

ROLLING STOCK RENEWALS PROGRAMME

by John Hawkins

The Mayor's reorganisation of TfL seems to have caused a hiatus in ongoing update reports. This has hopefully changed with a paper for the New Programmes and Investment Committee meeting on 8 March 2017 detailing LU Rolling Stock Renewals. However, it is quiet on planned additional trains for the Jubilee and Northern lines, orders for which were anticipated at this meeting.

Over the last 12 years, the average reliability of LU passenger rolling stock has improved significantly from 5,000km to 24,000km mean distance between failure. A plot of reliability against age shows the Victoria Line trains ahead of the S Stocks, but with 1995/96 Tube Stock performing similarly after some 20 years. The most unreliable are the Central Line trains, despite being under half the age of Bakerloo Line trains. Outstanding are the Piccadilly Line trains which do as well as modern stocks, although due for replacement in 2023-25. The latter project is again known as the Deep Tube Upgrade Programme (DTUP?), although called the New Tube for London since 2014. The Bakerloo is due for new trains in 2026-27, followed by the Central Line in 2029-32. The Waterloo & City is now listed to follow in 2034, so no demo. driverless line as once proposed. Interim works to prolong the life of the Central Line fleet is an important part of the process.

The Central Line Improvement Project (CLIP) will replace the current DC motors with new AC motors; replace the on-board computer; repair floor corrosion damage, door pillar cracking and water ingress; provide wheelchair access & RVAR information systems; install CCTV & LED lighting. Only the lighting will be done on Waterloo & City trains. To cover for reduced train availability during this work, a Hainault to Woodford shuttle service will operate, requiring signalling modifications and repairs to two defective cab units. Five trains will be dealt with at a time, being required for 32 days each between April 2019 and the end of 2022. A new workshop will be built at Acton Works for this and other projects (see below). The estimated cost of the programme is £321.6 million, and it is expected to reduce failures attributed to the Central Line fleet by 14%.

Bakerloo Line trains are undergoing three separate upgrades. Already, nine of the 36 trains have had weld repairs and new flooring. From March 2017 they will be dealt with two at a time, with completion by the end of 2018/19. Reliability improvements for motors, brakes, doors and both interior and exterior finishes will be part of a programme to be considered in 2018. RVAR compliance modifications are also being developed to provide two wheelchair bays in a single car of each train, with adjacent palm-operated emergency alarm and signage. Handrails are to be fitted by each door, and a passenger information system (PIS) installed. LED lighting will reduce power demand, providing for the PIS requirements. The various modifications are to enable the fleet to remain in service until the late 2020s, when the trains are scheduled to be replaced as part of LU's Deep Tube Upgrade Programme.

The Jubilee Line trains are undergoing two upgrades. The current mid-life refurbishment also provides for RVAR compliance. Interiors and exteriors are being refurbished, with replacement saloon glass and resealing of car ends to prevent water ingress. A new flooring system is being fitted, together with RVAR compliant wheelchair spaces with palm-operable emergency alarms. Power system upgrades are also planned to improve reliability, with a programme being developed for 2018.

The current Metropolitan Line Rail Adhesion Train will be replaced by two (converted D Stock) trains by September 2017 in view of additional adhesion requirements with automatic train operation. By the same date the Piccadilly Line will be provided with two RATs by splitting a service train for up to six months each year and fitting temporary equipment¹. One RAT will operate east from Arnos Grove, whilst the other will operate between Northfields and Osterley. The Rayners Lane branch of the Piccadilly Line will be covered by the Metropolitan Line RATs. A leaf-fall timetable will be introduced on the Piccadilly Line to allow RAT operation, and to accommodate lower braking rates and temporary speed restrictions.

Currently automatic track monitoring systems are fitted to several S Stock trains², together with several Bakerloo and Victoria Line trains, enabling track monitoring during normal service operation. The track

¹ The arrangement will be as on the 1992 Tube Stock before the dedicated 1962 Tube Stock trains came into use. In one car of a train, temporary sand dispensing hoppers were fitted during the leaf fall season and removed after. For the Piccadilly Line, two double ended units will be used.

² S8 trains 21100-21099 and 21116-21115. S7 trains 21504-21503, 21506-21505 and 21508-21507.

recording vehicle (TRV) tours other lines on an eight-weekly basis, together with the sub-surface, Bakerloo and Victoria lines on a six-monthly basis. The TRV is life expired, and it is proposed to extend its life, and develop a contingency plan in the event of its unavailability.

Two Points & Crossing (P&C) tamping machines have arrived, whilst tilt wagons and cranes are awaited to allow delivery of prefabricated P&C units to site. Overnight ballasted track renewal requires new plant to replace ballast, and will be progressed in 2018.

Mechanised renewal of concrete track in deep tube tunnels will require the development of two vehicles for full mechanisation, with custom-designed equipment, which may take six years to implement. Partial mechanisation using standard equipment on one vehicle is expected within two years. Loading areas for all of the above track maintenance vehicles are to be established within Ruislip Depot. It is also proposed to develop a mechanised rail head re-profiling machine that can operate across the LU network from 2018.

Funding was approved in February 2017 to commence overhauling the engineering vehicle fleet, and 17 vehicles will be dealt with in 2017/18. An order for 86 wagons to replace 99 existing wagons has been reduced to 71 new wagons due to exchange rate variations. The future fleet size will therefore be 185 wagons. The battery loco fleet is currently having life extension works and modifications for 750V line voltage, with completion expected in August 2019³. Due to limited space, battery locos can only accommodate two modern signalling systems, and Schöma locos accommodate only one. There are currently three modern systems on the LU network, with a fourth expected on the Piccadilly Line. A study for replacements battery locos will commence in 2018, with an intention of building the first two, and then replacing the fleet by 2026. A £21 million project will see two replacement locomotives manufactured, with the remainder of the fleet obtained through a lease agreement. A feasibility study is due to begin in 2018. Expected benefits include a 20% increase in capacity, reduced maintenance costs and a signalling backbone to provide compatibility with four different systems.

The Train Modification Unit at Acton Works uses life expired 1920s buildings which are not connected to the railway and do not accommodate full length trains. They will be inadequate for the Central Line Improvement Programme. It is proposed, by December 2018, to erect a new workshop with four rail-linked maintenance roads and one flat maintenance road. This will also provide for S Stock heavy maintenance and avoid such provision at Neasden.

³ As at the end of March 2017, 22 locos had been completed, two were in work, leaving five outstanding.