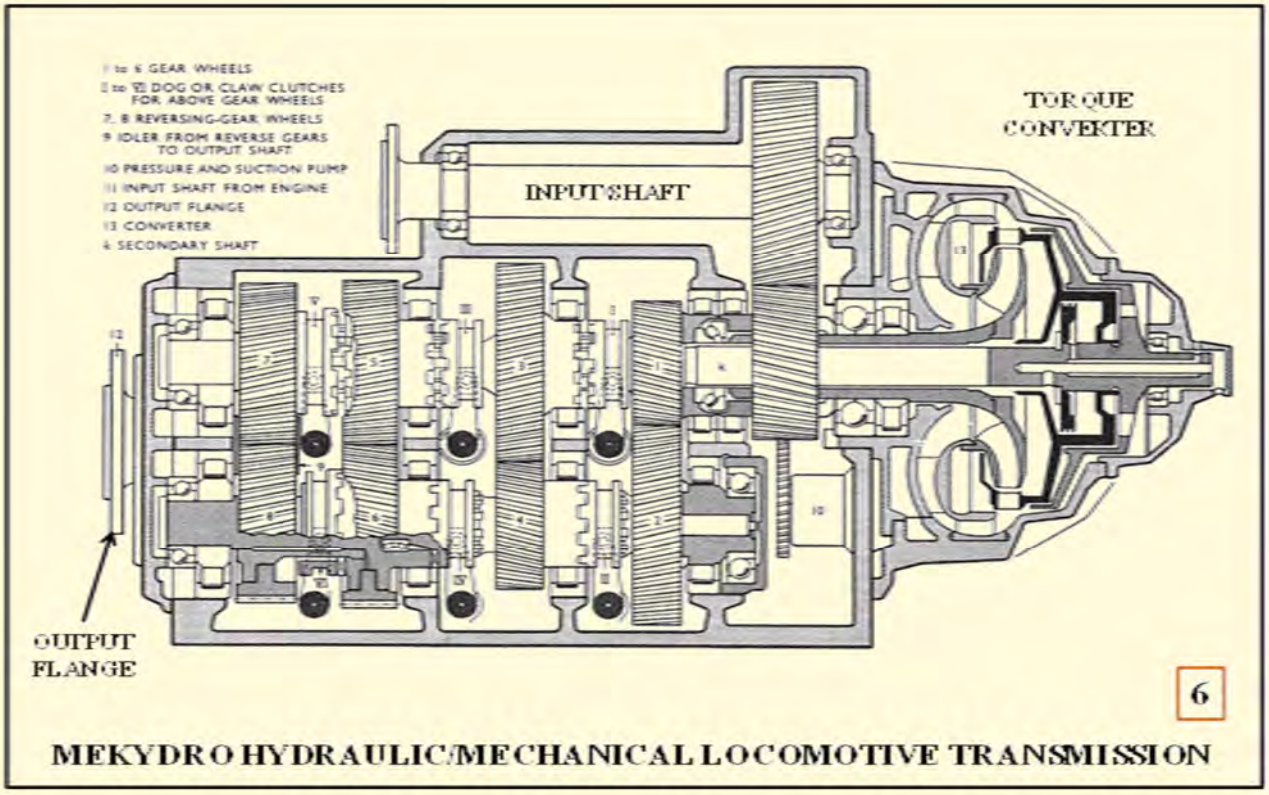
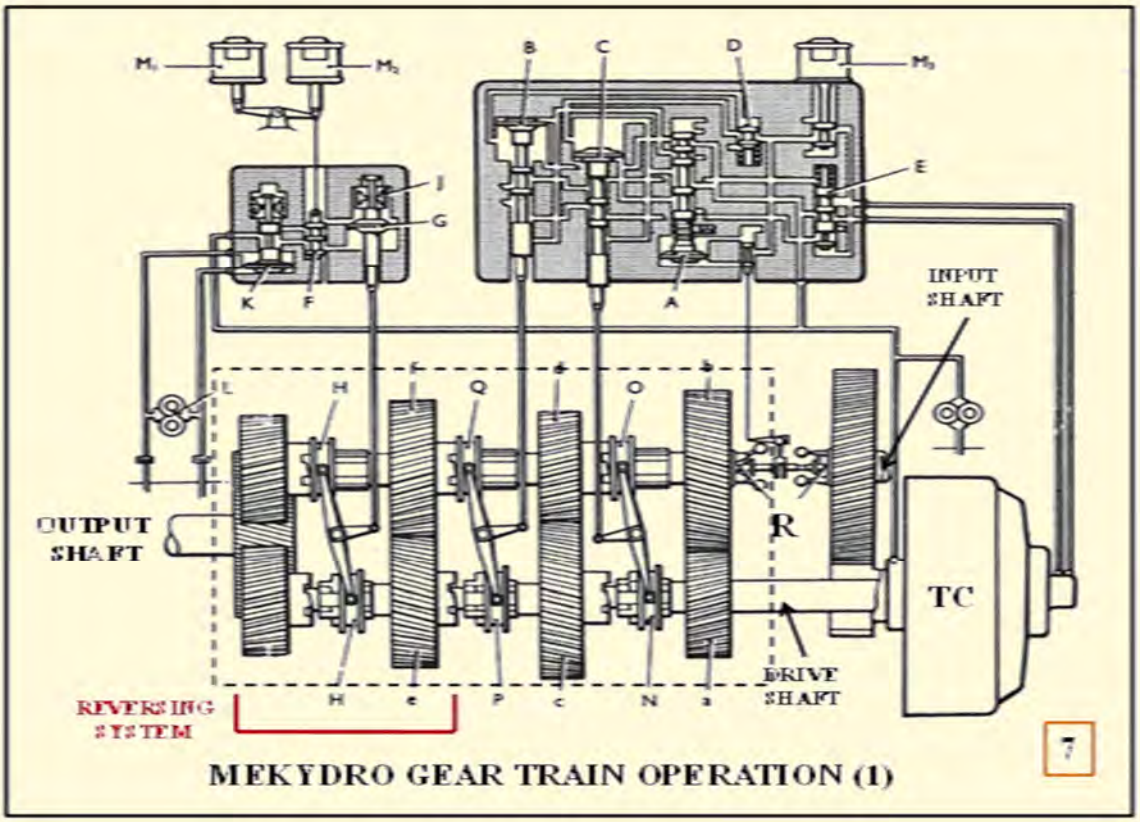
This is similar in action to pressing the clutch and easing off on the accelerator in a manual car when accelerating, an action with which most of us will be familiar and practiced, and we do it more or less automatically and smoothly. Similarly the control system in a Mekydro drive automatically co-ordinates the TC back-torque and gear change in a smooth action that takes less than a second.

Note that like the Voith system there is a speed up gear between the engine input and the TC - this really is a high speed piece of kit!





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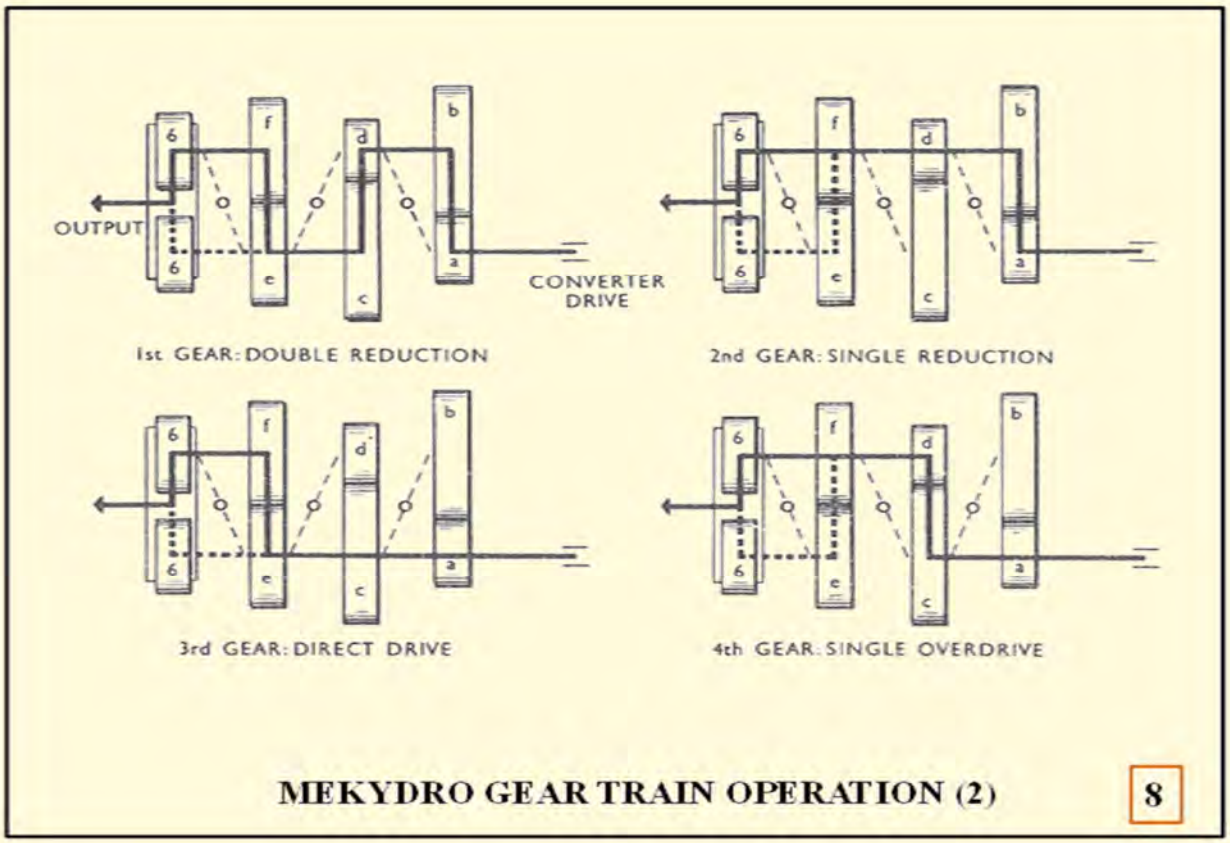
The Mekydro schematic (Fig. 7) perhaps shows the way the box operates, and the actuator cum control mechanism, more clearly. The automatic control of the TC/gear combinations depends very much on the input shaft and layshaft speed governors (R), which speed match the two 'sides' of the drive. Note that the dogs are paired – one in and one out - especially important in the reverse set that sits at the LH end. Or its crunch time again!

Below: An ex DV V160 (from 1968 Class 216) now with the firm mkb Güterverkehr inside Bremen Works on 14 June 2014. Photo by Robin Coles



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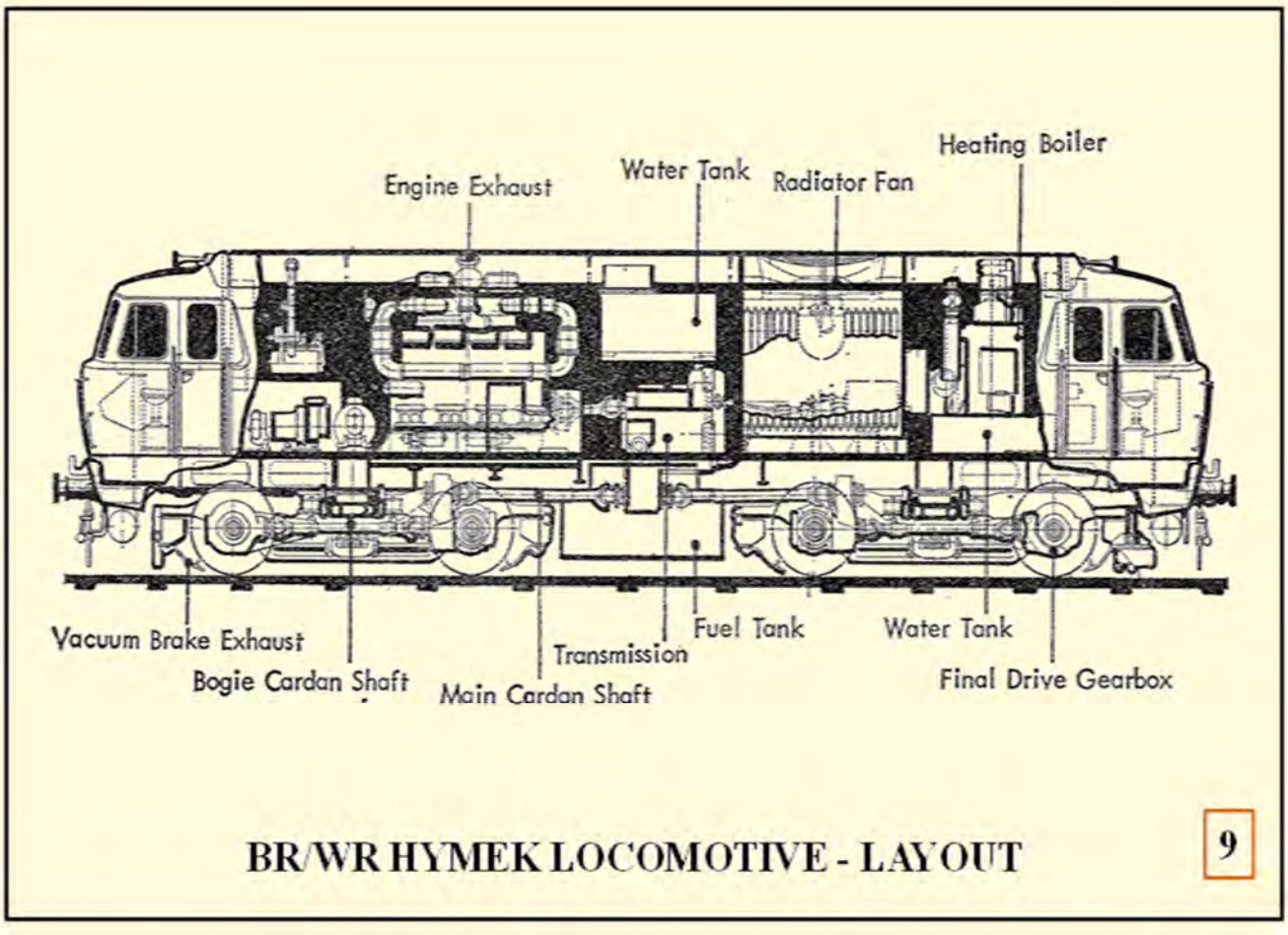
Finally, you'll be relieved to read, the skeletal diagram (Fig. 8) shows the drive train path through the gear pairs at the four different ratios. This is the dotted box area in Fig. 7. The position of the forks shows that in 'Op 1' the box is working in 2nd gear. The dotted path in 'Op 2' is the train in reverse gear at each ratio, when the LH fork arm would be over the other way.

Well congratulations if you are still with me – it does take a bit of figuring out and a childhood spent in the corner with a good sized Meccano set helps still. Gear train engineers must be a race apart (try figuring epicyclic gears; the Wilson box for example) and I suspect the complexities and details of the Mekydro drive must have challenged even the German genius for mechanical design at times. Though mind you the gear trains in the larger WW2 piston engines must have required some mental gymnastics and precision manufacture, especially the sleeve valve types (such as the Bristol Centaurus).

CLOSING COMMENTS

It might be worthwhile to explain a little about what happens after the drive box. Fig. 9 shows a BR Hymek which had a Mekydro box driven by a single diesel engine, but the layout would have been the same with a Voith box. The transmission to both bogies, in similar fashion to the DB V160 class, and within them is by a mix of Cardan shafts and axle located gearboxes, which would usually be supplied by Maybach or Voith or their subcontractors as part of the package. In the case of twin engine locomotives there would be two boxes with Cardan drives out to the axles within the bogie, as in the DB V200 and BR Warship and Western classes.



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Either way some or all of the drive wheelsets are mechanically locked together which avoids the individual axle wheel-slip problems that plagued DE locos for many years. The high speed engine, DH 'gearbox' plus shaft drives to the bogie axles combination is lighter than the slower running engine, generator, motor combination typical of most diesel electric locomotives giving a better power to weight ratio for the DH system, while the shafts and gearboxes are lighter than electric traction motors so the unsprung mass on the wheelsets is less than for a DE loco, as least when the motors are axle hung. So DH locos are, in principle, kinder to the track, especially at joints and through pointwork.

Development of the Voith hydraulic drive has continued to the present, both for locomotives and railcars of various types. The latest locomotive drive box on their website, the LS640reU2, can transmit up to 4200 kW (5630hp), and features in the Voith Maxima range of heavy freight locomotives at up to 3600kW (4825hp) in the CC wheel configuration.

I can find no sign of similar development of the Mekydro system. Maybach has for many years been part of the MTU Group and their rail focus is now very much on the prime movers, the diesel engine, both for re-engining older locomotives and powering new units. They do advertise drive packages for railcars but these feature either electric or Voith transmissions. A pity that such a fine piece of design should have, I suspect, proven to be a dead end but I suspect that the principal gearing would have become too heavy at ever increasing power demands. Or perhaps the Company just decided to focus on prime parts of the business and let others fade away!?

I hope this relatively cursory summary has been enlightening: You could write whole books about DH transmissions, indeed some have, and a few of these and other sources are listed in the Bibliography below. These are much recommended for further reading if you wish to explore the topic further. Most are available off used book websites (e.g. Abebooks) at reasonable prices. Curiously my copy of the Voith Power Transmission book came from a shop in India, such is the reach of the internet!!

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Below: Ex DB V160 (from 1968 Class 216) No. 216 012-5 now in service with HF Wiebe. Photo by David Hughes

BUILDING KITS FOR VIESSMANN N GAUGE SIGNALS

BY BRIAN MARTIN

A project for a patient person with steady hands

INTRODUCTION

If you want N gauge signals for a German layout the best option are signals made by Viessmann. These are excellent models and can be obtained with all the various aspect combinations that occur on the prototype together with appropriate control systems. The downside is that they are very expensive. For my layout I wanted 3 exit or starter signals that have six aspects and cost £36.50 and 4 distant signals that have four aspects and cost £29.50 each (Gaugemaster UK prices). That is a total of £227.50!

I discovered that Conrad Electronics sell kits to make up these signals and the seven kits I would need cost £73. This article describes and illustrates what is involved.

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THE KIT CONTENTS

Figure 1 Kit Packaging

The kits come in a plastic bag clipped together with a Viessmann cardboard label with their website address. (Figure 1) Inside the bag everything carries the Conrad logo including the instructions for building the kits, which it turns out are only available in German-I asked Conrad if there was an English version but got no response. I used Google translate to get the essence of the project and I have posted these on the website. (XXXXXX).

Figure 2 shows the contents of the two types of kit I have built. The contents are similar except for the arrangement of the signal head. The district signal head is already connected to the wires whereas for the exit signal they are separate. Otherwise each kits contains the signal post with head, a back for the post, a control box, a diode, resistors and coloured shrink wrap tubing. The wires provided are good quality enamelled wire.

Figure 2 Contents of Kits Distant Left Exit Right

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ASSEMBLING THE DISTANT SIGNAL

The wire loom is supplied as a very tight loop that is kept together by taking the ends of the individual wires and winding them round the coil. The first step is to find the ends and unwind them from the coil and then straighten the wires. This is quite a long job and needs to be done very carefully to avoid detaching the signal head from the signal post.

The wires then need to be threaded through the base of the signal and fitted snug into the body of the post which is a U shaped channel. One of the wires is much longer than the others and this is the common connection for the four LED's. The diode is soldered to this with the black ring pointing towards the signal head. The common connection is the positive side of the circuit and the diode prevents damaging the LEDs if the supply current is reversed.

It is then necessary to determine which wire is connected to which LED and this is best done with a 12V bench power supply connecting the diode to the positive and adding one of the resistors to a wire and connecting this to the negative supply. Then using this lead test each of the remaining wires to determine which LED lights up and then slip on the appropriate coloured piece of shrink wrap and add the resistors Figure 3. In my case I plan to show either both greens together or both yellows together as I only have two control channels available. However four resistors are provided so the aspects can be shown separately if desired.

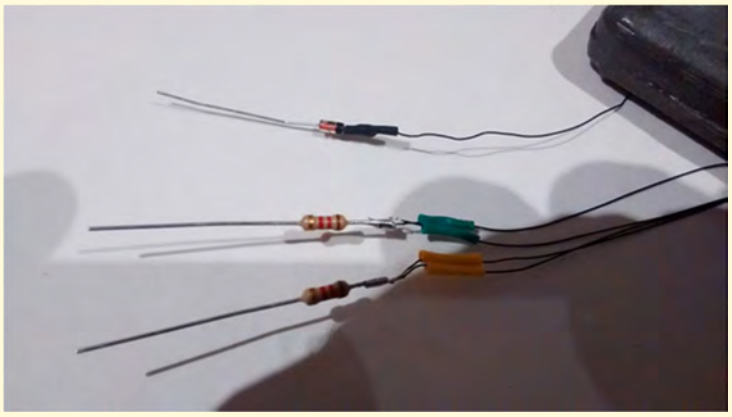

Figure 3

To finish the signal add the control box to the post back and then slip the pointed foot of the back into the hole containing the wires and super glue the back to the sides of the signal post. The completed signal is shown in Figure 4

Figure 5 shows the signal powered.

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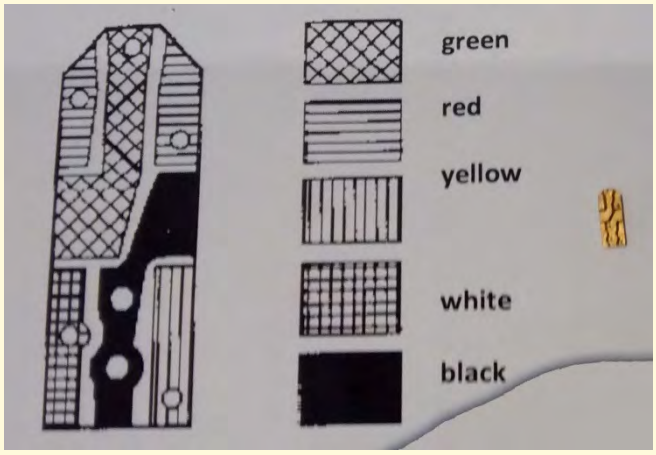
ASSEMBLING THE EXIT SIGNAL

Unlike the distance signal the wire loom for this kit is not attached to anything and hence there are two ends, each with six wires that have been wound around the loop. Thus one needs to be very careful in unpicking the ends so as to prevent the wire getting tangled and/or kinked. The next step is to thread the wires through the base of the mast and to then solder on the diode as before.

However you then need to locate the other end of this wire and a continuity meter is best for this – pulling the wires through the mast can be misleading as it is a tight fit and if one has even the slightest kink it will move an adjacent wire. The German instructions then suggest adding the resistors and the coloured shrink wrap to the other wires, but that is frankly stupid since the signal head is face down when you are soldering to it and you cannot see the LEDs. I just soldered the wires to any of the signal head sectors and then determined which was which, after the event, as for the district signal.

However the real challenge for this kit is attaching the wires to the signal head circuit board. Figure 6 shows the actual board beside a diagram provided in the kit that indicates which colour is which.



The circuit board does have well defined tracks but it is very small and of course it has a lot of surface mounted LEDs and related circuitry on the other side. Definitely a case of the smallest possible soldering iron tip and the lightest of touches. It is essential to prevent the board from moving while soldering so I pressed it into a soft piece of Bluetak. I then put the smallest possible dab of flux on each section of the board and then with a very light touch with the soldering iron added a cap of solder. The solder will spread over most of each section but the divisions prevent the solder from running across to another section. The biggest danger is bridging between the sections with the iron.

Before adding the wires make sure each has only a short section of bare wire, to prevent an end from bridging to another section, and then tin that end with a little solder. Attach the wires to each pad, again with a very light touch, and choose an order that will minimise the risk of bridging or de-soldering the adjacent wire. On completion try and test for any bridging with a continuity meter. If it occurs it will not cause any damage but just means you may have a red aspect and a green at the same time!

Now locate which wire lights up which LED, add the coloured shrink wrap and solder on the resistor.

Next one has to organise the wires down the signal mast column and press the signal head circuit board into the signal head itself making sure all the wires are neatly contained within the column and none have come off. Test each LED is still working correctly before adding and gluing the mast back plate.

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The finished job is shown in Figure 7. The red aspect is a true red in reality but when photographed it gains a yellow centre. The kit has six aspects (a white one I am not using) and potentially each can be controlled separately. In my case I only have two control channels available and so I have chosen to show either green plus yellow or the two reds.

Figure 7

CONCLUSIONS

The four district signal kits took three hours to build and the three exit signal kits also three hours. I saved over £150 and I enjoyed the challenge of building them and getting them working. After they have been installed on the layout I will touch up the back of the units with black paint and add a signal number label (provided in the kit).

I am in my 80th year but managed to cope using a desk magnifier for the circuit board soldering so I think it is a worthwhile project for anyone confident in their soldering technique and particularly if you want a reasonable number of the signals. There are kits available for other types of German signals produced by Viessmann including some of the semaphore types.

A-Z OF GERMAN RAILWAY OR TECHNICAL TERMS, INCLUDING RAILWAY MODELLING WORDS AND TERMS-PART 8

BY DOUG TOMPKINS

Following on from Part 7, which appeared in issue No. 144 of *Merkur,* herewith entries for the letter **I**:

I

Indusi: An inductive train safety device which will stop the train automatically if the driver fails to observe signal indications. Indusi is the abbreviation for *Induktive Zugsicherung* which translates literally as Inductive Train Safety.

Indusigenerator: Generator for above device.

Industriebahn: Industrial railway

Injektor: Injector

Ingenieurkunst: Engineering

Inselbahnsteig: Island platform

Instandsetzung: Putting in (order, trim) repair, restoration, reinstatement

Isalator: Insulator (Electrical)

Isolierung: Insulation

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DATES FOR YOUR DIARY

BY CLIFF WHITE

25th & 26th November 2017 Warley National Exhibition, NEC, Birmingham

21st January 2018 French Railway Society Winter Reunion. Lenham Community Centre, Lenham, Kent

17th February 2018 Tonbridge Model railway Club, Angel Centre, Tonbridge, Kent

24th & 25th March 2018 The London Festival of Railway Modelling 2018, Alexandra Palace, London

Full details are on the Modelshops directory at www.ukmodelshops.co.uk

If anyone is able to help at these events, please contact Cliff White (address details at page 3).

TRACTION NEWS BY DOUG TOMPKINS

Electric Locomotives

Class 101

DB Fernverkehr's Class 101 No. 101 112 has been finished in the livery of the Rheingold train from 1962, namely beige, grey and blue as part of an initiative by the model railway shop chain "W13plus". An H0 scale model of this loco is to be offered by the firm Piko.

Class 103

On 01 April 2017 103 245 was taken into the custody of the DB Museum. However, from 09 August the l03 is now back with DB Fernverkehr and should be seen at work on specials from München. The locomotive underwent an overhaul at Werk München on 18 August and performed a test run to München Ost. On 06 September she worked IC service IC2094 from München to Ulm, returning on IC2097.

Class 110

Class 110 No. 110 169, which was sold by DB Systemtechnik, Minden to Euro Express in the spring of 2017 has received a new livery of Bordeaux red and beige with DB style 'Keks' emblem with the lettering EE. Along the bodysides she carries the lettering www.euro-express.eu.

Class 112.1

Werk Kiel currently has an allocation of 33 active Class 112.1 locomotives and these are used on scheduled passenger trains in Schleswig-Holstein. Locos concerned are: 112 125, 131, 140-145, 147, 149-151, 153, 154, 156-160, 163, 167, 168, 171-173 and 175-181. 112 128 was moved to Kiel from Cottbus in November 2016 and acts as a source of spares.

Class 120

It is now more than 30 years since the first of the production series Class 120.1 locomotives were introduced on the Deutsche Bundesbahn (DB). The first to be handed over to DB was 120 103 on 13 January 1987. As at the end of July 2017 120 103 was still in active service, based together with numerous sister 120.1s at DB Fernverkehr's Werk München Hbf. Apart from those based here, 120 206 and 207 are stationed at Aachen and 120 201, 202, 203 204 and 205 are allocated to Rostock. In addition, DB Systemtechnik and DB Netz have 120 153 (now renumbered 120 501) and 120 160 (now 120 502) as well as 120 125. Members 120 106, 124, 131, 135, 138 and 156 have been scrapped, while 120 110 and 120 208 serve as a source of spares.

Class 140

Two further ex DB Cargo Class 140 locomotives have been sold. 140 850

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passed to the Bayernbahn, Nördlingen on 26 June, whilst 140 806 is now with the firm Press following an overhaul at Werk Dessau. 140 806 now carries the number 140 017.

Class 143

As at the end of June 2017 there were still two Class 143 locomotives allocated to Werk Kiel, these being 143 163 and 930. Both are used on services between Kiel, Nemünster and Hamburg, as well as between Hamburg and Bad Oldesloe.

Three more ex DB region members have passed to DB Cargo, these being 143 012, 043 and 074. Locomotives 143 124, 143 295 and 143 226, which were with DB Cargo, have now passed to the firm RBH.

Classes 146.1 and 146.2

Werk Stuttgart has lost its last Class 146.2 locomotives. 146 213, 221, 222 and 234 have moved to Werk Ulm, whilst 146 204 and 214 have been reallocated to Werk Freiburg.

Following the move of 146 222 from Ulm, the number of Class 146.1 and Class 146.2 locomotives based at Werk Freiburg has increased. Freiburg now have the following members on their books: 146 109-116, 201, 203-206, 213-218, 221-222 and 225-239. Here they have replaced the Class 111 locomotives.

Class 151

Ex DB Cargo locomotives 151 139 and 151 067 have been acquired by the firm Eisenbahngesellschaft Potsdam (EGP). 151 139 is to receive a general overhaul but 151 067 is to serve as a source of spares.

Class 155

The firm Franz Logistik (WFL) has received their second ex DB Cargo Class 155 electric in the shape of 155 159. The loco sports orient red livery, whilst their other Class 155 is finished in Deutsche Reichsbahn Bordeaux red.

Class 181

The blue liveried Class 181 No. 181 201 received an extension to her overhaul due date on 13 May and is now scheduled to remain in service until December 2018.

Class 186

The last two Class 186 locomotives in use with DB Fernverkehr have been taken out of service. Members 186 143 and 186 275 were both based at Berlin-Rummelsberg and were deployed on the night trains EN 452/453 Moscow – Paris between Berlin-Lichtenberg, Warsaw and the Polish Terespol. They were hired in from Railpool in July 2015. These two night trains now only operate once a week and are now worked by Polish Class EU44 (ES64U4) locos.

Electric Multiple Units

Class 420/421

S-Bahn-prototype 420 001/421 001/420 501 has ended her days in service and has been saved for posterity by the DB Museum in Nürnberg. She was delivered new to Bw München Hbf on 11 December 1969.

Apart from 420/421 001, 420 002 can be seen in the Verkehrsabteilung (Transport Department) of the Deutsches Museum in München.

420/421 003, like all other units of the first series 420/421 004-200 have been scrapped.

Since 24 June 2017 Class 420s are again in use on the S-Bahn München network, these being: 420/421 437-439, 446, 448, 456, 459, 460, 463, 465, 467, 470, 471 and 476.

Diesel Locomotives

Class 212

Three Class 212 diesel-hydraulic locomotives previously owned by the firm NBE rail which went into liquidation at the end of 2014 have passed to new owners. 212 058 (MaK 1963) is now with LaConnect in Türkismühle, whilst 212 364 and 369 (both built by Deutz in 1965) have been sold to Italy.

Class 218

The firm EfW Verkehrsgesellschaft received their first ex DB Regio Class 218 diesel-hydraulic at the end of March, namely 218 455. The locomotive has been finished in Deutsche Bundesbahn crimson red (RAL 3004), a livery not previously carried by this loco, as she was delivered new to Bw Kempten from builders Henschel on 06 April 1978 in ocean blue & beige.

On 01 August the firm RailSystems acquired withdrawn DB Regio Class 218s 218 356 and 218 400. The two locomotives were hauled from Mühldorf to their new owners at Gotha by RailSystems Class 215 No. 215 001.

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Class 216

Preserved V160.0 (from 1968 Class 216.0 'Lollo' No. V160 002 (fitted with a Maybach MD870 power unit) is to be used on a special to Willingen in the Hochsauerland on 03 February 2018. Further details available at www.wesfalendampf.de/index.php?page=6&zid=162

Class 225

Withdrawn DB Cargo Class 225 locomotives 225 029 and 225 032 have been sold to Eisenbahhngesellschaft Potsdam (EGP). This company has been the owner of sister locomotives 225 002 and 225 006 since January 2016 and in May they acquired 225 030 from NOBEG Dienstleistungen in Fürth im Wald. Meanwhile 225 011 has been purchased by the firm Lokservice Sascha Dehn in Gelsenkirchen. This company already own 225 008, which they received from DB Cargo in January 2016.

Class 232

The railway company Erfurter Bahnservice (EBS) has acquired its fifth Class 232 'Ludmilla' diesel locomotive, namely 232 690 (Lugansk 1981/0971). The locomotive is to receive a general overhaul at DB-Werk Cottbus.

Class 290

Withdrawn ex DB Cargo Class 290 No. 290 510 has passed to DB Cargo's sister company DB Cargo Hungaria in Györ.

Class 294

The two withdrawn ex DB Cargo Class 294 diesel-hydraulic locomotives 294 789 and 294 832 are, with support from the company Toshiba, to be used as guinea pigs for the project "Helms" (Hybrid Electro-Mechanical Shunter). The locomotives will each have their existing power unit and transmission removed and a battery or diesel engine and generator will be installed. Completion date for both these locomotives this is due in 2018.

Class 298

Following the departure of Class 291 and Class 294 locomotives from Rostock-Seehafen, DB Cargo has now put into service Seddin-based Class 298s on shunting duties.

Class 335.0

On 16 June 2017 335 009, the last Class 335.0 locomotive in regular service, was taken out of use at Kassel. The shunting locomotive was new in August 1969 and was first allocated to Bw Ulm.

V320 001 (232 001)

Henschel-built diesel-hydraulic locomotive V320 001 (from 1968 232 001), which was withdrawn by owners HF Wiebe GmbH following damage in 2015, was hauled from Nienburg to Kassel by Rail Adventure's Class 103 No. 103 222 on 23 August 2017 and has now found a new resting place on static display in the grounds of the locomotive builders Bombardier Transportation, formerly Henschel. The locomotive still belongs to Wiebe and there are currently no plans to make her operational.

Class 360

The firm Lang Recycling in Gaggenau has acquired ex DB Class 360 0-6-0 diesel-hydraulic No. 360 335 from the company EMN. 360 335 was built by Esslingen in 1957 with the works number 5176.

Diesel Multiple Units and Railcars

Class 605

From 01 October 2017 the two ICE services ICE 1230 Oesterport – Hamburg Hbf and ICE 1233 Hamburg Hbf – Copenhagen worked by the three remaining Class 605 units based at Hamburg-Eidelstedt depot will be worked by Danish State Railways (DSB) Class IC3 units.

Class 628/928

628/928 201 of the DB Museum has been repainted in the original mint green and light grey livery. The unit is scheduled to be used on local passenger services in northern Germany being organised by the Verein Historische Eisenbahnfahrzeuge Lübeck e.V. (HEL).

Class 642

The use of Class 642 'Desiro' units from Werk Leipzig-Süd has ended. Werk Leipzig Süd received their first allocation of Class 642s in October 2000 with the delivery of 642 044/544 and 045/545. With this came the closure on 30 June 2017 of what is claimed to be the oldest locomotive depot in Germany after a period of 180 years.

From the December 2017 timetable change Class 642 s are due to replace Class 628/928 diesel-multiple-units on the Kurhessenbahn in Kassel. The first of the Class 642 units arrived at Kassel from Leipzig in August and September last year, these being 642 135, 137,143 and 144.

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Steam locomotives

Class 23

By the time you read this Eurovapor-Sektion Deutschland's preserved ex Deutsche Bundesbahn Class 23 locomotive 23 058 should be back in operational condition following a complete overhaul at Sissach in Switzerland. The loco was built by Krupp in 1955.

Class 52

On 14 March 2017, No. 52 6106 (BMAG 1943/12547) of the Vulkan-Eifel Bahn (VEB) in Gerolstein returned to service and is now available for use on enthusiast specials.

ICE-T on the outer ring in Berlin **Photograph: kaffeeeinstein**

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Bavarian Class 70 2-4-0 tank locomotive No. 70 083 at Mümchen Ost - Easter 2016. Photograph by Graham Lightfoot

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BAHN-NOTIZEN

BY
MICHAEL DONOVAN,
PAUL TUCKER
GARTH PONSONBY AND
D. SELGRABEN

Rheintal line reopens after Rastatt repairs

German infrastructure manager DB Network restored through operation on the Karlsruhe – Basel Rheintal (Rhine Valley) line in the early hours of 2 October, following the reconstruction of the line at Rastatt, which was seriously damaged by a landslip on 12 August. As well as regional and long-distance services, the line is normally used by more than 200 freight trains per day and the collapse at Rastatt has caused huge disruption on this key north – south route with services diverted or even cancelled. Replacement bus services carried up to 30,000 passengers a day between Rastatt and Baden Baden. The collapse was caused by groundwater entering the construction site of the new 4.27km-long railway tunnel being built beneath Rastatt. To stabilise the ground beneath the existing line, 10,500m3 of concrete was installed on the surface. Work on the superstructure was completed on 25 September, enabling the installation of overhead catenary. Deutsche Bahn AG says it has put in sensors at the site of the collapse to monitor ground stability. The first scheduled train to pass through the tunnel was the ÖBB's Nightjet service EN470 from Zürich to Hamburg-Altona.

Modus coaches find a new home in the north of Germany

Some of DB Regio Franken's withdrawn Modus suburban coaches have found a new home in northern Germany and are in use on route RB77 between Kiel and Neumünster, powered by Kiel-based Class 112 electric locomotives.

DB Netz to install LED-style colour-light signals

Over the next few years all of the circa 262,000 colour-light signals on routes of the Deutsche Bahn AG are to be replaced by new modern LED colour-light signals. LED colour light signals have been used on the German rail network since the end of the 1990s, initially where colour-light replaced semaphore types.

Oil tank trains over the Bentheimer Eisenbahn (BE) to end in 2019

Since 1944 oil tanker trains have been run over the BE on a regular basis. However, the BASF's sister company Wintershall AG is to begin building a 16km-long pipeline from Emlichheim to Osterwald in 2018 which will go into operation from 2019, thus bringing an end to this rail traffic.

Renovation work on Oberstaufener Tunnel completed

The Allgäu area of southern Germany's only railway tunnel, the Oberstaufener Tunnel on the Kempten – Immenstadt – Lindau line has been successfully renovated. The tunnel, which lies around 400m from Oberstaufen station, dates from 1852/53. Work began on the renovation on 03 April 2016 and was originally due to be completed on 21 October 2016. However, this was delayed and so the tunnel finally reopened on 07 December.

DB Fernverkehr orders 25 further IC2 trains

DB Fernverkehr has ordered 25 further Twindexx-Vario IC2 trains from Bombardier. The total of 125 double-deck coaches will be used with TRAXX AC3 (Class 147) electric locomotives also from Bombardier, The coaching stock will be built at their factory in Görlitx, while the locomotives will be constructed at their factory in Kassel. For their deployment on services between Germany and Switzerland (EC Line Stuttgart – Zürich) the vehicles will be equipped with the European Train Control System (ETCS) Baseline 3-Level 2. The new trains are due to enter service from 2019. At present DB Fernverkehr have 27 IC2 sets in use on lines IC55 Köln – Dresden and IC56 Norddeich – Leipzig with Class 146s. In the summer of 2018 17 further sets will be placed into service and for these trains Class 147.5 electrics will be used.

Hohenzollerische Landesbahn AG orders additional Coradia Lint trains

The Hohenzollerische Landesbahn AG (HzL) has ordered 10 additional Coradia Lint regional trains from Alstom in a deal worth 50 million Euros. The diesel-multiple-units will be built in Alstom's plant in Salzgitter and will run on the RE Ulm – Aalen, RB Ulm – Langenau and RB Ulm – Munderklingen

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lines. The trains are due to be delivered by May 2018.

Locomore files for insolvency

The German train operating company Locomore that began operating services in 2016 has filed for insolvency. Locomore was launched as a low-cost alternative to DB AG but despite growth in its revenue-the venture has not become cost-effective. In a statement released on its website, a spokesman for Locomore said "our financial reserves have now been exhausted and we have been compelled to take this step". A number of services have been cancelled but Locomore continues to operate despite opening insolvency proceedings. Apparently the Czech open-access operator Leo Express has submitted a bid for Locomore and has promised to retain Locomore's employees and suppliers. However, no firm date for negotiations has so far been made. For up to date information visit: www.locomore.com

DB Regio orders further Coradia Continental EMUs

On 29 March DB Regio placed an order with Alstom for 53 further Coradia Continental electric-multiple-units (EMUs). The order is worth around 330 million Euros and the trains are due to be delivered between 2019 and 2020. They will be deployed on passenger duties in Bayern, Nordrhein-Westfalen and Rheinland-Pfalz.

Frankfurt (Main) – Milan EC service

From 12 December a new EC service will be introduced from Frankurt am Main to Milan using SBB 'Pendolino' type ETR610 units from Alstom, replacing trains EC206 and 207 which are loco-hauled.

111 059 on an inspection train at Chemnitz Hbf in May 2017. **Photograph by Graham Lightfoot**

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DB BUS REPLACEMENT -A PERSONAL EXPERIENCE

BY JONATHAN COLLINGE

Back in May, I booked a train journey through Germany to Switzerland for September. This included an overnight stop in Freiburg (im Breisgau). I had been this route a few times before and I was looking forward to the usual comfortable and punctual ICE journey. How wrong I was!!

I was alerted to a problem, a few days before I left home, by an email from the European Rail Timetable team who reported the re-routing of Paris Germany trains and cancellation of overnight services to Switzerland.

I started investigating and discovered that the line at Rastatt (just north of Baden-Baden) was totally closed. This meant no trains at all on this important route towards Switzerland. As far as I could ascertain the track had been totally undermined and was hanging in thin air. A German version of Dawlish, however, this appears to be an own goal. DB was building a new tunnel under the existing line at the time when something mega went wrong. As far as I can tell nobody was killed or seriously injured which is good, but the main line was totally severed.

The plan to fix the line was to stabilise the ground (lots of concrete) and then to put some sort of bridge over the unstable ground. This would however take some time which meant I was going to have to experience the German version of bus replacement.

A couple of stops south of Frankfurt there was a long announcement, in German, which included Rastatt, Baden-Baden and the dreaded word bus!

So, we arrived at Rastatt and the fun started. Many years ago, I discovered that one thing Germans are not good at is queueing. So, it was suitcases at the ready as the push to get onto the buses started. No DB staff were present and there was no queuing system at all. In fact, it was dangerous as people tried to dash in front of moving buses to get to ones waiting further away. After a lot of pushing I made it onto one of the buses for the 15min journey to Baden-Baden. There was then another suitcase push onto the substitute IC heading south. I got a seat but many did not.

I had booked an overnight in Freiburg and made my hotel just over an hour late.

In the morning, it was supposed to be just an hour journey in one of the substitute ICs to Basel SBB. Wrong again!

I checked the DB website first thing, and all was well. So, I enjoyed my breakfast and made my way to the station for the 8:13 to Basel SBB. What a difference an hour makes! My train was now reported as an hour late and the 08:15 RE (an improvised plan b) was cancelled! The northbound IC was sitting in the station with a revised departure time of some 60 minutes later, so obviously something else had gone wrong. In the end DB laid on another RE (different train number) and after mega confusion, which would have done a comedy programme proud, we set of for Basel Bad. Unfortunately, en-route DB decided to change us from RE to RB (all stations) which meant missing my connection to Basel SBB. Plan C was now to catch a later IC (which was the delayed one I should have caught). Unfortunately DB decided to terminate this at Basel Bad. So it was yet another platform change and dash for the SBB S-Bahn and an hour late arrival in Basel SBB.

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So, my tally south bound was 2 hours of delays, 2 train cancellations and 2 missed connections. I did wonder, however, what had happened to all the freights. Unsurprisingly I had not seen a single one for quite a while.

So, my lesson here is to not only have a plan b, but a couple of extra ones up your sleeve.

If anybody experienced the bus replacement for Dawlish it would be interesting to compare notes. I suspect GWR did better but they do get more practice than DB!

Suffice it to say I changed my homeward journey to use the Zurich Stuttgart route which I had not done before. I had reserved a seat expecting it to be packed, however, there was actually quite a lot of empty seats. Once into Germany the line becomes single. I did get worried that there would be delays but in fact we were generally on time. However, every single passing station, was absolutely packed with freight trains waiting for a path. So, that's where all the freights went. The final pleasant surprise was at Horb, here Semaphore signals are still in use for all tracks.

The line at Rastatt was fixed in early October.

If you want, you can read more about the Rastatt problem here - https://inside.bahn.de/tunnel-rastatt-sperrung/

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THE GERMAN RAILWAY SOCIETY

SOCIETY PRODUCTS

The images (below) are numbered and available on the items listed with each image. **Coasters** are circular (●) or square (■). Dimensions: 90 mm diameter or 90 mm square. **Fridge Magnets (FM):** Image size 75 x 45 mm. **Key Rings** include a fob with an image 50 x 35 mm. **Mouse Mat** (**M-mat**): Images are 220 x 180 mm. Mugs (white) have either one of images 13-15, 17, 19 or two of 1-12, 16; see the example in image 12.

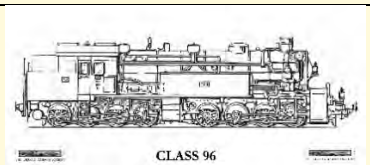
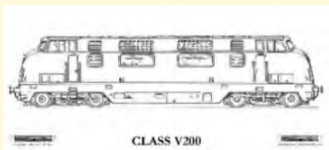
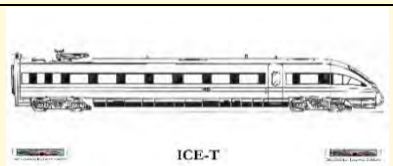
When ordering please state the unique description below the desired image (e.g. DR green on white). Please send any queries to the Society Products Officer (see "Society Officers" page for contact details).

Prices exclude Postage and Packaging.

RAILWAY COMPANY LOGOS AND OTHER IMAGES

1. Bavarian coaster ● £3.40 FM £2.00 key ring £1.50 mug £4.20	**2. Prussian** coaster ● £3.40 FM £2.00, key ring £1.50 mug £4.20	**3. DRG** coaster ● £3.40 FM £2.00 key ring £1.50 M-mat £7.50 mug £4.20	**4 DR white on green** coaster ● £3.40 FM £2.00 key ring £1.50 M-mat £7.50 mug £4.20	**5. DR green on white** mug £4.20	**6. DB silver on black** coaster ■ £3.40 FM £2.00 key ring £1.50 mug £4.20

7. DB white on black coaster ■ £3.40 FM £2.00 key ring £1.50 M-mat £7.50 mug £4.20	**8. DB cream on turquoise** coaster ■ £3.40 mug £4.20	**9. DB white on red** coaster ■ £3.40 mug £4.20	**10. DBAG red on white** coaster ■ £3.40 FM £2.00 key ring £1.50 M-mat £7.50 mug £4.20	**11. DBAG red on white and the front of an ICE** FM £2.00 key ring £1.50	**12. Example of a logo on a mug.** The image wraps 3/4 of the way around a mug

		
13. Class 96 mug £4.20	**14. V200** diesel mug £4.20	**15. ICE-T** tilting high-speed driving car mug £4.20

			
16. BR 44 mug £4.20	**17. BR 86** mug £4.20	**18. BR 181 dual voltage loco** key ring £1.00, fridge magnet £2.00	**19. GRS logo** M-mat £3.50, mug £4.20

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