ROLLING STOCK NEEDS IN SCOTLAND - THE PICTURE IN 2017

1 My original paper on this subject ("Rolling Stock Needs in Scotland") was dated 12 April 2013. There has been considerable change since then, both in the ordering and delivery on new rolling stock, and of plans to cascade existing stock from elsewhere. Four years on it seems appropriate to reconsider the conclusions reached then.

2 In 2013 I ignored Sleeper provision entirely. Now that the new franchise has been separated from the daytime franchise it is right to include night-time service provision.

3 The Sleeper franchise was awarded to Serco, trading as Caledonian Sleepers (CS). Virtually their first act was to announce orders for new-build Mk 5 sleeper coaches, currently under construction in Spain, and expected to enter service in 2018. At the same time CS announced that their haulage would be provided by a small dedicated fleet of six Class 73/9 locomotives. While they were being rebuilt CS would continue to use Class 67 or Class 66 for diesel haulage and Classes 90/92 south of Edinburgh and Glasgow on the electrified WCML.

4 When the new fleet is fully operational the existing Mk 2 lounge and seated coaches, and the Mk 3 sleeper coaches will be redundant.

5 To its credit CS is open to suggestions about how these may be used within Scotland. The company is willing to consider running a service to Oban, although the restricted platform length at Euston makes it impossible to marshal longer trains. Diagramming an Oban service as an addition to the present services will present a problem, but not one impossible to resolve.

6 A more radical innovation has been suggested by HITRANS (the RTP covering the Highlands and Orkney). This would use some of the existing fleet to provide a service between Thurso (where it would connect with ferry traffic from Orkney) and the Central Belt (Edinburgh or Glasgow, or possibly both). A consultation on how this might be operated is currently under way, with publication expected in the summer. It is expected that the likely service would run south and north on alternate nights (excluding Saturday) and would travel *via* Aberdeen. Edinburgh would be the preferred destination, but as maintenance would probably be carried out in Glasgow it might be possible to run to Glasgow as a Sleeper, rather than as ECS.

7 I now turn to daytime services. When the ScotRail franchise was awarded to Abellio one of their first announcements was that the Inter-City services in Scotland (apart from those between Edinburgh and Glasgow) would be operated by HSTs (a suggestion made here four years ago in para.22). (This includes services on the Inverness-Aberdeen corridor.) These would be sourced from the GWR fleet as electrification proceeds, and Abellio will be able to cherry-pick the individual sets in best condition. They will be re-configured as 2+4 and 2+5 sets, and are expected to enter service in 2018/19. While they are in some cases over 40 years old (the class was introduced in 1975) the re-engineering and refurbishments which have taken place since they were introduced means that they are likely to remain the principal inter-city fleet for at least another 10 to 15 years. Mk 3 coaches remain the rolling stock which most passengers, when asked, find the most pleasant to use.

8 The introduction of HSTs will release Class 170 and Class 158 DMUs which now operate these services.

9 Since 2013 the Borders Railway has opened, operated by a mixture of 170s and 158s.

10 Abellio announced that some longer-distance rural services will be operated by "tourist trains". These will operate on the routes from Inverness to Kyle and Thurso/Wick, on services from Glasgow Queen Street to Oban and Fort William/Mallaig, on the Borders Railway from Edinburgh to Tweedbank, and on Glasgow Central to Stranraer services. The tourist train will be a 158, smartened up appropriately for the tourist trade. The exact details of what the product will offer are not known, but some form of engagement with passengers is expected.

11 When the previous paper was written in 2013 the ScotRail 158 fleet comprised 25 units based at Inverness (158701 to 158725), 15 based at Haymarket (158726 to 158740), and 8 "rogues" based at Haymarket (158782 and 158867 to 158871; and 158786 and 158789, these last two being equipped with 1st Class seating). The 40 "real" Scottish 158s were all fitted with retention toilets some years ago; some (all?) of the rogues are not. The Inverness fleet was reconfigured some years ago in a more tourist-friendly manner, with seats aligned with windows, more luggage storage space, and 2 extra cycle spaces. Haymarket units, generally used on commuter traffic were not refurbished in the same way.

12 The PRM-TSI requirements now oblige an operator to have 2 wheel-chair spaces, and this has been done by removing the extra 2 cycle spaces provided when the Inverness fleet was refurbished. As the former is a legal requirement its provision clearly over-rides the much more commonly encountered requirement of a family of cyclists travelling together. Resolving this clash is not easy and requires sensitive handling, particularly by on-train staff.

13 A simple solution would be the removal of a few more seats. Since the tourist train fleet will be captive, and therefore *never* diagrammed for commuter use, removal of seats will not present an over-crowding problem. Nor is it likely to cause revenue loss as families travelling together with their cycles will again be able to do so by rail - reversing a potential revenue loss introduced with the reduction in provision. It is worth noting that 156s - now providing services on the West Highland Line - can carry 6 cycles, and the reduction here from 6 to 2 unless something is done about it is likely to cause significant shift away from the railway.

14 Once the HSTs and the tourist train 158s are fully in service the only diesel services on the ScotRail network will be the Fife Circle, the ex-GSWR services from Glasgow Central to Kilmarnock and Carlisle (and from Troon to Kilmarnock), and Glasgow - East Kilbride.

15 Fife Circle services will continue to be provided by 170s for the foreseeable future. They were introduced in 2001 and can be expected to remain in service for 35 to 40 years. Whether they will be able to carry the volume of passengers expected over that period is open to question, as is the related view that, as new trains are introduced elsewhere in Scotland, the interior comfort and facilities of a DMU already almost 20 years old used twice a day by season ticket holders will not be seen by them to be satisfactory.

16 It is likely therefore that at some point well before 170s reach the 30-year mark there will need to be a replacement for Fife Circle services. How this is provided will depend crucially on the progress made with Transport Scotland's (TS) rolling programme of electrification.

17 In 2013 TS had a policy objective of electrifying around 60 single track miles (stm) a year once the EGIP electrification was complete. The effluxion of time has modified this, and the current policy is believed to be to electrify 100stk (metric now) a year *within CP5* (italics mine). With the CP6 HLOS expected within a few months, and the quinquennial wrangling expected to be concluded by late 2018 it may be that TS will continue their 100stk a year into, and throughout, CP6. This paper will base its conclusions on that expectation.

18 Since 2013 TS has planned to electrify the Edinburgh - Glasgow line *via* Shotts, and work has now started. This service, as well as the main E&G service *via* Falkirk High will be operated by Class 385 EMUs, currently being delivered. Once these lines are electrified, including extensions to Dunblane and Alloa, the 100stk policy should become operational.

19 The 2013 paper (in para.16) suggested the following completion dates for electrification, based on the then figure of 60stm a year and continuing indefinitely.

Edinburgh and Glasgow to Inverness	2022
Edinburgh and Glasgow to Aberdeen	2026
Fife Circle	2028
Aberdeen to Inverness	2030

20 The decision to deliver Inter-City services with HSTs alters the need for electrification on most of these routes, but it does not eliminate it. Para.7 above suggested that HSTs might be expected to operate for another 10 to 15 years. The total track distance on the three above routes (excluding the Fife Circle) is approximately 600 miles, or say 1000km. Ten years-worth of electrification. Were work to start in 2023 it would be completed by 2033, by which time the HSTs would be over 60 years old and increasingly hard to maintain in working order (not least because the supply of spares will become critical).

21 This would indicate that electrifying the Fife Circle should move to the top of the list of priorities if TS intends to keep the skilled workforce currently working in the Central Belt actively employed in Scotland. The full length of the Fife Circle, including those parts which lie on the ECML, amounts to 120 stm - two years-worth. If work started in 2019 it would finish in 2021.

22 The 2-year gap between finishing the Fife Circle and starting the Inter-City network should be used on smaller infill projects. These would not necessarily find it easy to develop a business case if standing along. However a combination of rolling stock diagramming and the economic need to keep the skill sets of electrification staff would suggest that a solution can be justified. Glasgow to East Kilbride and some of the ex-GSWR routes would be the obvious choices.

23 Making the heroic assumption that all this is done, what will the Scottish network look like at various future dates?

Provision of tourist train	DMU	2018
Completion on both Edinburgh - Glasgow routes	EMU	2019
Provision of HSTs on Inter-City network	diesel	2019
Completion of minor Glasgow infill and GSWR	EMU	2021
Completion of Fife Circle	EMU	2023
Completion of Inter-City network	EMU	2033

24 What rolling stock will be needed to provide these services (ignoring 385s already on order)? A small fleet based in Glasgow to provide services on the lines to be electrified between 2021 and 2023, although it is likely that careful diagramming of existing fleets will be enough to cater for this. A fleet of commuter EMUs for the Fife Circle will be needed in 2023. A fleet of long-distance EMUs will be needed in 2033.

25 In addition to these EMUs there will need to be a fleet of DMUs to provide services where the 158s will become life-expired. In 2013 the industry-wide belief was that no-one

would ever order new built DMUs for cost reasons. That was shown to be wrong whe Northern placed an order for Class 195s from CAF in Spain. It is impossible to predict the state of the market for new-build DMUs into the future, not least because it is impossible to predict when the tourist train 158s will need to be replaced. 158s were first built in 1989, and will be almost 40 years old in ten years' time. They can hardly be expected to remain in service much beyond then as maintenance will become increasingly expensive. It would seem likely therefore that an order for their replacement will need to be made in around 2027 if a two-year build and test programme is to take place.

26 Without a knowledge of existing diagrams it is impossible to know how many units would be required, but it is likely to be at least 50 sets - hardly a worthwhile order on its own, but one which, if made in association with a parallel order by another TOC (or ROSCO) would certainly be economical.

27 TS and Abellio should investigate the appetite from other TOCs (inspired by the Northern order) for new build DMUs, and seize any opportunity to achieve economy of scale by placing an order, possibly before 2027 if the likely cost saving proves sufficiently large. It is hard to see where ex-ScotRail 158s might be deployed after say 2025, and the owning ROSCO might well be open to a persuasive case for maintaining its revenue stream.

28 All the above has been predicated on the types of rolling stock now available (EMUs, DMUs). However there are interesting developments taking place which make other forms of propulsion worth considering. These include hydrogen, currently undergoing testing in Germany (see *RAIL* 824, p.30, *inter alia*). If successful Alstom believes it could operate in the UK in 2021 at the earliest. More immediately, and less technologically innovative, Vivarail's D-Train (Class 230, being a diesel-engined rebuild of former London Underground District Line stock) will carry its first passengers in June this year (see *RAIL* 824, p.12).

29 HITRANS has suggested that it has potential value on the Kyle Line where its use could more readily permit working in alignment with the A890 between Attadale and Stromeferry (where there are landslip problems). In addition, the windows are very large, making it possible to equip the interior in a suitable manner for an improved version of the Tourist Train. Class 230s will be 3-car DMUs, allowing considerable scope for product differentiation within the set, perhaps even three cars of different classes: Standard, orthodox First, and a Premium quasi-Pullman service at an appropriate price. The patronage of the *Royal Highlander* would indicate that there are enough tourists willing to pay a high price for a high quality journey to make this worth serious consideration.

30 There will be other routes within Scotland where a 230 would provide a useful alternative to some of the existing diesel fleet, and one which should be available well before 2027. There are also opportunities for additional service not currently provided, one being a shuttle between Wick and Thurso. With careful timetabling this could obviate the need for double visits to Georgemas Junction. It is likely that most Wick passengers would prefer to walk a few metres along the platform at Georgemas Junction to the 25 minutes or more now wasted by travelling *via* Thurso.

31 A battery-operated Class 379 train was trialled in 2015 in East Anglia. *RailEngineer* April 2017, p.36 describes a new ultra-high-power charging facility which can be installed at station platforms, obviating the need for a set to go to a maintenance facility between journeys. This would get round the major problem of battery power, being that it needs time-consuming re-charging at frequent intervals. This work has some way to go before a train operator can be confident that battery-powered kit can operate a particular service, keeping to the existing turn-

round times. It does, however, offer a clean and relatively inexpensive form of motive power. As with all EMUs the pollution is at the power station, not the railway station.

32 None of these modes of traction is yet available to purchase, but most, if not all, will be beyond the testing stage well before decisions have to be made about stock replacement in Scotland. TS should keep a close eye on opportunities for radical approaches to procurement.

28 **CONCLUSION** The rolling stock picture in Scotland is now significantly different from that envisaged as recently as 2013. The direction of movement is still clear though. Electrification must proceed once EGIP is complete, starting with the Fife Circle. A commitment must be made to continue with the 100stk policy into, and beyond, CP6.

Mike Lunan; 13/4/17