

UNDERGROUND TICKETING SYSTEM UPDATE¹

Text and photos by Kim Rennie

London Underground's (LU) current ticketing system has its origins in the 1987 Underground Ticket System (UTS) scheme, which introduced secure ticket office suites, new self-service facilities – i.e. the 'Few Fare' and 'Multi-Fare' Passenger Operated Machines, and the now familiar 'credit card'-sized ticket. All ticket gates and associated equipment since have been supplied by Cubic Transportation Systems (known as Westinghouse Cubic Ltd. in the UK until April 1997). Gates are placed in and out of service, or reversed (when possible), by means of the Station Control Unit (SCU) panel in the ticket hall. The five types of gate currently in use on LU are:

P GATE (PNEUMATIC GATE)

P Gates were installed at all LU Zone 1 stations as part of the initial UTS project and require both electrical power and a compressed air supply (to operate the paddles). These supplies are usually carried in sub-floor ducting, making it difficult to reposition the gates if required. The majority of gates are unidirectional (i.e. designed for either entry or exit), but there are some bidirectional versions that are identifiable by their double sets of paddles.

The first were commissioned at Regent's Park on 12 October 1987, and the last at Bank (Northern Line ticket hall) on 19 June 1992. Not included as part of the original gating project were King's Cross Thameslink (then still a BR station), added on 29 July 1991, and Monument (which had been undergoing reconstruction) added on 25 November 1991.

P Gates were subsequently installed outside Zone 1 at Brixton and Stockwell from 9 December 1991, due to perceived high levels of fare evasion. As built, each gate had a square Passenger Orientated

Display unit ('POD') on top of a stanchion and facing the entry end(s). These would show messages to passengers such as 'No Entry', 'Enter', 'Take Ticket' and 'Seek Assistance'.

They could also display 'Child' when a child ticket was used. The original PODs have since been replaced with a newer version (also fitted to the E1 and E2 types) that display a green £ or red X, plus the credit value remaining on pre-loaded PAYG smartcards. Another modification is the retro-fitting of circular Oyster Card/Contactless readers to the right-hand stanchion on the entry side(s). The number of P Gates has declined over the years as stations have been modernised and/or gatelines updated.

E1 GATE (FIRST GENERATION ELECTRIC GATE)

The E1 electronic gate was conceived, in part, in connection with the Jubilee Line Extension. Two reasons being that the architects disliked the P Gate design and wanted something more stylish, and because the engineers thought that with the new signalling system proposed, a continued supply of compressed air in the future could no longer be guaranteed. A further factor was that it was becoming increasingly obvious that the gating of stations needed to be expanded into the outer areas, and a design



A unidirectional pneumatic P Gate configured for 'exit' at Paddington (Praed Street).

¹ It is thought the last *Underground News* article under this title appeared in 1993.

which did not rely on an air main would allow this to be done quicker and more cheaply. The E1 Gates have a stanchion width of 155mm instead of 390mm on the P Gates, allowing three E1 Gates to be installed in the space of two P Gates

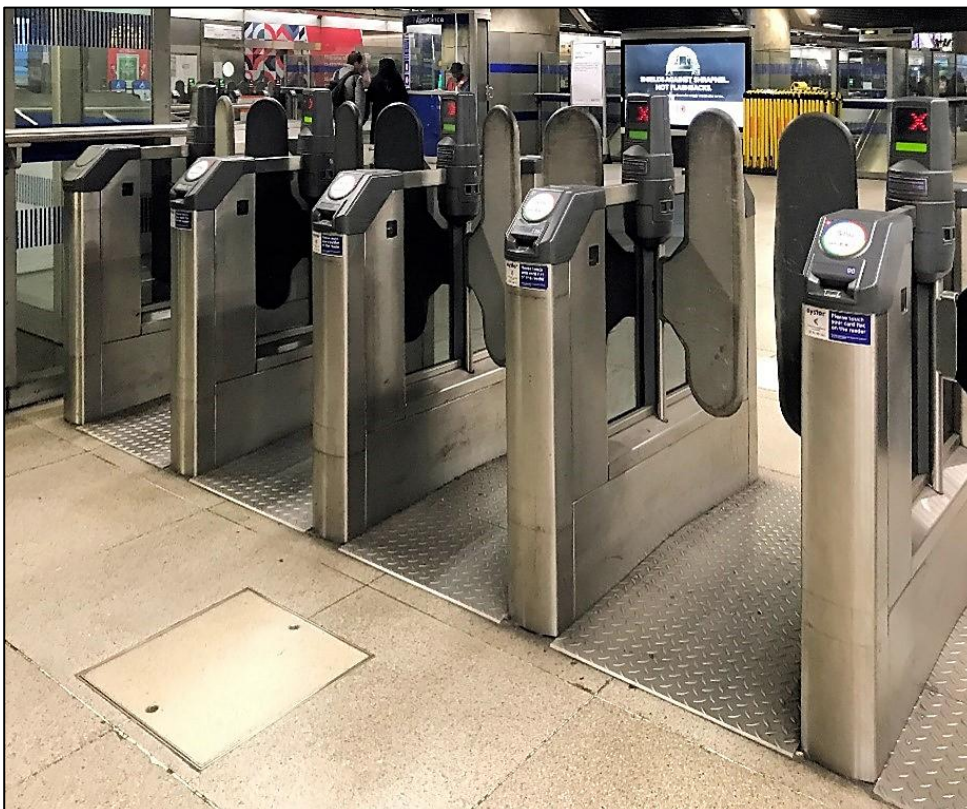
The first appeared at Dagenham Heathway on 1 August 1994, replacing an experimental and unsuccessful tripod design. E1 Gates can be either unidirectional or bidirectional, but in both cases, use a single set of paddles. The paddles fold flat against the stanchions when open, as opposed to being at a slight angle as on the P Gates. As with the P Gates, Oyster Card/Contactless readers were later fitted to the top of stanchions on the entry side(s). Power supplies run under the raised floor plate covers, making it relatively easy to remove or reposition these gates as required. The E1 is the design that was eventually used to gate the majority of LU stations beyond Zone 1 (initially starting with 'problem' locations).

From 1996, LU offered a 'Carnet' travel option, where 10 transferable paper tickets could be bought in advance for single journeys within Zone 1 at a 10% discount. These were normally validated by the ticket gate at the start of a journey, but at Bank, Farringdon, King's Cross Thameslink, Moorgate and Old Street, where entry was possible from an ungated system (i.e. the DLR or National Rail), bespoke Carnet Validators were installed on certain platforms. These were adapted from the 'entry' end of an E1 gate, minus of course the paddles and ticket capture bin. Advancements in ticketing technology gradually made the Carnet offer less popular, and in 2005 the tickets were withdrawn, and the Validators removed.



First-generation electric E1 gates at Canary Wharf. These are all bidirectional and can be set for either 'entry' or 'exit' mode. Note the small LT roundel feature below the ticket entry slot, and the Contactless readers fitted retrospectively on top of the stanchions.

E2 GATE (SECOND GENERATION ELECTRIC GATE)



Left: The second-generation electric bidirectional E2 gates are immediately identifiable by their grey stanchion tops and the Contactless readers fitted from new on the angled ends. The power supply runs under the raised floor plate covers. This array was added at Canary Wharf in more recent years to expand the capacity of the original E1 gatelines.

The E2 electronic gate is now the most common design used overall on the TfL network and was developed in the late-1990s as part of the 'Prestige' Private Finance Initiative. Their first use was on 154 previously ungated LU stations, starting at West Brompton on 31 July 2000.

The stanchions are the same width as on the E1, but the transverse depth is 600mm shorter, meaning an E2 Gate occupies around 68% of the floor space used by an E1.

The E2s are immediately recognisable from the E1 by the dark grey tops of their stanchions. Here, the Oyster Card/Contactless reader pads are integral and fitted from new, to both sides, and are angled on the approach, rather than flat and on top of the stanchion as with the E1 Gates and P Gates. Unlike the E1s, the small cast metal roundel design feature on the stanchion is omitted.

All E2 Gates are bidirectional, using a single set of paddles that open flat against the stanchions. Power supplies are again typically run under the floor plate covers in the walkway. E2 Gates are sometimes now fitted alongside existing P Gates and/or E1 Gates in small numbers to increase gateline capacity. They are also used extensively at Elizabeth Line and London Overground stations, where they are the standard design, and uniquely appear on the DLR at Woolwich Arsenal. Gates of the same design are also found widely across National Rail in the London and South-East area but are not part of the TfL networked operating system.

E2 WIDE AISLE GATE

The Wide Aisle Gate (WAG) is a development from the E2 Gate and primarily for use by disabled and/or encumbered passengers and use the same stanchions. The first appeared experimentally in 2006 at Canary Wharf, London Bridge and Westminster, with funding for 140 more gates announced in 2007.

Originally, the paddles had a metal frame with a glass infill, allowing greater visibility for those with restricted lines of sight (e.g. wheelchair users). These were later found to be insufficiently robust and the majority have since been changed for ones made of solid black plastic² (at certain stations, the WAG paddles are formed of mesh metal). For the most part, WAGs have replaced the Manual Gates (q.v.), which required staff intervention before use. Unsurprisingly, the gateline arrays of Heathrow Terminals 2 & 3, and Heathrow Terminal 4, consist entirely of WAGs. WAGs are also used on the Elizabeth Line and London Overground, plus at Greenwich Peninsula and Royal Docks on the IFS Cloud Cable Car.

MANUAL GATE

These are generally kept locked and opened manually by local staff as required. Some are fitted with an internal luggage 'gate' consisting of vertical rubber strips, allowing items to be passed through it whilst it is in the locked position. An Oyster/Contactless Validator Unit (q.v.) is normally placed nearby so that passengers using the gate can validate their journey.

VALIDATOR UNIT

A small number of LU stations remain ungated or only partially-gated (see Table 'A'). This is usually due to low passenger numbers, peak hour or event-only³ entrance/exit use, on some fire exits, plus where



A Wide Aisle Gate in original condition at Paddington (Bakerloo) with the paddles formed of glass within a metal frame. The majority of these have since been replaced by paddles made of solid plastic.

² Despite the change, glass WAGs were installed at Stratford (Gibbins Road) and Paddington (Paddington Square) in July and September 2024, perhaps because Cubic were contractually required to fit out the gatelines to the original design spec.

³ e.g. Football at Chelsea and Leyton Orient, Cricket at the Oval, the Chelsea Flower show, and Notting Hill Carnival.

physical space restrictions would make the installation of gates difficult. In these cases, Validator Units are provided for Oyster and Contactless users. They are also used at stations where there is ungated access and egress with National Rail services⁴. These can be either wall-mounted or free-standing and are of several different designs. Validators are also used at ungated stations on the Elizabeth Line and London Overground, on London Buses, London Trams, the DLR, and on river piers served by Thames Clippers. They also appear at National Rail stations where Oyster is accepted.

On 6 September 2009, a separate type of validator, distinguished from the standard yellow validators⁵ by having a pink-coloured reader, was introduced at 12 LU or LU-served, stations, with one more added later (see Table 'B'). These do not deduct funds but are used at peripheral interchange points to confirm journey details, because Oyster PAYG users making orbital journeys between two stations, and not passing through Zone 1, are eligible for a lower fare.



Far Left: At ungated and partially-gated stations, and at some LU/NR interchanges, Validators are provided for those using Contactless cards.

Left: Pink validators are installed at certain locations for Contactless users that are making orbital journeys and not entering Zone 1.

TRAINING CENTRES

In addition to stations, operational gates are also installed at two TfL training centres: LU's Ashfield House

Training Centre has one E1 Gate, one E2 Gate and one WAG at its 'West Ashfield' mock station; whilst the Elizabeth Line's 'West Ilford' facility is host to one E2 Gate and one WAG, plus one Validator Unit.

Table 'A'	Table 'B'
<p>Stations with standard Validator Units †</p> <p>Ungated Stations:</p> <p>Mill Hill East</p> <p>Roding Valley</p> <p>South Kenton</p> <p>Partially-gated stations:</p> <p>Buckhurst Hill (west end entrances/exits)</p> <p>Chalfont & Latimer (NB platform 1)</p> <p>Chorleywood (NB platform 1)</p> <p>Epping (platform 1)</p> <p>Finchley Central (NB platforms 1 & 2)</p> <p>Fulham Broadway (event-mode exit)</p> <p>Leyton (event-mode exit)</p> <p>Oval (event-mode exit)</p> <p>Pinner (NB platform 1)</p> <p>Sloane Square (event-mode exit)</p> <p>Waterloo (W&C Line platforms 25 & 26)</p> <p>West Harrow (WB platform 1)</p> <p>Westbourne Park (event-mode exit)</p> <p>Woodside Park (NB platform 1)</p> <p>† Excludes stand-alone validators in use at fully-gated stations – e.g. Stratford.</p>	<p>Stations with pink Validator Units</p> <p>Blackhorse Road</p> <p>Canada Water</p> <p>Ealing Broadway (LU) ‡</p> <p>Gunnelsbury</p> <p>Highbury & Islington</p> <p>Kensington (Olympia) (LO)</p> <p>Rayners Lane</p> <p>Richmond (NR)</p> <p>Stratford</p> <p>West Brompton</p> <p>Whitechapel</p> <p>Willesden Junction (LO)</p> <p>Wimbledon (NR)</p> <p>‡ Added June 2022</p> <p><i>Pink validators are also installed at Clapham Junction (NR), Gospel Oak (LO), and Surrey Quays (LO).</i></p>

On 1 January 2025, the deployment of gate types at London Underground stations was as follows:

⁴ e.g. Barking, Farringdon, Highbury & Islington, Moorgate, Old Street and West Brompton.

⁵ Since 2020, the yellow Oyster Card logo on LU readers has been replaced by a white one carrying advertising for Google G Pay. The readers on some other TfL modes continue to display the original 'swoosh' design.

LONDON UNDERGROUND TICKET GATE SUMMARY

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Acton Town		4		1			5
Aldgate			6	1			7
Aldgate East	5		5	3			13
Alperton		3		1			4
Amersham		4		1		3	8
Angel	8			2			10
Archway		5		2			7
Arnos Grove		4		2			6
Arsenal		3	2	1	1	1	8
Baker Street	20			5			25
Balham		3	1	2			6
Bank	11	9	25	10	1	2	58
Barbican	8			1			9
Barking		Gateline under c2c control				14	14
Barkingside		3		1			4
Barons Court		5		1			6
Battersea Power Station			12	4			16
Bayswater	5			2			7
Becontree		3		1			4
Belsize Park		6		1	1	1	9
Bermondsey		6		2			8
Bethnal Green		6		2			8
Blackfriars			12	2			14
Blackhorse Road		5		2		2	9
Bond Street	12		18	8			38
Borough			3	1			4
Boston Manor		3		1			4
Bounds Green		4		1			5
Bow Road			2	2			4
Brent Cross		3		1			4
Brixton	8			2		1	11
Bromley-by-Bow			3	2			5
Buckhurst Hill		3		1		2	6
Burnt Oak		3		1			4
Caledonian Road			2	2			4
Camden Town		10		2			12
Canada Water		13		2		9	24
Canary Wharf		34	16	7			57
Canning Town		8		2			10
Cannon Street			6	2			8
Canons Park		3		1			4
Chalfont & Latimer		3		1		3	7
Chalk Farm		4		1			5
Chancery Lane	6		3	2			11

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Charing Cross			18	4			22
Chesham		3		1			4
Chigwell		3		1			4
Chiswick Park		3		1			4
Chorleywood		2		1		3	6
Clapham Common		5		1			6
Clapham North		5		1			6
Clapham South		6		1			7
Cockfosters		3		1			4
Colindale						4	4
Colliers Wood		4		1			5
Covent Garden			15	2			17
Croxley		3		1			4
Dagenham East		4		1			5
Dagenham Heathway		3		1			4
Debden		3		1			4
Dollis Hill			3	1			4
Ealing Broadway		Gateline under Elizabeth Line control				4	4
Ealing Common		3		1			4
Earl's Court	9			5			14
East Acton			2	1			3
East Finchley		6		1			7
East Ham		8		2			10
East Putney		4	1	1			6
Eastcote		3		1			4
Edgware		4		1	1	1	7
Edgware Road (B)			4	1			5
Edgware Road (C&H)	7			2			9
Elephant & Castle	14			4			18
Elm Park		4		1			5
Embankment			8	3		3	14
Epping		3		1		2	6
Euston	12			2	1	1	16
Euston Square	5		3	2			10
Fairlop			3	1			4
Farringdon			36	8		12	56
Finchley Central		3		1		3	7
Finchley Road		5		2			7
Finsbury Park			10	5		8	24
Fulham Broadway		5		2		12	19
Gants Hill		4		2			6
Gloucester Road	6			2			8
Golders Green		5		1			6
Goldhawk Road		3		1			4
Goodge Street	3		3	2			8

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Grange Hill		3		1			4
Great Portland Street	7		1	1			9
Greenford		3		1			4
Green Park	11			3			14
Gunnersbury		2	3	1		2	8
Hainault		3		1			4
Hammersmith (C&H)		10		4			14
Hammersmith (D&P)		17		4			21
Hampstead		6		1	1	1	9
Hanger Lane		3		1			4
Harlesden			2	1			3
Harrow-on-the-Hill		8		2		4	14
Harrow & Wealdstone			6	2		2	10
Hatton Cross		3		1			4
Heathrow T2&3				19		1	20
Heathrow T4				8			8
Heathrow T5		Gateline under Heathrow Express control					
Hendon Central		4		1			5
High Barnet		3	2	1	1	1	8
Highbury & Islington		4	9	3		16	32
Highgate		4		1			5
High Street Kensington	8			2			10
Hillingdon		3		1		2	6
Holborn	11		3	3			17
Holland Park			2	2			4
Holloway Road		5		1			6
Hornchurch		4		1			5
Hounslow Central		3		1			4
Hounslow East		4		1			5
Hounslow West		3		1			4
Hyde Park Corner	6			2	1		9
Ickenham		3		1			4
Kennington		3		1			4
Kensal Green		3		1		1	5
Kensington (Olympia)		Gateline under London Overground control					
Kentish Town			5	1		5	11
Kenton			2	1			3
Kew Gardens		5	1	2			8
Kilburn		4		1			5
Kilburn Park		3		1			4
Kingsbury		3		1			4
King's Cross (Met)			9	2			11
King's Cross (Tube)	4		16	3			23
King's Cross (North)			20	3			23
Knightsbridge	11			4			15
Ladbroke Grove		3	1	1			5

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Lambeth North			3	1			4
Lancaster Gate			4	2		1	7
Latimer Road		3		1			4
Leicester Square	16		1	4			21
Leyton		3		2		2	7
Leytonstone		5		2			7
Liverpool Street	24		18	6	1	1	50
Liverpool Street (Broadgate)			10	3			13
London Bridge		35		7			42
Loughton		4		1			5
Maida Vale		3		1			4
Manor House		7		2			9
Mansion House	6			2			8
Marble Arch	4		4	2			10
Marylebone			7	2			9
Mile End		6		2			8
Mill Hill East						3	3
Monument	15			1			16
Moorgate			30	9		6	45
Moor Park		3		1			4
Morden		6		1			7
Mornington Crescent		4		1			5
Neasden		3		1			4
Newbury Park		3	2	2			7
Nine Elms			9	2			11
North Acton		4		1			5
North Ealing		3		1			4
Northfields		4		1			5
North Greenwich		11		2	2	4	19
North Harrow		3		1			4
Northolt		4		1			5
North Wembley			2	1			3
Northwick Park		3		1			4
Northwood		3		1			4
Northwood Hills		3		1			4
Notting Hill Gate			7	2			9
Oakwood		3		1	1	1	6
Old Street			8	2		2	12
Osterley		3		1			4
Oval		6		1		2	9
Oxford Circus	32	6		6			44
Paddington	3	9	20	9	2		43
Park Royal		3		1			4
Parsons Green		5		1			6
Perivale		3		1			4

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Piccadilly Circus	14			2	1	3	20
Pimlico	5			2			7
Pinner		4		1		2	7
Plaistow		5		2			7
Preston Road		3		1			4
Putney Bridge		3		2		4	9
Queensbury		4		1			5
Queen's Park		5		2			7
Queensway	4		1	2			7
Ravenscourt Park		3		1			4
Rayners Lane		4		1		2	7
Redbridge		3		1			4
Regent's Park			5	1			6
Richmond		Gateline under South Western Railway control					
Rickmansworth		3		1			4
Roding Valley						4	4
Royal Oak		3		1			4
Ruislip		3		1			4
Ruislip Gardens		2		1			3
Ruislip Manor			3	1		4	8
Russell Square	7			1			8
St. James's Park	8		4	2			14
St. John's Wood		4	1	3			8
St. Paul's	5		3	2			10
Seven Sisters		11		3		4	18
Shepherd's Bush		8		2			10
Shepherd's Bush Market		5		2			7
Sloane Square			7	2		2	11
Snaresbrook		2	3	1	1	1	8
South Ealing			4	1			5
South Harrow		3		1			4
Southfields			6	1			7
Southgate		7		2			9
Southwark		19		3			22
South Kensington	9			2			11
South Kenton						2	2
South Ruislip		3		1		2	6
South Wimbledon		2	1	1			4
South Woodford		7		1	1	1	10
Stamford Brook		3		1			4
Stanmore			4	2			6
Stepney Green		4		1			5
Stockwell	5			2			7
Stonebridge Park			2	1			3
Stratford		25	13	12		25	75

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Sudbury Hill		3		1			4
Sudbury Town		6		2			8
Swiss Cottage		4		1			5
Temple	6			1	1	1	9
Theydon Bois			2	1			3
Tooting Bec		3	2	2			7
Tooting Broadway		6	1	2			9
Tottenham Court Road			34	8			42
Tottenham Hale		5		2			7
Totteridge & Whetstone		1	2	1			4
Tower Hill	14			4			18
Tufnell Park		2	2	1			5
Turnham Green		4		1			5
Turnpike Lane		7		1			8
Upminster		Gateline under c2c control					
Upminster Bridge		2		1			3
Upney		3		1			4
Upton Park		5		2			7
Uxbridge		5		2	1	1	9
Vauxhall			10	2			12
Victoria	15		31	6	1	1	54
Walthamstow Central			11	4		1	16
Wanstead		3		1			4
Warren Street	8			2			10
Warwick Avenue		4		1			5
Waterloo (Main)	28			2		14	44
Waterloo (Jubilee)		14	11	5	1		31
Watford			3	1		1	5
Wembley Central		3		2		4	9
Wembley Park		7	26	3	1	1	38
West Acton		3		1			4
West Brompton			3	1		8	12
West Finchley		3		1		1	5
West Ham			4	2		2	8
West Hampstead		5		1			6
West Harrow		2		1		2	5
West Kensington		4		1			5
West Ruislip		3		1		3	7
Westbourne Park		4		2		2	8
Westminster		13		2		1	16
Whitechapel			8	2		10	20
White City		5		2			7
Willesden Green		6		2			8
Willesden Junction		Gateline under London Overground control					
Wimbledon		Gateline under South Western Railway control					

Gate Type:	P	E1	E2	WAG	MANUAL	VALIDATOR	TOTAL
Wimbledon Park		3		1			4
Wood Green		7		2			9
Wood Lane			7	2			9
Woodford		3	3	2		1	9
Woodside Park		2	1	1		2	6
GRAND TOTAL	425	848	647	521	22	260	2723