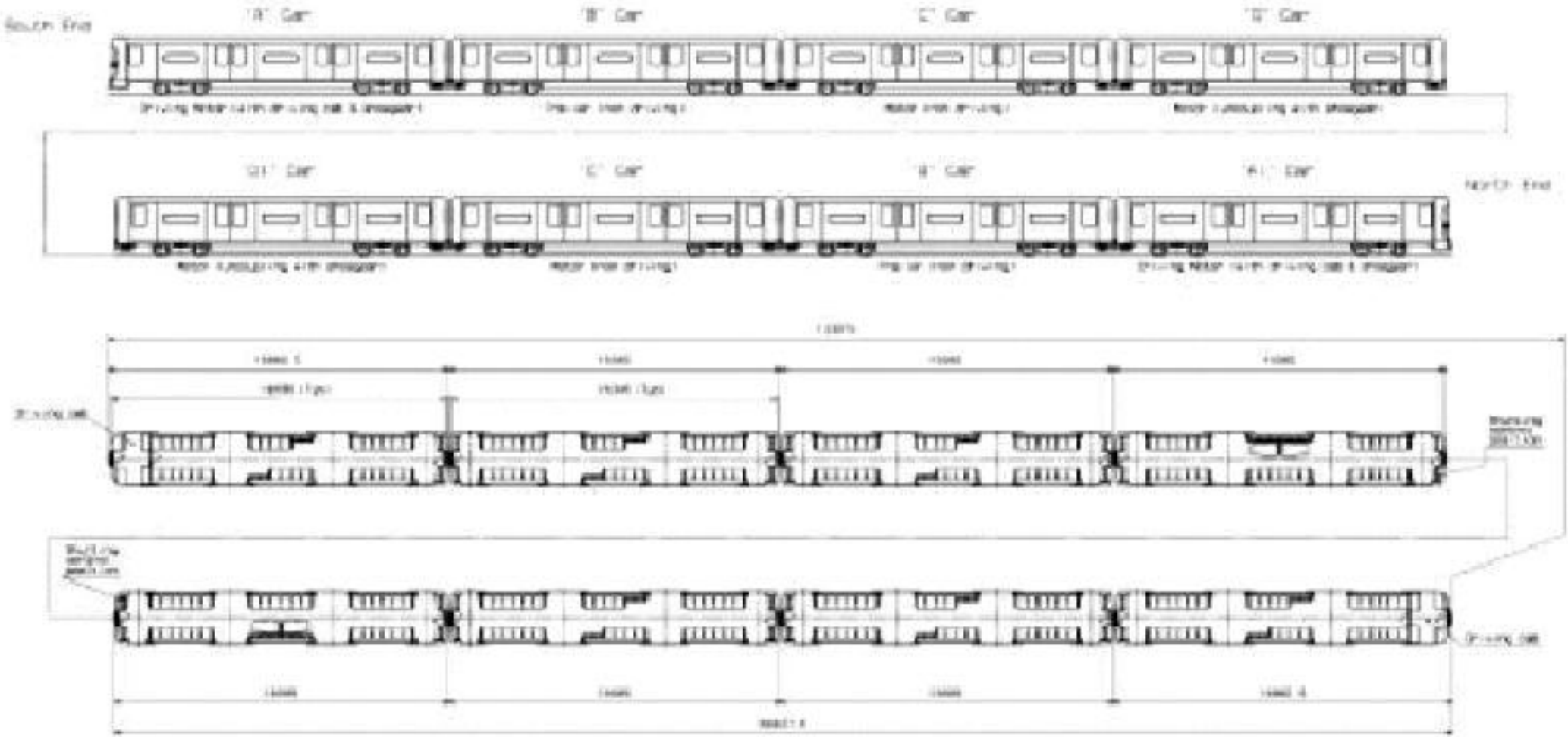
BOMBARDIER *MOVIA* London

Car body	Aluminum
Max speed	80 km/h
Train length	133 m
Vehicle width	2,6 m
Doors per side	16 double, 16 single

Number of seats	288
Standing capacity	996
Start of delivery	2009
Air condition	yes



Corporate
Modes of transport
London Underground
Rolling stock
A' stock
C' stock
D' stock
S' stock
2009
1972
1973
1992
1995
1996

2009

2009 stock.

2009 stock train

- Victoria line

As part of the 2011 upgrade of the Victoria line, 47 new 2009 tube stock trains are now in service, completely replacing the 1967TS that previously ran on the line.

The train consists of eight cars, of which six are motered improving acceleration rates and also improving braking capability.

The door system uses a number of features new to London Underground.

The doors are electrically operated as opposed to pneumatic control that has been traditionally employed on London Underground trains.

The 2009TS doors can also electronically detect objects preventing the doors closing.

The train is the first on London Underground to fully comply with the Rail Vehicle Accessibility Regulations with full sized wheelchair spaces, door threshold lighting and colour contrasting fittings and displays.

Traction is provided by IGBT driven AC asynchronous electric motors from a 630V supply. The train is capable of regenerative braking at 790V, significantly improving the energy efficiency of the train.

Braking is controlled by the latest technology, Knorr Bremise's EP2002 system which employs data bus links along the train to improve brake effectiveness taking into account a wide range of parameters.

As well as the 2009TS, the line upgrade also delivered a new 'Distance-to-go' signalling system allowing automatic train protection and operation, leading to shorter headways and faster journey times.

Total seating capacity per eight-car train is 288 with another 24 tip up seats and four RVAR compliant wheelchair spaces (or an additional 12 tip up seats).

Total standing capacity per eight car train is 576, making a total of 864* passengers per train.

Length per car	133m
Height	2.88m
Width per car	2.62m
Weight	
Driving motor car 'A'	26.8 tonnes
Trailer 'B'	21.6 tonnes
Non-driving motor 'C'	223.8 tonnes
Uncoupling non-driving motor 'D'	225.2 tonnes

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London Underground 2009 Stock

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The **2009 Tube Stock** (previously designated **2005 Tube Stock**) is a type of London Underground train built by Bombardier as part of its Movia family at its Litchurch Lane Works in Derby, England. 47 eight-car units are being built for the Victoria line and have replaced the original 1967 tube stock.[4] Construction of the new trains is on-going and their introduction into service will continue until the end of 2011.[5] The first 2009 Stock train entered passenger service on 21 July 2009.[6]

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2009 Tube Stock

Manufacturer	Bombardier Transportation
In service	21 July 2009
Family	Movia
Lines served	Victoria
Length of train	133.28 m (437 ft 3 in)[1]
Width	2.68 m (8 ft 10 in)[2]
Height	2.88 m (9 ft 5 in)[2][3]
Maximum speed	80 km/h (50 mph)
Train capacity	252 seated[1] 1196 standing[1]
Stock type	Deep-level tube

London Transport portal

Description

[edit]

Dot matrix display within a 2009 Stock carriage

The trains are part of a £3.4 billion contract awarded by the now defunct Metronet to Bombardier to supply new trains featuring Automatic Train Operation and signalling for the Victoria and sub-surface lines.[7] This upgrade should provide improved reliability, an 8% decrease in journey times between stations and a 16% overall decrease in journey times.[8] This is due in part to the trains having better performance than the 1967 stock they have replaced - they have a higher top speed of 80 km/h (50 mph), faster maximum acceleration of 1.3 ms^{-2}, normal service deceleration of 1.14 ms^{-2}, and emergency brake deceleration of 1.4 ms^{-2}, the same as the 1992 Tube Stock.[9] At peak times, 43 trains should be in service, an increase of six over the current number.[10] The trains seat 252 and have standing space for an estimated 1,196 passengers, giving a 19% increase in capacity,[8] and feature wider doors for easier boarding and alighting of passengers in order to reduce dwell times in stations.

The trains are 40 mm (1.6 in) wider than the older stock, to take advantage of the Victoria line's slightly larger than normal loading gauge compared with the other deep-level tube lines.[2] This prevents the trains from leaving the Victoria line except by road,[11] which means that each car of an eight-car train has to be uncoupled for moving, loaded on to a lorry and re-coupled upon delivery. The trains have been built with Bombardier's FICAS technology, giving a thinner bodyshell and hence (along with the larger size) more internal space for passengers.[12] They are the first London Underground trains to be designed since the Rail Vehicle Accessibility Regulations came into force,[13] so they have more facilities for people with impaired mobility, including multi-purpose areas with tip-up seats and space for wheelchairs and pushchairs (despite the fact that only a small number of station have step-free access) ,[14] and offset centre door poles for wheelchair access.[15]

Interior of production unit, seen at Brixton

The trains are the longest deep-level tube trains on the system at 133.275 m (437.25 ft), 3 m (9.8 ft) longer than the 1967 Tube Stock,[2] although the new sub-surface S Stock, which is also part of Bombardier's *Movia* family and has been ordered under the same contract, is longer still.[2] They are said to use a version of the traction pack used on Bombardier's *Electrostar* trains which has been modified for short-distance metro-style services.[16] They have CCTV cameras[8] and dot-matrix displays to show real-time service information as well as audio announcements.[2] They maintain a fixed height to keep the train in profile under different loading patterns and regardless of the extent of wheel wear.[17] Unlike most other London Underground trains, they have their Combined Traction Brake Controller (driver's manual controls, often called "dead man's handle") on the right-hand side of the cab,[18] as most of the platforms on the Victoria line are on the right.[19] Access to the cab for driver changes will be easier: an external side door is fitted, unlike in the 1967 Tube Stock,[20] whose cab had to be accessed through the passenger compartment, which could be difficult at rush hour.[21]

Exterior view of a carriage at Euston

Trains are made up of two 4-car units coupled-back-to-back, with the configuration A Car (Driving Motor) - B Car (Trailer) - C Car (Non Driving Motor) - D Car (Uncoupling Non Driving Motor (Shunting) | D Car (Uncoupling Non Driving Motor (Shunting) - C Car (Non Driving Motor) - B Car (Trailer) - A Car (Driving Motor),[22][23] and will be maintained by LUL train maintainers at the Victoria line's Northumberland Park Depot. Bombardier staff are on site for warranty parts replacement.[24] They were originally intended to have all-motored axles as in the 1992 Tube Stock, so that they would have enough traction and acceleration for faster running times. However, it was decided that 75% of motored axles would be sufficient,[25] which also gave a design that is simpler to manufacture and maintain, and reduced project costs by around £10 million,[26] about 3.5% of the overall cost.[27] They have mechanical-only Scharfenberg couplers.[28]

Introduction into service

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The design of the trains was finalised in September 2004. Manufacture of two pre-production trains began in January 2005, the first scheduled to be completed by mid-2006.[4] Metronet announced on 3

Diagram of the 2009 stock

February 2006 that the first of the pre-production cars had been completed in preparation for static testing. From 21 July to 4 August 2006, a mock-up of the train was on show at Euston Square Gardens, near Euston Square tube station, for a customer acceptance test followed by public display. From September 2006, the first train underwent testing at Bombardier's manufacturing and test site at its Litchurch Lane Works in Derby.[2] It was due to be delivered to London Underground by the end of 2006 for testing on the Victoria line during engineering hours[4] but this did not occur until May 2007.[2] It was also used for driver and maintenance training and familiarisation. The first of the trains was expected to begin passenger service on the Victoria line for evaluation purposes in July 2008,[2] with the remainder of the fleet being delivered and entering passenger service in 2009. However, by October 2007, the date for the first train entering service had slipped to January 2009,[29] and the first train entered service on 21 July 2009, leaving the depot at 23:00[30] and forming train 277 leaving Seven Sisters at 23:55 to Brixton.[6] By June 2011, there were sufficient 2009 stock trains to replace the remaining few 1967 stock trains, the last example of that stock running on Thursday 30 June.

Trains 1 and 2 were used for testing on the Victoria line and were then returned to Derby. The fourth train of 2009 stock was the first production train for the Victoria line. It was delivered in December 2009 and entered service in February 2010. Trains 3 to 45 are currently in service. Subsequently trains 1 and 2 were scrapped and salvaged for parts and two extra new replacement trains will be built.

Problems [edit]

On 26 July 2010 in the morning rush hour, the service was temporarily suspended due to a broken-down train at Oxford Circus. The previous week, ambulances had to be called to rescue almost 3,000 passengers trapped on board a failed train at Pimlico. Transport for London blamed software problems and over-sensitive doors.[31][32]

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External links [edit]

- Transport for London website on the Victoria line upgrade
- Computer generated artist's impression of a 2009 Stock unit
- An official photograph of a 2009 Stock unit undergoing testing at Bombardier's Litchurch Lane Works in Derby
- A photograph gallery of 2009 Tube Stock in Northumberland Park Depot on 21 July 2007 and on its second day of passenger service on 22 July 2009
- A video of 2009 Tube Stock arriving at Finsbury Park
- 2009 and 1967 Stock in Northumberland Park depot
- Riding 2009 Tube Stock
- Bombardier Transportation official website

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