

LU TRAIN RELIABILITY

by John Hawkins

I last looked at rolling stock reliability in the August 2015 issue of *Underground News*. I have been awaiting updated statistics to show the great improvement in modern stocks' performance, but none has appeared since the start of this financial year. However, the TfL website has a data almanac with 56 sheets of monthly data going back to April 2004. I have calculated the moving annual average on a line basis for the most recent month of July 2017, which therefore smooths out the good and bad months. This means that the figures reflect performance since July 2016, and are affected by all recorded delays over two minutes due to rolling stock failures.

I have also taken this opportunity to include earlier comparable figures for 2005 and 2008, when the PPP was intended to make a step-change in LU system performance. It would appear that most lines saw significant improvement in that period, except for the District Line which was already performing well. The Northern Line had an older PFI Train Service Contract with Alstom which did not, at the time, align with PPP aims, but subsequent renegotiation led to a significant improvement. Other lines continued to improve as LU resumed control, although the Victoria Line had problems during introduction of new trains. Old rolling stock on the Bakerloo, Central and Waterloo & City lines has resulted in falling performance over recent years, and even the Piccadilly Line trains are not achieving as well as in 2015. However, new trains have now settled in on the Victoria and sub-surface lines, showing substantial improvement over their predecessors. The Jubilee and Northern Line trains are also doing much better than in the past.

Over the 12 years from 2005, only the Waterloo & City Line trains are performing worse. The new S Stock travels around seven times further between failures compare to the A and C Stocks, and over three times as far as the reliable D Stock did. The Victoria Line trains travel almost six times further than their predecessors. Having overcome their contractual problem, the Northern Line trains are travelling five times further, whilst the Jubilee and Piccadilly lines travel over three times as far. Even the Bakerloo Line trains have more than doubled their distance traveled between failures and the Central Line trains run 60% further.

MEAN KMs BETWEEN FAILURES

	2017	2015	2011	2008	2005
Bakerloo	9,282	9,417	11,483	9,323	3,996
Central	8,363	7,933	10,975	9,794	5,147
Victoria	40,534	22,631	9,501	12,040	6,985
Waterloo & City	7,177	11,804	11,062	16,853	7,645
District	46,939	22,588	23,911	14,785	14,778
Metropolitan	43,121	19,620	11,047	10,919	6,066
Circle & Hammersmith	33,364	9,205	8,342	6,550	4,872
Jubilee	28,518	19,839	12,876	11,611	8,383
Northern	36,114	28,277	19,609	6,932	6,764
Piccadilly	35,636	46,744	37,072	18,378	9,699

Train problems remained the main cause of passenger delays over the past year on the Underground network. These include insufficient serviceable trains as well as failures in service. Train problems tower over other causes on the Central and Piccadilly lines. On the Bakerloo they are just second to National Rail problems, whilst on the Jubilee and Northern lines they are well behind delays caused by the public. On the remaining lines, they are well behind other causes. Delays caused by the public are significant on the Victoria, Metropolitan and District lines, whilst signal problems caused delays on the Metropolitan, District and Waterloo & City lines. Staff shortages have affected the District, Circle & Hammersmith & City lines, whilst the Waterloo & City Line was seriously affected by industrial action.

The District Line trains run nearly 10% further between failures than the almost identical Metropolitan Line trains. Even more interesting, they run over 40% further than the same fleet when it operates on the Circle and Hammersmith & City lines. These trains switch between lines on a regular basis for maintenance at District Line depots. Out on the Metropolitan, the average inter-station run is over 2km, whilst on the District Line it is just over 1km, and on the Circle & Hammersmith lines it's under 0.9km. These different run characteristics place different demands on the rolling stock.

	Mean Kms between failures	Kms operated per train per year	Weeks between failures per train	Number of train failures per week
Bakerloo	9,282	102,867	5	8
Central	8,363	153,615	3	30
Victoria	40,534	161,322	13	4
W'loo & City	7,177	70,768	5	1
District	46,939	106,507	23	4
Metropolitan	43,121	133,567	17	4
Circle & H'smith	33,364	97,694	18	2
Jubilee	28,518	171,921	9	7
Northern	36,114	137,693	14	8
Piccadilly	35,636	136,056	14	6

The latest figures for distance between failures have been brought down from the first table. The third column shows the average distance operated by each train. This is the annual actual schedule operated on each line divided by the fleet size. The Jubilee trains are required to travel furthest, followed by the Victoria and Central lines. By putting these two columns together we can calculate the average weeks between failure for each train, and the average number of train failures per week on each line. The trains that don't travel far between failures don't go many weeks between failures. But this is worse for the Central Line trains that are scheduled to travel the third furthest. The number of failures in a week is also affected by the fleet size, which again reveals the problems of the Central Line with its large fleet. The Central Line Improvement Project (CLIP) aims to deal with this problem, but is not planned to start until 2019 and, even working on five trains at a time, will not complete the fleet before 2022.

LU PERFORMANCE STATISTICS

It would appear that TfL are no longer intending to provide an explanation for their monthly performance figures, leaving it to data users to do their own statistical analysis. However, the provided data almanac lacks any explanation for how the figures are derived and what they are comparing. This left many pages of little value to me.

Over the financial years since 2004/05 to 2016/17 the LU total schedule has grown by almost 20% to 86,328,372km. This hides increases of only 4% or 5% on the Piccadilly, District, Circle & Hammersmith & City lines. The Bakerloo increased by 8%, but other lines have shown substantial growth. The Metropolitan and Northern lines have seen growth just under 20%, the Central Line 25% and the Victoria Line 41%.

The Waterloo & City has grown almost 50% whilst the Jubilee has seen nearly 58% growth. Nearly 97% of the improved scheduled services are operated compared with 95% back in 2004/05. Whilst the growth in scheduled km looks good, the number of passengers has grown by over 40%, from 975,877 in 2004/05 to 1,377,850 in 2016/17, meaning that overcrowding continues to worsen.

Train delays over 15 minutes have reduced by nearly 60% across the system, from an average seven per day to three per day, with substantial improvements on all lines. An area where there has been significant deterioration is in station closures, where increasing demand and tighter safety standards have resulted in over 50% more closures in a year, with a doubling on the Victoria and Central lines and a tripling on the District Line. The Northern Line has seen an improvement with the more frequent service upgrade.

Escalator availability across the network has improved from 94% to nearly 98%. Lift availability has fallen slightly from 98% to 96%, although the Bakerloo is worst with a 14% drop to 84%, and the Central Line has dropped by 6% to 92%. Most stations have no spare capacity, so any failures can still be disruptive. The average days between failures for escalators has improved by 14% to 52 days whilst the average days for lifts has almost doubled to 21 days.

The number of service control failures (former signal failures?) has reduced by 40% from nine daily to five daily. Resignalling has reduced failures on the Victoria Line by 88% and on the Northern Line by 86%, suggesting little difference in results from their quite different new systems. However, the Jubilee Line system, although like the Northern Line system, has only shown a 24% improvement. Most lines show some improvement, but the Bakerloo has deteriorated by 40%.

The number of track failures has improved by only 8% overall, but with wide variation between lines. The Central Line has suffered nearly three times as many failures as back in 2004/05, just after the last line upgrade. The Piccadilly Line has 44% more track failures, and the Metropolitan 24% more. The Northern Line has improved by 55%, whilst the Jubilee line has improved by 75%, with the line upgrades. The number of engineering overruns, something emphasized during the PPP days, has more than halved in recent years to an average of seven a month.