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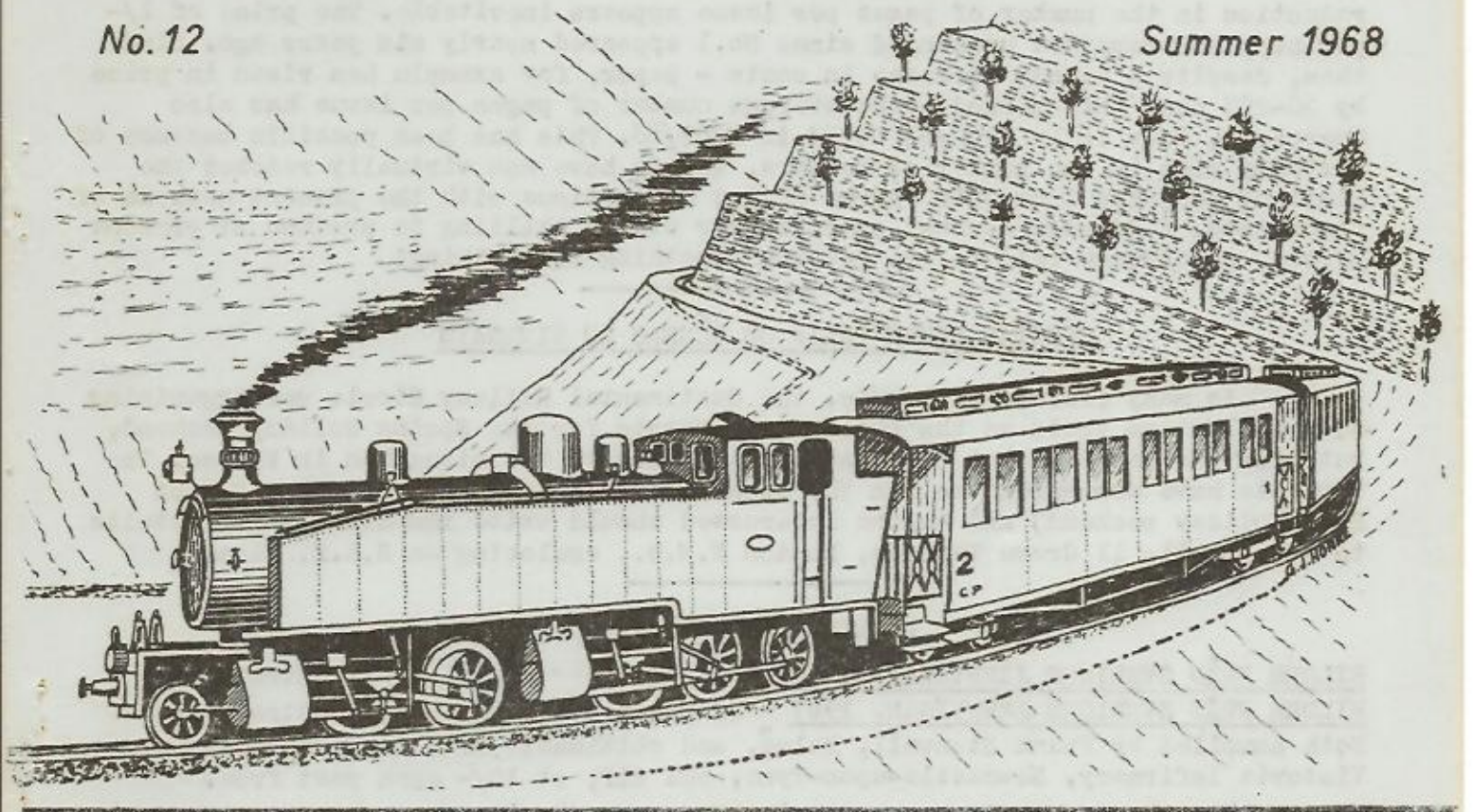

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The subscription of most of those readers of the Journal who receive their copy by post expires with this issue. Normally, a renewal form would have been enclosed but, unfortunately, the enquiries into improved methods of production, referred to in the last two Editorials, have still not been completed. The next issue of the Journal, in whatever form it may appear, will be sent out to all existing subscribers, and a renewal form will be enclosed where appropriate.

One of the objections voiced against a printed Journal is the increase in price which it would bring. It is, therefore, as well to point out that, even if we continue with a duplicated publication, either some increase in price or a reduction in the number of pages per issue appears inevitable. The price of 1/- per copy has remained unchanged since No.1 appeared nearly six years ago. Since then, despite a steady increase in costs - paper, for example has risen in price by 20-25% over this period - the average number of pages per issue has also increased, from 16 in 1962/63 to 24 in 1967/68. This has been possible because of a steady rise in the number of readers, but we have now virtually reached the limit of benefits from this source whilst we continue with the present methods of production. A 24-page Journal costs rather over a shilling to produce at present prices, so already readers are getting something for nothing!

SPECIAL STEAM TRAIN ON RÉSEAU DU VIVARAIS

As many readers will know, the Continental Railway Circle was organising a special steam train on the Réseau du Vivarais for the Spring Holiday weekend, but this was cancelled at the last moment owing to the situation in France. The Vivarais have now agreed to run the special on Sunday, 1st September (August Bank Holiday weekend) and anyone interested should write immediately for details to J.B. Snell, 11 Grove Terrace, London N.W.5., enclosing an S.A.E. please.

PUBLICATIONS RECEIVED

BILDER FRÅN SVERIGES JÄRNVÄGAR, 1966 - 40 pages 5¾" x 8¼", 64 illustrations.
BILDER FRÅN SVERIGES JÄRNVÄGAR, 1967 - 44 pages 5¾" x 8¼", 72 illustrations.
Both compiled by Frank Stenvall, Malmö, and obtainable from G. Wildish, Royal Victoria Infirmary, Newcastle-upon-Tyne, NE1 4LP, at 10/- each post free.

These two booklets are pictorial reviews of the railways of Sweden for 1966 and 1967 respectively. The main topics in each are rail tours, new equipment, closed lines, museums, steam locomotives and general railway scenes. There is virtually no text, and captions are in English as well as Swedish. Despite the dearth of regular steam workings in Sweden, nearly half the photographs feature this form of traction, and a wide range of types is depicted, many of them in

(Continued on Page 19.)

THE STEAM TURBINE LOCOMOTIVES OF THE T.G.O.J.

by B.H. Deer

With successful replacement of cylinders, connecting rods and cranks by the steam turbine in ocean vessels and in power stations, it was not surprising that locomotive engineers began to consider its application to railway locomotives. Thus, between the wars, a large number of designs was evolved, although most were designed and built by locomotive manufacturers as experiments, and thus could run serious trials on main line railways only with the consent of the railways concerned. Few railways, as such, were tempted into experiments of their own at this time.

The great attractions of turbine propulsion were the even torque, together with lack of certain features of normal locomotives, such as hammer-blow, back pressure, and delicate valve setting, whilst above all there was, following industrial experience, the great economy to be gained from condensing the steam back to water for re-use. On these early locomotives, condensing apparatus was always provided, but since it had to be fitted within a fixed profile of height and width, and within a prescribed maximum axle-weight, it almost always had to be carried on a separate vehicle, often looking like some sort of tender, and in some cases even with the driving wheels on this extra vehicle, as with SJ No. 1474. The result was a rather clumsy-looking locomotive, with a large number of axles and a great overall length, which presented difficulties in turning at the end of journeys. Existing methods of taking on coal and water, intended for use with orthodox locomotives, also presented problems.

By 1930, higher pressure turbines had been developed, and with the resultant greater economies, it was possible to dispense with all condensing apparatus, and thus its effect upon the design, size and appearance of a locomotive. Locomotives could, and did, appear now as though they were but a variant of an orthodox locomotive, and as such were much more efficient than their predecessors. Railways themselves became more interested, and the LMS produced such machines as their No.6202, and the Pennsylvania Railroad their No.6200 (an engine which showed much promise, but was ill-fated because of the unfortunate decision of the PRR to change to diesel traction).

However, it was the relatively unknown TGOJ in Sweden that must claim the honour of having had the most consistently trouble-free and reliable steam turbine locomotives that the world has ever seen, or is likely to see. The TGOJ (Trafikaktiebolaget Grängesberg-Oxelösunds Järnvägar) was, and still is, a privately owned standard gauge railway, 273km. in length, extending from Ludvika and Grängesberg in central Swedon, where there are large privately owned ore deposits, south-south-eastwards via Eskilstuna, where the railway's principal workshops are situated, to Oxelösund on the Baltic coast. Although operating ordinary freight trains and passenger trains (some with restaurant cars) as they still do, the principal traffic was ore, and it was for this that the turbine design was prepared. As can be seen from the diagram on page 9 of Journal No.9, Winter 1966, the 1-4-0 axle arrangement was adopted, with an orthodox appearance other than the equipment in front of the smokebox. This equipment, designed by Firma Ljungström Angturbin Aktiebolaget, consisted of the turbine itself, and the reduction gearing. This reduction had a ratio of 50.4 to 1. Final drive to

conventional coupling rods and wheels was by means of a crank, similar in action to those used on early Swiss and Italian electric locomotives. Reversing was achieved by inserting a slow-moving extra set of gear-wheels. Together with the connecting rod from the driving crank, the mechanism was sprung so as to allow vertical movement. On the second set of driving wheels, the flanges were 10mm. thinner, so as to allow easier passage on sharp curves. The firebox, ashpan and grate were normal, but the draught on the fire and the exhaust through the blast-pipe were, of course, continuous. The diameter of the tip of the blast-pipe pipe was automatically altered by the amount of steam used against the turbine blades, so that by the use of a small increase in steam used, an increase of blast was obtained.

Steam passed from the boiler through a saturated-steam valve into the superheater and from there, via a steam collector and filter, to the regulator itself, which consisted of five steam-jets, controllable from the cab. The saturated steam valve, mentioned above, was fully opened before starting and fully closed when stopping. Steam pressure from the boiler to the turbine never lost more than $\frac{1}{2}$kg/cm^2.

The following are the chief measurements, other than those shown on the drawing previously mentioned:-

Boiler pressure	-	13kg/cm^2
Length between tubeplates	-	4250mm
Heating surface;- tubes	-	136.9m^2
flues	-	149.2m^2
superheater	-	100.0m^2
firebox	-	12.3m^2
Grate area	-	3.0m^2
Driving wheel diameter	-	1350mm

Adhesion weight was 72 tonnes. The total weight of the locomotive and tender in working order was 117.5 tonnes, of which the tender contributed 34.5 tonnes when carrying 15m^3 of water and 5 tonnes of coal. The curiously small two-axled tenders seem to have been necessitated by turntable requirements, since conventional freight engines with four coupled axles, but without any carrying axles, had normal three-axled tenders. Maximum rated power of the turbine was 2000hp, and was 1370hp when the locomotive was travelling at 40km.p.h. Maximum permitted speed was 60km.p.h., and the tractive effort was 20 tonnes.

The cabside numberplate was modelled, as with other Swedish private locomotives, broadly on the standard SJ oval pattern. The number was shown on each side of the coupling, on both front and rear buffer beams, the figures being of polished brass strip riveted to the beam. The number also appeared on each side of the chimney, and on an illuminated panel on each side of the headlight in front of the chimney.

The first locomotive, No.71, was placed in service in 1929 and hauled ore trains of 800 to 1600 tonnes between Eskilstuna and Oxelösund, and in comparison with a 3-cylinder locomotive of similar size, used 30% less coal. In 1936, two more locomotives were ordered and delivered, and all three continued at work until electrification of the TGOJ in 1956. No.71 was used on 4th June 1966 for hauling a special train for Svenska Järnvägsklubben from Ludvika to Eskilstuna.

Apart from this they have been carefully stored, in accordance with Swedish government regulations, which require that all steam locomotives which are capable of further use, irrespective of age, size, type or ownership, are to be kept in good condition in case of emergencies, such as failure of power on electrified lines. This requirement has thus preserved, for posterity we hope, a complete class of turbine locomotives, which although relatively unknown have undoubtedly been the most successful. All three, together with some conventional locomotives, all in immaculate storage condition, were noted by the author in the roundhouse at Grängesberg, early in September 1967.

Summary of Locomotives

TGOJ No.	TGOJ Class	Maker	Maker's No.	Year built
71	M3t	Nydqvist & Holm A.B.	1872	1929
72	M3t	" "	2000	1936
73	M3t	" "	2001	1936

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STEAM LOCOMOTIVE STOCK - FINNISH STATE RAILWAYS

In January 1968 the locomotive stock of the Finnish State Railways (VR) numbered 352 steam and 354 diesel, together with 276 diesel railcars and 32 tractors. Finnish locomotive classes are designated by two letters (one capital, one small) followed by a number (e.g. Tk3). the letters have the following meanings:-

H	Passenger	k	Light	(Axle load not above 11t)
P	Suburban	v	Middle-weight	(" " 11.1-14.0t)
T	Goods	r	Heavy	(" " 14.1 tonnes and over)
V	Shunting			
S	Mixed traffic			

The numbers are used to distinguish between different designs of locomotive with similar letter classifications, e.g. Tk3 is the third class of light-weight goods locomotive. The wheel arrangements of the surviving classes are as follows:-

Hv2	4-6-0	Prl	2-8-2T	Trl	2-8-2	Vr2	0-6-2T
Hv3	4-6-0	Tk3	2-8-0	Tr2	2-10-0	Vr3	0-10-0T
Hrl	4-6-2	Tvl	2-8-0	Vrl	0-6-0T	Vr4	0-6-2T

The locomotive stock is divided between eight districts (nine until recently), most of which comprise several motive power depots.

1st District - Helsinki:- Hv2: 582; Hrl: 1000-11; Prl: 767/9-73; Tk3: 1170; Tvl: 695, 738/41; Trl: 1044-51/72-80; Tr2: 1304-8/10; Vrl: 787-94. Total 54 Also 55 diesel locomotives, 105 railcars and 9 tractors.

2nd District - Kouvola:- Hv3: 781-5; Hrl: 1018-21; Prl: 761/2/74-6; Tk3: 859/61/5/7/8, 1145; Tvl: 726/30/2/7; Trl: 1081-96; Vrl: 656-70; Vr3: 754-6; Vr4: 1420/1. Total 60. Also 75 diesel locomotives, 12 railcars and 3 tractors.

3rd District - Turku:- Tv1: 605/10; Vr2: 962-5. Total 6. Also 28 diesel locomotives, 26 railcars and 5 tractors.

4th District - Tampere:- Hv2: 778/9; Prl: 763-6; Tk3: 821/3/9/31/3/4/7, 1129/30; Tv1: 1208-11; Vr1: 799; Vr2: 953-6: Vr4: 1417-9. Total 27. Also 93 diesel locomotives, 3 railcars and 3 tractors.

5th District - Seinäjoki:- Hv3: 991-9; Tk3: 814, 1100-4; Tv1: 697/9, 704, 925-9; Trl: 1052-63; Vr1: 532-6; Vr2: 950-2; Vr4: 1404-9. Total 49. Also 34 diesel locomotives, 23 railcars and 3 tractors.

6th District - Oulu:- Tk3: 847/8, 1146-69; Tv1: 939-48, 1201-7; Trl: 1068-71; Vr1: 798; Vr4: 1400/1. Total 50. Also 38 diesel locomotives, 37 railcars and 1 tractor.

7th District - Pieksämäki:- Hv2: 680/1; Hrl: 1012-7; Tk3: 846, 1131-44; Tv1: 697/8, 708/16/20/2/3, 902/5/12/4/6-24; Trl: 1030-43; Vr1: 537/40-2, 796/7; Vr2: 959-61; Vr3: 752/3; Vr4: 1402/3/22/3. Total 72. Also 20 diesel locomotives, 55 railcars and 7 tractors.

8th District - Joensuu:- Tk3: 840/52, 1105-14/6-8; Tv1: 595/6, 930-7; Trl: 1064-7; Vr1: 539/44, 795; Vr2: 957/8. Total 34. Also 11 diesel locomotives, 15 railcars and 1 tractor.

(A previous Finnish stock list appeared in Journal No.10, page 7)

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STEAM IN AUSTRALIA

A brief survey of the remaining steam locomotives and their workings compiled by

M.C.G. Schrader

Commonwealth Railways: Completely dieselised.

Tasmania: Government Railways nominally dieselised, but M and Ma Class 4-6-2's and H Class 4-8-2's see occasional service from Launceston, Hobart and Devonport. One H Class recently received a major overhaul. The only remaining private line in the island - the Emu Bay Railway - is completely dieselised.

Victorian Railways: 17 steam locomotives of the K and J classes, both 2-8-0, survive in service, with numbers of others stored. These latter may see more use if a bumper wheat harvest occurs in 1968-69. Existing steam operation centres on Ararat depot, in Western Victoria, with 4 shunters at Geelong, 45 miles from Melbourne. In addition, a veteran D3 4-6-0, an R Class 4-6-4, a J and a K are maintained in good condition at Melbourne for use on enthusiast specials, which average about 3 per month. (B.R. please note - Ed.)

New South Wales: The Government Railways have rapidly dieselised during the last two years, but there is still an active pocket of steam between Gosford, the end of electrification 50 miles north of Sydney, and Newcastle, 50 miles further north again. 60 Class Beyer-Garratts, 38 Class 4-6-2's (some hauling 70 m.p.h. passenger trains), 53 Class 2-8-0's, and 59 Class postwar Baldwin 2-8-2's see service on this section. In the Newcastle area, 30 Class 4-6-4T's are also

active, and a few veteran 19 Class 0-6-0's. This latter class is also at work in one of the main marshalling yards in Sydney, which is by no means steamless, as Garratts and 38's operate south to Goulburn, and there are also local goods workings. Steam shunting persists in many country areas. N.S.W.G.R. are maintaining quite a stud of locomotives at Sydney for enthusiast use, including aged 4-4-0's and a 4-4-2T. (B.R. again please note.) The Newcastle area is rewarding in that Coal and Allied Industries Ltd. are still operating ex-R.O.D. 2-8-0's and heavy 2-8-2T's on coal trains near Maitland.

South Australia: Steam on the 5'3" gauge has ceased regular operation, but several 520 Class 4-8-4's see enthusiast service outside the summer fire danger period, and one 620 Class 4-6-2 is also available. (No comment.) On the 3'6" gauge sector, several T Class 4-8-2's and one 400 Class Beyer-Garratt are in service near Peterborough. The impending gauge-standardisation of this line will probably see the demise of steam.

Queensland: Although almost 300 steam locomotives are still on the register, their share of the total duties is very small. PB 15 4-6-0's and DD 17 4-6-4T's still run a few Brisbane suburban services; and local goods workings there, and near Toowoomba, are steam. Rockhampton has a stud of B and BB 18½ 4-6-2's, C 17 4-8-0's and Beyer-Garratts. The steam picture is clouded; its use is rapidly declining. None operates north or west of Townsville, and most inland lines are all-diesel. Steam shunting persists in the south, but is slated for early replacement. A very limited quantity of steam lingers on some 2-foot gauge sugar tramways near Ingham, Bundaberg and Nambour - in the season.

Western Australia: This Government system presents the brightest picture currently, with heavy steam power still on main line "link" (goods) working. A well-maintained fleet of some 120 locomotives is in very active service - massive V Class 2-8-2's, S Class 4-8-2's, W Class 4-8-2's, and P Class 4-6-2's, plus D Class 4-6-4T's in Perth. The Great Southern line from York to Albany is virtually all steam; operations in the Collie area, and all traffic south and west of Bunbury are handled by the steam fleet. Policy is to maintain modern steam power for some years yet, although the remainder of Perth's steam suburban working - always very smart and efficient - is close to extinction. Perhaps the only fault is that locomotives are no longer cleaned! The very few privately-owned wood-burning shunters on timber lines and sidings have a very short prospective life span.

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NOTES AND NEWS

WEST GERMANY

Osnabrück - Steam was still much in evidence in April, although electrification work on the line to Hamburg was far advanced and will be completed during the late summer. Most expresses on this line have 01[10] Class Pacifics, with a few diesels only; the very heavy freight traffic is now about half worked by rebuilt 41 Class 2-8-2's, with the rest divided between 44 and 50 Class 2-10-0's. The latter are recent arrivals, no doubt replacing withdrawn 41's.

Altenbeken - Freights here are erratic, but worked by very energetic 44's when

they do run (often in convoy). Passenger trains are almost all diesel, with the exception of the Kassel-Münster (out a.m., back p.m.) worked by a coal-burning 01^{10} since the withdrawal of the surviving 10 Class 4-6-2; and the 07.46 Osnabrück-Altenbeken and 09.48 return, worked by a rebuilt 01 Class.

Rheine-Emden - This line also has coalburning 01^{10} Class (the Osnabrück allocation are all oil-burners) on expresses. 41 and 23 Classes work some locals from Rheine; most passenger trains from Emden appear to be worked by 23 Class 2-6-2's, diesels taking over Bremen trains at Leer. The Aussenhafen branch is normally worked by an 82 Class 0-10-0T.

Aachen-Mönchengladbach - 03 Class 4-6-2's were still working almost all passenger trains up till the time of electrification, which was officially inaugurated a few days before the start of the 1968 Summer service. Freights were mostly hauled by 50 Class, with the occasional 41. The former class were also responsible for most of the banking from Herzogenrath up the steep incline towards Aachen. The many visitors who have seen, photographed and recorded one of the heavy coke trains ascending this bank with one 50 Class at the front and two more at the rear will no doubt treasure their memories of this impressive spectacle which is now, presumably, no more. However, some steam working may remain over this section, as many of the trips were to and from colliery branches which remain unelectrified. Reports subsequent to electrification would be welcome. 55 Class 0-8-0's were still to be seen working at Rheydt and Aachen West in May, and probably still continue on trip and shunting turns. Again confirmation would be welcome.

Koln-Mönchengladbach-Venlo - Electrification was inaugurated on this line at the same time as Aachen-Mönchengladbach. Most passenger workings were previously diesel, though there was steam on freight. 55 Class could, and probably still can, be observed in action at Kaldenkirchen.

Koblenz - Passenger trains along the Mosel valley to Trier are now mainly diesel, though with some 01 Class on expresses and 23's or 50's on locals. Freight is still exclusively worked by 44's. In the opposite direction, the 17.26 to Limburg appears to be a steam turn, often with a 65 Class 2-8-4T.

Saarbrücken - The line from Trier still has a fair amount of steam, including 01's on passenger trains. Local trains are now often diesel, but 23 Class 2-6-2's and 78 Class 4-6-4T's still work a proportion, especially Völklingen-Lebach-Neunkirchen and Neunkirchen-Türkismühle.

Kaiserslautern - Not much steam here, but what there is includes 23's, 50's and 86 Class 2-8-2T's on Lauterecken, Pirmasens and Kusel branches.

Darmstadt - This shed is one of the homes of the 65 Class 2-8-4T's. All services on the line to Erbach are diagrammed for the class (except those shown as railcars in Table 317F of the Kursbuch), but 50 Class deputise when there are not sufficient 65's available. The latter also work certain early morning and evening services on the Weinheim-Fürth branch (Table 315B).

Stuttgart Area - There is an interesting steam area beyond the end of electrification at Böblingen. Steam-worked trains can be recognised in the Kursbuch by the 7-8 minute stop to change engines (diesels work through) and are mainly locals. 38 Class work to Freudenstadt and Hausach, and Horb, Rottweil or Tuttlingen; 44's and 50's are also in evidence. The Horb-Tübingen branch has 38 Class 4-6-0's and 64 Class 2-6-2T's, the latter also working the Urach branch. Tübingen-based 38's and 64's also work towards Sigmaringen, and in certain cases through to Aulendorf, together with the line from Rottweil to Villingen.

Crailsheim-Heilbronn is mainly steam, with 23's predominating. Both routes from Heilbronn to Heidelberg are predominantly 38 Class, and there are also some of these on the Heilbronn-Würzburg line, including E-trains. Considering the rarity of these engines elsewhere in West Germany, these dispositions are interesting.

EAST GERMANY (August 1967)

Magdeburg - Observations at the Hauptbahnhof, Rothensee, Buckau and Haldensleben produced 01 and 03 Class Pacifics and 22 Class 2-8-2's for expresses, whilst other passenger trains had classes 38, 41, 50.3 (2-10-0), 64 and 75 (2-6-2T's) and 65 (2-8-4T). Freights had 50.3, 52.8 (2-10-0), 55 (0-8-0), 83 (2-8-4T) and 94 (0-10-0T). The 83 Class were at Haldensleben.

Erfurt - Classes at work included 01, 01.5, 03, 22, 38, 41, 44, 56 (2-8-0), 58 (2-10-0), 65 and 93 (2-8-2T), but there have been reports of some dieselisation.

Halle - Under works repair were engines of classes 38, 56, 64, 78, 83, 86, 93, 94, plus Saxon 75 and 94, and 0-8-0T 92.6476. At work was an 80 Class 0-6-0T.

Leipzig - Diesel and electric traction now predominate, but there is still a healthy amount of main line steam, including Saxon Class 38 as well as more common types.

Karl Marx Stadt - Passenger power includes Classes 22, Saxon and Prussian 38's and 58's, Saxon 75, and standard 65 and 86. Freight produces Classes 44, 50, 58 and Saxon 94.

ITALY (October 1967 and February 1968)

The FS proposes to withdraw 400 steam locomotives during 1968, leaving approximately 826 on the books, as a result of current diesel deliveries (125 main line and 270 shunting locomotives). A proposal to close down some 2,870 miles of branch line may keep a number of steam locomotives in service until this matter is decided.

Domodossola - 640 Class 2-6-0's work passenger trains to Novara via Borgomanero.

Alessandria - This shed has 53 steam locomotives allocated. At work are 640's, 685 (2-6-2), 743 (Franco-Crosti 2-8-0), 835 (0-6-0T) and 880 (2-6-0T). The line to Pavia appears to be mainly steam worked.

Cremona - 35 locomotives allocated. 625 Class 2-6-0's and 685's work passenger trains to Treviglio and sometimes through to Milan. Other classes at work are 743, 835 and 880.

Verona - 32 locomotives allocated. Steam works to Modena/Mantova, including Classes 625, 740 (2-8-0), 741(Crosti 2-8-0) and 835. Porta Vescovo works are still repairing steam, and there are steam passenger trains on the Vicenza-Schio branch.

Padova - Active, with some passenger turns, are Classes 625, 740, 743, 745 (2-8-0) and 851 (0-6-0T), notably on the Bassano del Grappa line. 20 locomotives are allocated.

Rimini - 44 locomotives allocated. Active are Classes 623 (Franco-Crosti 2-6-0), 625, 685, 735 (USA 2-8-0), 835, 851, 875 (2-6-0T) and 880. The line to Ferrara, though partly diesel, has 623's on passenger and 735's on freight.

Ancona - 19 locomotives allocated. 740, 835 and 851 Classes in use.

Terni - 20 locomotives allocated. 740, 835, 471 (0-10-0) and 940 (2-8-2T) in use.

Rome Smistamento - No active steam, but many stored pending preservation. he only active steam in Rome is allocated to Trastevera, which has an allocation

of 12 locomotives of Classes 625, 740 and 743.

Napoli Smistamento - 32 locomotives allocated. Active steam includes 740, 741, 744 (2-8-0), 835 and 896 (0-8-0T) Classes. The 744's work passenger trains to Cassino and Caserta, where there is a small depot, as also at Salerno and Sapri. There are also a number of steam-hauled works trains on the main Naples-Reggio line, in connection with doubling and various realignments.

Paola - 18 locomotives allocated. Classes 625 and 743 on ballast trains. 981 Class (0-6-0 rack tank) work the line to Cosenza pending a diversion to abolish the rack section; but steam trains up the hill by daylight are abnormal.

Catanzaro Lido - 14 locomotives allocated. Classes 625, 743 and 851 in use; 896 under repair.

Bologna - 40 locomotives allocated to Centrale and 22 to San Donato. Most are stored, but in addition to pilot duties, there are 735 Class (USA 2-8-0) on standby and hump shunting.

Milano Smistamento - Still has a 480 Class 2-10-0 in use.

FRANCE (February-May 1968)

SNCF stock in January consisted of 1,042 steam, 1,523 diesel and 2,135 electric locomotives.

Calais/Boulogne - There is no apparent change from last year's picture, with 231G's and 231K's on most boat trains, 141R's on the remainder and on ordinary passenger services. Classes 050TQ, 151TQ (Desvres) and 040D (St. Omer) are still to be seen in action. The southbound "Golden Arrow" on a Thursday in February was a shadow of its summer self, with a fair sprinkling of winter-sport types in second class, but only 18 first class customers leaving London. However, the atmosphere was still the same. Two fur-coated widows drinking gin on the boat were overheard discussing a third - "Of course, poor dear, she just can't live without a man; but naturally she's got to pay for it nowadays".

Le Mans/Argentan - Not yet steamless. 141R's are active at both, with, in addition, 241P and 141P respectively.

Nantes - Early in the year active steam included Classes 141C, 140C and 231D. The latter were on the Les Sables and Le Croisic lines, but by early May they were reported to have been replaced by diesels on all regular workings. Most expresses to Paris are diesel, but the 241P's still have some turns, especially at night and on extras.

Bourbonnais line - 241P's are still active on Clermont-Ferrand expresses from Moret and Vierzon, where they replace the electric locomotives which have hauled the trains from Paris. The only day train normally diesel is the 14.19 Clermont-Paris (Austerlitz) via Vierzon. A 241P was also observed on the 19.00 Paris (Lyon)-Nevers Fridays only. Most other passenger trains, and all except a few freights, are 141R-hauled; diesels are still uncommon. The freight traffic is heavy, and both coal and oil-burning 141R's are at work. Saincaize is a good centre for observation, especially in the afternoon, the Vierzon line being perhaps slightly busier than the Moret and St. Germain routes. On Saturday, 10th February there was a 12-coach relief running ahead of the 14.19 Clermont-Paris. Entering Saincaize behind 141R.1177, the brakehanger in front of the second left-hand driving wheel fractured, causing minor track damage and bringing the train to a sudden and screeching halt. The engine crew had to extricate and partially dismantle the brake gear, remove the cripple, fetch another 141R that was fortunately nearby, turn it on the triangle and couple on. The total time from the accident to departure for Vierzon was nevertheless only 39 minutes - a most creditable performance.

Paris (Bastille) - This comparatively little-known terminus is likely to close in the autumn of 1969, together with the line from it as far as St. Mandé. The line beyond that point is being electrified as part of the new RER (a through east-west route, underground in the centre of Paris). The whole route will not be ready by 1969, and the initial electric service will be Nation - St. Mandé - Boissy. Meanwhile Bastille is well worth a visit. All trains are steam-worked, by Class 141TB, formerly used on the suburban services from Gare de l'Est. Off-peak there is basically an hourly service in each direction, but in the peak periods this is much increased, with some trains running only to and from Joinville-le-Pont, instead of right through to Boissy-St-Leger. Unfortunately for the photographers the service is push-pull with the locomotive almost invariably coupled chimney towards the train, at the country end. However, this is a small blemish on an otherwise splendid prospect.

Paris (Nord) - This is the only other Paris terminus at which steam traction appears. The services to Persan-Beaumont, Valmondois and Pontoise are still largely worked by the splendid 141TC class, with their unusual Cossart valve gear. Here again push-pull working is in force, with locomotive at the country end, but this time bunker to train. Locomotives of Class 141R also still appear at the Gare du Nord, working certain peak hour services from and to Creil via Persan-Beaumont, which were until quite recently the preserve of the Nord 230D's.

PORTUGAL.

On 15th February, the CP ran a farewell steam train from Lisbon to Entroncamento to mark the end of steam in Zone 2. This covers all the lines between Lisbon and Pampilhosa. In Zone 3, south of the Tagus, there is still some steam, though it is getting progressively scarcer, and may well be completely displaced by diesels before the end of the year. In May, most of the mixeds in the Funcheira area were being worked by American 2-8-2's, 2-8-4T's and 4-8-0's. The latter, presumably, are the Spanish-built machines of 1947 - some of the very few locomotives ever exported from that country - which had not been reported as seen for some years, and consequently believed by many English enthusiasts to have been scrapped.

In Zone 1, north of the Douro, there is still plenty of steam to be found, though even here the infiltration of diesels has commenced. By autumn 1967 there were several railcars working in the area, including two return trips from Porto to Barca d'Alva and several to Braga. Now, in May 1968, a correspondent reports that an English-Electric locomotive is working from Porto to Regua and back each day. However, certain new steam classes have also arrived at Porto. Pacifics 558/9/60 and three 2-8-4T's have been drafted from the south of the country. The former work northwards on the Minho route and the latter eastwards up the Douro valley. The aged Beyer Peacock 0-6-0's which formerly shunted at Contumil and Regua are reported to have been replaced by diesels, but by way of compensation Beyer Peacock 2-4-0 of 1875 No.9 is retained for preservation and can be seen in the shed at Braga alongside the even more aged 2-2-2ST 02049. It is worth mentioning that the RENFE trains into Barca d'Alva are still in the hands of the 1928 Oeste 0-6-0's, the last of their wheel arrangement in regular main line use on the Iberian peninsular. Of the several classes of CP 4-6-0 which could be found in the Porto area, the compounds appear to have been largely displaced, but the others, and particularly the inside-cylinder variety, are still hard at work.

FINLAND

New lines opened in 1967 were the Parikkala-Onkamo cut-off (64 miles), and the Herajärvi-Ilomantasi branch for timber traffic (11 miles). Lines under construction at present are Kolari-Akäsjöki for industrial traffic (12 miles), the Siilinjärvi-Luikonlahti mine railway (18 miles) opening late 1968, and the Tampere-Parkano-Seinäjoki line. This section, 96 miles long, will shorten the main line to the north by 27 miles compared with the present route via Haapamäki. Tampere to Parkano was opened early in 1968 for freight; the remainder will follow in 1970, together with through passenger services. The Jyväskylä-Jämsänkoski line, 33 miles, long delayed by a particularly difficult tunnel, will not be completed for some years.

SPAIN

Miranda de Ebro-Venta de Baños - Traffic on this line was still largely steam-worked in April, and electrification works were insufficiently complete to suggest that the switch-on would occur with the start of the summer service as planned. Early July was suggested as an alternative date, but even this is now reported as unlikely. There are unconfirmed reports that the 4-8-4's will be transferred to the Madrid-Zaragoza line to replace diesels, which will be sent elsewhere. Firm information would be welcome.

Salamanca - In October 1967, the Avila line was found to be mainly diesel, except for a sparse freight service and short workings. The once conspicuous 0-6-0's and 4-8-4T's appeared to have gone, leaving MZA 4-8-2's, Oeste 4-8-0's and standard 2-8-2's doing most of the work. However, the SECN 0-6-0's of 1928 are still working the Fuente San Estaban-Barca d'Alva line.

Tarragona - In April the four Central of Aragon 4-8-0's (240.2071-4) were all on shed, out of use. However, the 2-8-2 Garratts are well employed, working both passengers and freights on the line to Lerida.

Jativa - A visit here in April found only two engines in steam; one was the pilot, 040.2499, but the other was a 4-6-2 Garratt, No.0404.

Lorca/Aguilas - The long reign of the Great Southern of Spain 2-6-0's which were all active as recently as last October, appears to have come to an end. In April all twenty-five were dumped at these two points, together with three or four other locomotives, and all traffic was diesel-worked. Guadix was also steamless, though though with several engines stored, including some Andaluces 2-8-0's and an ex-Norte 0-8-0, (040.2184) disguised with cowcatcher and diamond smokestack, no doubt after participating in a film.

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ERRATA

Unfortunately, an unusually large number of errors crept into Journal No.11. We apologise for these and give corrections below:-

Page 8, line 4 of table: 8101-575 should read 8101-675.

Page 9, last line: Nos.6-8 were built by La Meuse, not SLM.

Page 10: Nos.951-62 and 971-75 are all 4-8-2 + 2-8-4, and not as shown.
Nos. 990-92 are ex-CO and not ex-RR.

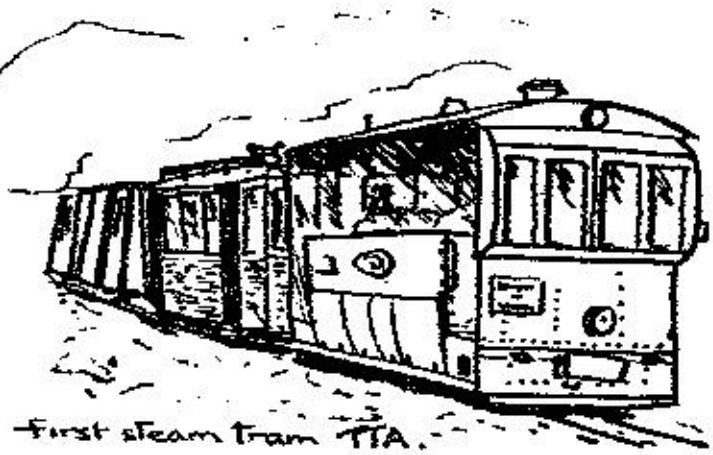
Page 25, para.2, line 1: 1886 should read 1896.

o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o

THE COVER DRAWING

The drawing on the front cover of this issue is by Graham Hoare, and shows a Portuguese narrow gauge 2-4-6-0T in action. See article on Page 16.

MINOR RAILWAYS SECTION



First steam from TTA.

AN APPEAL

It is proposed to increase the reference value of this section of the Journal by starting two series of articles:-

(1) 'Location' maps for specific areas, accompanied by short notes on the lines involved. This should make the use of the 'Notes and News' section much easier!

(2) Brief articles (map, main dates, stock-list) of individual surviving lines, for reference.

Specialists on particular lines/areas are cordially invited to help by preparing articles. Offers of help to Keith Davies, please.

AUSTRIA

The Steiermärkische Landesbahnen have finished with steam operation, and are willing to sell their remaining 760mm gauge steam locomotives to any museum line that wishes to have them. Prices are reported to be cheap, and the locomotives concerned are:- 0-6-2T's S12, U9 and U12; 0-6-0TT 11.810 and 0-8-0TT 699.01. Any offers to the Landesbahnen, please, and not to us! Considerably more than these 5 locomotives were shown as in stock at 31st December 1967, but presumably the remainder are not fit for further use.

The Zillertalbahn has received two new O&K Bo-Bo diesel locomotives, Nos. D8 and D9 - 26615/6 of 1967. It has also acquired the three-car diesel-electric set from the RTM. This was composed of ex-DUWAG tramcars and an RTM diesel power car.

ÖBB Narrow Gauge Lines - The Klaus to Molln section of the Klaus-Garsten line has closed, probably from 26th May. The remaining section from Garsten to Molln is still entirely steam worked, with 298 Class 0-6-2T's. The only other ÖBB narrow gauge passenger trains booked for steam haulage are the 13.17 Gmünd to Heidenreichstein and 15.47 back, worked by a 399 Class 0-8-0 Engerth.

BELGIUM

TTA now has the Type 18 tram locomotive No.1076, which arrived at Blier on 6th May. It was originally used on SNCV Brussels area lines (Leerbeek-Enghien), finishing its career as depot shunter at La Roue. The official 'steam-opening' will take place on 22nd June, and the locomotive will be used every Sunday during July and August hauling trains between Pont d'Erezée and Anonines. The Corpet-Louvet should join it about September.

DENMARK

The following standard gauge private lines have closed:- Kolding-Troldhede, Horsens-Silkeborg, Silkeborg-Rødkaersbro, Aalborg-Saeby, Ørsø-Asaa and Ebeltoft-Trustrup. Compared with the extensive network of such lines which existed just after the War, the present picture is very thin, particularly on the mainland of Jutland. However, as a change from closures, it is pleasing to report that a second museum line was due to open on 19th May, from Mariager to Handest, this being part of the former Mariager-Faarup-Viborg Jernbane. Like Maribo-Bandholm, this line is operated by the Danske Jernbane Klub, and its first steam locomotive is 2-4-0T No.7 of the Lemvig-Thyborøn Jernbane (Henschel 9482/09).

FRANCE

Ligne de la Lozère - This line, from Florac to Ste. Cécile, closed 1/4/68.
CFTA de l'Herault - Montpellier to Palavas closes to passengers 21/9/68.
CFD du Vivarais - This system is due to close on 1/11/68. The Circle is hoping to run a special steam train from Tournon to Dunières - see page 2 for details.
CFTM (Meyzieu) is acquiring an ex-WD Dick Kerr petrol-electric tractor from Nemours.

GERMANY

DEG Lines - Braunschweig-Schöninger Eisenbahn - Steam locomotives 226 (Krupp 1500/35) and 227 (1712/37) are out to grass at Gliesmarode Ost. No.225 (1714/37) is still serviceable, but V122 and D05 are doing most of the work. TWE (See Journal No.8, page 18) - The remaining passenger service, from Versmold to Hövelhof, was replaced by buses from the end of May. Of the steam locomotives, 161/2 are for scrap at Lengerich, 222/3 are in reserve, and 271 is going to the Fargo-Vegesak. Of the railcars, T31, T42, T51 and T92 are scrapped; T60 and six coaches have been sold to a swimming pool at Lengerich for use as bathing huts; and T61 and a coach have been sold to the Hohenzollerische Landesbahn at Gammertingen. TWE is still the operating HQ for DEG lines, and a constant trickle of diesels comes in for repair from other branches. Three new 1,300 h.p. MAK Bo-Bo diesels, to be numbered V131-3, are on order for delivery later this year.

Other Lines - Kahlgrund Verkehrs GmbH - The last steam locomotive, No.4, was scrapped on 1/9/67.

German Preservation - No less than three groups are now busily engaged in preservation work. The Deutscher Eisenbahn Verein (formerly Deutscher Kleinbahn Verein) will be running trains on their line from Bruchhausen-Vilsen to Heiligenberg (described in Journal No.9) on Saturdays 13th and 27th July, 10th and 24th August, 7th and 21st September and 5th and 19th October. Departures are at 14.20, 15.30 and 17.50 from Bruchhausen-Vilsen, returning from Heiligenberg at 14.50, 17.10 and 18.20. 0-6-0T 33 (ex-HSAE) requires a costly overhaul, so 31 (HOYA) which is in better condition will be overhauled and used instead. Ex-Kreis-Altenaer 0-6-0T No.15 has also arrived at Bruchhausen.

Deutsche Gesellschaft für Eisenbahngeschichte e.v. - This organisation, centred on Karlsruhe, is hoping to set up a museum line. It owns Krauss 2024/88 (metre) from Zell-Todtnau and Krauss 1222/83 (standard, ex-DR 98.7508). In addition to numerous rail tours over DB lines, mainly with steam traction, a special steam service is being run this summer on the standard gauge Nebenbahn Achern-Ottenhöfen of the Südwestdeutsche Eisenbahn Gesellschaft mbH (SWEG). Three trips each way are advertised for Sundays, 2nd, 16th and 30th June and 14th July, leaving Achern at 10.30, 14.05 and 18.10 and returning from Ottenhöfen at 9.15, 13.15 and 17.00. These are shown in the Kursbuch at Table 301n. The locomotive used

is No.28, an ex-Prussian T3 0-6-0WT, and four restored 4-wheel coaches are available. On 26th May this same locomotive hauled a BDEF special from Karlsruhe to Ottenhöfen and back to Achern. Gay progress was made down the old Baden State Railways main line, with a maximum speed of about 55km.p.h. (official limit for the locomotive is 40), despite a load of six four-wheelers, the four SWEG coaches already mentioned and two DB vehicles which had been specially resuscitated for the occasion.

Verkehrsamateure - Verkehrsmuseum E.V. Hamburg - This merger of the Hamburger Verkehrsamateure and the Kleinbahn Verein Wohldorf has been collecting stock:- Hamburger Hochbahn electric tramcar 2734 and trailer 1786; tramcar 656 and trailer 310; Wismar railbus VT509 of the OHE; two coaches. At present the trams are stored on the HHA, the railbus by the OHE and the coaches on the AKN.

SPAIN

Lines closed from 1st January were:- Felanitx branch (Majorca); Tortosa-La Cava; Vitoria-Malzaga; Vitoria-Estella; San Prudencia-Oñate.

San Feliu-Gerona - On 16th April services were being worked by 0-6-2T's Nos. 4 and 6. Nos. 5 and 7 of the former Onda-Castellon line were lying out of use at Gerona. Traffic was very sparse at Gerona (the only point observed) and an air of decrepitude is creeping over the line. It seems that closure may not be long delayed.

Olot-Gerona - In contrast, this line appears to be thriving. On 16th April trains were well loaded, particularly between Gerona and Amer, and locomotives and stock looked well maintained. 2-6-2T No.23 was on the 8.15 arrival at Gerona, this being the morning "commuter" train from Amer. However, perhaps greater interest attaches to the coaches than the engine, for these are an incredibly antique rake of four-wheelers, variously painted in green and brown. The same engine headed the 13.10 Correo from Gerona to Olot, whilst sister engine No.22 was on the 13.00 Ligero Olot-Gerona, the two passing at Amer. No.22 later worked the return evening "commuter" train, the 18.30 Gerona-Amer.

Langreo - This line is reported to have recently acquired two B-B 1,000 h.p. diesel hydraulics, and to be using them on a Talgo train. The latter consists of the demonstration unit which was shipped to America and has now been returned to Spain.

BULGARIA

According to official sources, the ten 75-00 Class B-B diesel hydraulics work the majority of the traffic on the Septemvri-Dobroniste line, but some steam is still required for certain mixed trains and works trains on the section Septemvri-Varvara-Pazardijk. Steam shunters are still used at Septemvri and Velingrad, but all these steam operations only amount to about 10% of the total traffic. To replace the remaining steam engines on this line would need between four and six more 75-00 Class and six 92-00 Class shunters. The 82-00 Class railcars displaced by the 75-00 locomotives have been transferred to Chervenbreg-Orjachovo, where they have taken over the entire passenger service.

JUGOSLAVIA

It is reported that the metre gauge lines around Osijek are to be closed, commencing with Donji Miholjac-Podravska Slatina. The 760mm gauge line from Sipovo to Mlinište has closed to passengers.

Capljina to Dubrovnik and Zelenika - This is the southern end of the old Sarajevo

(Continued on page 19.)

NARROW GAUGE VINTAGE IN PORTUGAL

by G.J. Hoare

(Continued from Journal No.11.)

The remaining four narrow gauge lines make connections with the broad gauge Douro valley line, which is a through route from Porto to Spain. They all run in a northerly direction, having first to follow tortuous river valleys before reaching the high "serras".

3.) Tamega Line (Livracao - Arco de Baulhe)

Owing to the service provided - 5 through and 2 short workings, all railcars - this line was not travelled upon, although an 0-4-4-0T mallet for freight working was observed by the small shed at the junction of Livracao.

4.) Corgo Line (Regua - Vila Real - Chaves)

This is the best of the lines, service-wise, being operated solely by 2-4-6-0T mallets, which haul three trains daily over the 97km. The "shed" is at Regua, and consists of an open "roundhouse" without the "house". It is completely uncovered and shares facilities with the broad gauge. Look out for the station pilot, 0-6-0T No.E54 by Esslingen /89, and the derelict 0-4-0T E1 by Henschel /22.

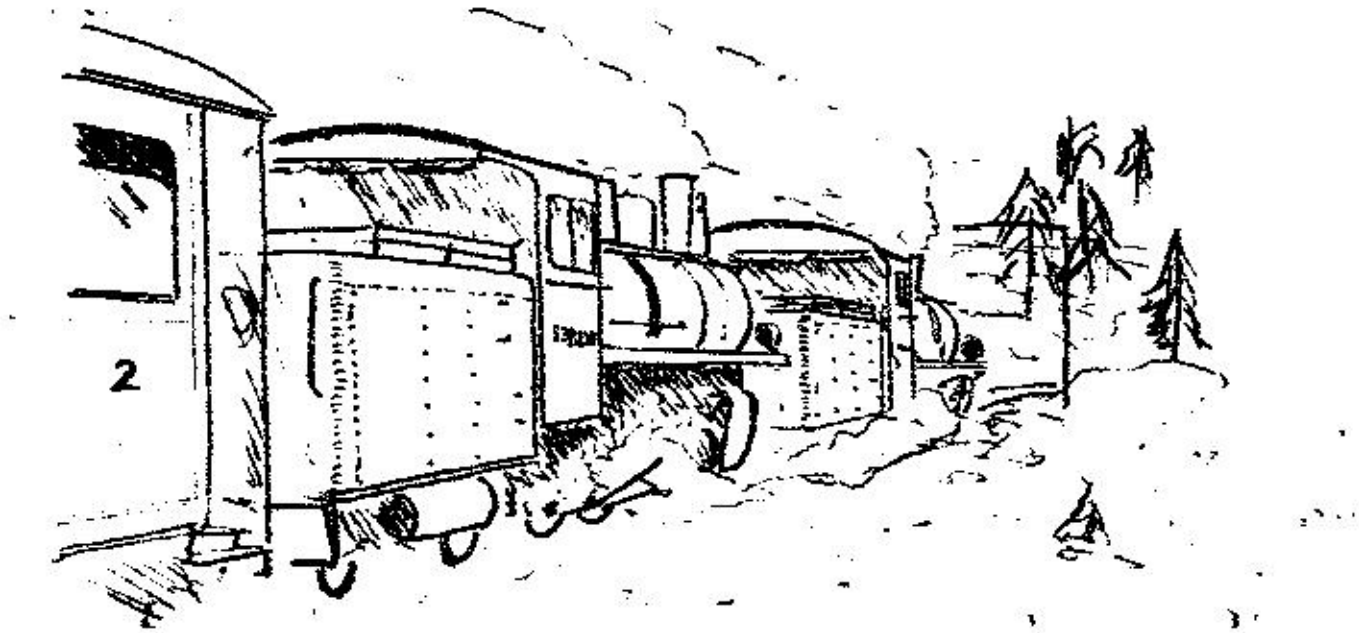
The most scenic part of the line is from Regua to Vila Real, in the broad but winding valley of the Corgo river. Points to look out for are the dual-gauge viaduct over the Corgo near Regua, the viaduct at Tanha, and the many loops near Carrazedo. Beyond Vila Real the scenery is less dramatic though equally pleasing, like the locally grown wine of repute - Mateus Rosé.

5.) Tua Line (Tua - Mirandella - Braganca)

This line has a mixed service of steam trains and railcars, consisting of 3 through/1 short railcar workings and 1 through/2 short discretional steam workings. The steam passenger workings are operated by 2-6-0T by Esslingen 1886/1904, and are assisted on freights by 0-6-0T (Esslingen 1889) which also perform station pilot duties. Scenically, again the first part of the line from Tua to Mirandella, where the shed is situated, is the best. Again following a river, the Tua, the valley is much narrower, almost a defile with the line on a rocky ledge, and the countryside presents a more rocky, barren appearance than the Corgo.

6.) Sabor Line (Pocinho - Duas Igrejas-Miranda)

With a service of 3 railcars/1 steam daily, this was another line not travelled over, though a lengthy pause by the broad gauge train enables one to visit the shed at Pocinho to observe the 2-4-6-0T mallets (one of which has a Giesl ejector), 0-6-0T E52 (named "VIZEU", thus making it unique), and 0-6-0T E41 (the only Hohenzollern locomotive on the CP). From the platform at Pocinho, one can see the magnificent double deck road/narrow gauge bridge over the Douro, a fitting start to an interesting journey which lies ahead for the traveller wishing to cover the 106km to the terminus, so I have been assured by those fortunate enough to have ventured there.



THE RHAETIAN 2-8-0'S

by J. Morley

Those readers of the Journal who have travelled on the excellent steam-hauled rail tours operated by the metre gauge Rhätische Bahn (RhB) will be familiar with the two 2-8-0's that provide motive power for these excursions. They are the last survivors in Switzerland of the last class of steam locomotives built for the RhB and the only tender locomotives to have been used on the line.

The earliest RhB locomotives were 2-6-0T's, two of which, Nos.11 and 14, remain in use, and they were followed by 0-4-4-0 and 2-4-4-0 Mallet tanks. In 1904 the first of the 2-8-0's appeared, and by 1915 a total of 29 was in use. Numbered 101-129, they were all built by SLM at Winterthur.

As electrification of the RhB commenced in 1913, most of these locomotives were soon surplus to requirements, and Nos.109-111 were sold to the FC de La Robla (FR) in northern Spain in 1920. Four years later, Nos.101 and 103 were sold to Brazil and in 1926-7 the last eighteen, Nos.112-129, went to the Siamese State Railways. This left six 2-8-0's on the RhB, and it was not until about 1953 that four more, Nos.102 and 104-106, went to Spain to join Nos.109-111 on the FR.

This left 107 and 108 on the RhB, and as previously mentioned, they have found additional work in recent years hauling enthusiasts' specials, for which duties they are excellently maintained, and it is to be hoped that they will remain available for future tours. (See Notes and News Section.)

The Spanish engines of this class will be well known to those who have visited the FR, where they retained their original RhB numbers, but like nearly all the other FR steam locomotives, they have names as well. They appear to have been used principally on freight trains at the eastern end of the FR, working from Valmaseda shed, and although now replaced by diesel locomotives, they were all still in existence fairly recently. Perhaps some of our more widely travelled readers can supply news of those locomotives of the class that went to Brazil and Thailand?

SONDRIO - TIRANO VICISSITUDES

by P.H. Kalla-Bishop

The Sondrio-Tirano Railway, north-east of Milan, is a 16½ mile standard gauge line, opened in 1902 and electrified at 3,700V three-phase 16.7 cycles per second in 1932. Five years ago, Parliament decreed that it should be absorbed by the FS, as although the owning company had long failed to make a profit, even when subsidised, the railway was deemed to be of importance socially. The line extends a 3,000V direct current outer suburban line of the FS, and at Tirano connects with the Rhaetian Railway's Bernina section. There was talk of converting the Sondrio-Tirano to 3,000V d.c.

The FS took over towards the end of 1963, and their first act was to cut off the three-phase current and supply diesel railcars for the passenger services and 880 Class 2-6-0 tanks for freight. Their second act was to reconsider the whole matter and to decide that they did not wish to take over the Sondrio-Tirano after all. In 1962 the FS was given some independence as an autonomous business. One may speculate that it occurred to those in the Rome headquarters that they no longer need to take over any old bankrupt railway that Parliament happened to dump in their laps, but now could pick and choose.

The Sondrio-Tirano was returned to the reluctant arms of the private company. In the circumstances, the company prevailed upon the FS to switch on the electric current once more, and they then looked about for a greater subsidy to cover their losses. Surprisingly, they got one from the Rhaetian Railway, who valued their rail connection from the Bernina, over the private line to Sondrio, and so to Milan. For the last four years the railway has been operated in a sort of administrative limbo; everyone concerned, with the possible exception of the FS, would like to see the railway kept open, provided they do not have to pay.

The original FS three-phase electrification of 1902 was north-east of Milan, and one of its terminal points was Sondrio. The system was supplied by a hydro-electric generating station at Morbegno and the Sondrio-Tirano drew current from this source from 1932. Between 1922 and 1923, another three-phase electrification was carried out, away the other side of Milan, on the Turin-Genoa main line. At the Novi Ligure sub-station on this line, two motor-alternator sets were installed, to convert 50 cycles industrial current to railway 16.7 cycles current. Shortly afterwards, a power transmission line 85 miles long was put in between Novi Ligure and Morbegno generating station, for the transference of power between the two electrification areas when necessary.

In 1953 the last three-phase railway north-east of Milan was converted to 3,000V d.c., and the Morbegno generating station was altered to supply 50 cycles current only. Thereafter the Sondrio-Tirano was supplied with three-phase 16.7 cycles current from Novi Ligure via the power transmission line. In 1962 the three-phase railways served by the Novi-Ligure sub-station were converted to 3,000V d.c., and the two motor-alternator sets there were retained solely to serve the Sondrio-Tirano. Today the sets are 45 years old and worn out. In any

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