



How Many People Does It Take To Operate A Train?

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In June the New York State Legislature [passed a bill](#) requiring all subways with at least two cars to have both a conductor and a train operator. Dictating train operations from Albany is legislative overreach. How the MTA runs its trains, obviously, should remain with the MTA and not become a contentious political debate. The governor has yet to call the bill up for signature; thus, [she hasn't had to sign, veto, or amend it yet](#). But, based on custom, it is likely that she will act by the end of this year.

This got us thinking. What other transit systems have two-person train operations (TPTO)?

We looked at more than 400 individual subway and commuter rail lines in 36 cities in Canada, Spain, Korea, Singapore, France, Germany, Sweden, Czech Republic, China, Canada, Japan, Italy, Turkey, Denmark, and the United Kingdom and found that fewer than 6.25% of the systems we looked at currently use TPTO. The listed subway lines in Tokyo, for instance, are currently undergoing modernization improvements by 2030 that will enable One-Person Train Operations (OPTO) or even Zero-Person Train Operations (ZPTO). Every other subway line we examined had either OPTO or ZPTO, or had plans to upgrade to OPTO or ZPTO.

OPTO predominates on commuter rail, too. We identified more commuter rail lines with TPTO than subway lines, but these are usually less modernized lines in smaller metropolitan areas. In contrast, the workhorse Parisian and German commuter rail systems use OPTO on trains that are longer and more crowded than the New York City Subway, and the commuter lines of London are a mix, transitioning toward OPTO. Leaner operations mean lower operating costs, which allow more frequent service and greater ridership.

What was most interesting, in reviewing train operations in these different systems, was the tendency to modernize older lines, starting in the late 1970s and early 1980s – in Japan, England, Prague, and Glasgow – to enable OPTO. This was done decades before modern Communication-Based Train Control (CBTC) signaling, which the MTA installed on the L and 7 and is pursuing on the F, G, A, C, E, M, and R. OPTO is the norm in cities with more and less advanced signaling, in cities with busier and less busy trains, and in cities with high and low wages. As far as we can tell, New York is almost globally unique in maintaining TPTO. This legislation would directly undermine the spirit of the billions of dollars committed to improved signalization and operations. This is all the more urgent as the MTA embarks upon building the Interborough Express (IBX), a new line connecting Brooklyn and Queens. Ideally, IBX will be fully automated when it opens so that it can operate the most robust service possible.

New York's elected officials should leave the train operations to the train operators. If there is genuine concern about how best to operate trains, the MTA should respond to the legislature's questions. This bill was originally written [more than thirty years ago](#) and has no basis in contemporary high-quality transit operations. As we have shown, fewer than 6.25% of the systems in our sample have TPTO, and of those few systems, the Japanese are in the midst of a modernization effort to move to OPTO and ZPTO. This bill, as written, does nothing to improve MTA service and will stymie the authority's efforts to become a world leader in transit operations.



TRAIN OPERATIONS		OPTO: One-Person Train Operation ZPTO: Zero-Person Train Operation	
CITY	LINE		NOTES
London			
	Bakerloo	OPTO	Since 1987
	Central	OPTO	Transition 1994-1995
	Circle	OPTO	Since 1984
	District	OPTO	Since 1984
	Hammersmith & City	OPTO	Since 1984
	Jubilee	OPTO	From start in 1979
	Metropolitan	OPTO	Since 1985
	Northern	OPTO	Since 2000
	Piccadilly	OPTO	Since 1987
	Victoria	OPTO	From start in 1967
	Waterloo & City	OPTO	Before handover to TfL in 1994, transition in 1985 under Network Southeast
	DLR	ZPTO	From start 1987
	Elizabeth	OPTO	From start 2022
	London Overground	OPTO	Some since Network Southeast 1983-1994, completed 2013
	Heathrow Express	OPTO	From start in 1998
	Thameslink/ Southern/ Southeast/ Southwest/ Great Northern/ Greater Anglia/ C2C	OPTO	Driver only operation conversion under Network Southeast 1983-1994. Almost universal, whereas elsewhere in England has not transitioned.
	Croydon Tramlink	OPTO	Since opening in 2000
Scotland			
	Glasgow subway	OPTO	Since 1979 modernisation.
	Scottish Railways	OPTO	56% of total railways mostly the Glasgow-Edinburgh area
Paris			
	1	ZPTO	From 2012



	2	OPTO	
	3	OPTO	
	3bis	OPTO	
	4	ZPTO	From 2023
	5	OPTO	
	6	OPTO	
	7	OPTO	
	7bis	OPTO	
	8	OPTO	
	9	OPTO	
	10	OPTO	
	11	OPTO	
	12	OPTO	
	13	OPTO	ZPTO soon
	14	ZPTO	From opening
	A	OPTO	
	B	OPTO	
	C	OPTO	
	D	OPTO	
	E	OPTO	
Berlin			
	U1	OPTO	
	U2	OPTO	
	U3	OPTO	
	U4	OPTO	
	U5	OPTO	
	U6	OPTO	
	U7	OPTO	
	U8	OPTO	
	U9	OPTO	
	S1	OPTO	
	S2	OPTO	
	S25	OPTO	



	S26	OPTO	
	S3	OPTO	
	S41	OPTO	
	S42	OPTO	
	S45	OPTO	
	S46	OPTO	
	S47	OPTO	
	S5	OPTO	
	S7	OPTO	
	S75	OPTO	
	S8	OPTO	
	S85	OPTO	
Shanghai			
	1	OPTO	
	2	OPTO	
	3	OPTO	
	4	OPTO	
	5	OPTO	
	6	OPTO	
	7	OPTO	
	8	OPTO	
	9	OPTO	
	10	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	11	OPTO	
	12	OPTO	
	13	OPTO	
	14	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	15	ZPTO/OPTO	Designed to be fully automatic but, regulations currently require supervision
	16	OPTO	
	17	OPTO	



	18	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	19	ZPTO	Future service, designed to be automatic
	20	ZPTO	Future service, designed to be automatic
	21	ZPTO	Future service, designed to be automatic
	22	OPTO	
	23	ZPTO	Future service, designed to be automatic
	Airport Link Line	OPTO	
Toronto			
	1	OPTO	
	2	TPTO	
	3	ZPTO	Future service
	4	OPTO	
	5	OPTO	
	6	OPTO	
	UP Express	OPTO	
	Go Transit	TPTO	
Vancouver			
	Expo	ZPTO	From opening
	Millenium	ZPTO	From opening
	Canada	ZPTO	From opening
Montreal			
	REM	ZPTO	
	EXO	TPTO	
	Métro	OPTO	
Tokyo			
JR East	Joban (Local) Line Chiyoda Line/Odakyu Mainline	OPTO	From Spring 2025
	Keihin-Tohoku Line	OPTO	Spring 2027
	Sobu (Local) Line	OPTO	Spring 2027
	Sobu Rapid/Yokosuka Line	OPTO	From September 2026



	Negishi Line	OPTO	From Spring 2026
	Nambu Line	OPTO	Since September 2025
	Yokohama Line	OPTO	From September 2026
	Kawagoe Line	OPTO	Partial from 2022
	Sagami Line	OPTO	From 2022
	Yamanote	TPTO	Transitioning to OPTO by 2030, and ZPTO afterwards
	Chuo (Rapid) Line	OPTO	Since September 2025
	Ueno-Tokyo/Shonan-Shinjuku/Saikyo Line	TPTO	Transitioning to OPTO by 2030
	Joban (Rapid) Line	TPTO	Transitioning to OPTO by 2030
	Keiyo Line	TPTO	Transitioning to OPTO by 2030
	Narita Line	TPTO	Transitioning to OPTO by 2030
Nagoya Subway	Higashiyama Line	OPTO	Since 2017
	Meijo Line	OPTO	Since 2022
	Sakuradori Line	OPTO	Since 1994
Fukuoka Subway	Kuko Line	OPTO	Since 1984
	Hakozaki Line	OPTO	Since 1984
	Nanakuma Line	OPTO	Since opening in 2005
Sendai Subway	Namboku Line	OPTO	Since opening in 1987
	Tozai Lin	OPTO	Since opening in 2015
Yokohama Subway	Blue Line	OPTO	Since 2007
	Green Line	OPTO	Since opening in 2008
Osaka Metro	Chuo Line-Kintetsu Keihana Line	OPTO	Since 2025
	Imazatosuji Line	OPTO	Since opening in 2006
	Nagahori-tsurumiryokuchi Line	OPTO	Since 1996
Milan			
	1	OPTO	
	2	OPTO	
	3	OPTO	



	4	ZPTO	From opening in 2022
	5	ZPTO	From opening in 2012
Prague			
	A	OPTO	From perhaps the 1980s
	B	OPTO	From perhaps the 1980s
	C	OPTO	From perhaps the 1980s, under conversion to ZPTO by 2030
	D	ZPTO	Under construction
Stockholm			
	Red Line	OPTO	
	Green Line	OPTO	
	Blue Line	OPTO	
	Pendeltåg	OPTO	
Copenhagen			
	M1	ZPTO	From opening
	M2	ZPTO	From opening
	M3	ZPTO	From opening
	M4	ZPTO	From opening
Munich			
	U1	OPTO	
	U2	OPTO	
	U3	OPTO	
	U4	OPTO	
	U5	OPTO	
	U6	OPTO	
	U7	OPTO	
	U8	OPTO	
	S1	OPTO	
	S2	OPTO	
	S3	OPTO	
	S4	OPTO	
	S5	OPTO	
	S6	OPTO	



	S7	OPTO	
	S8	OPTO	
Nuremberg			
	U1	OPTO	
	U2	ZPTO	Since 2010, first conversion of non-ZPTO to ZPTO in the world
	U3	ZPTO	From opening
Singapore			
	East-West Line	OPTO	From opening, ZPTO conversion underway
	North-South Line	OPTO	From opening, ZPTO conversion underway
	North East Line	ZPTO	From opening
	Circle Line	ZPTO	From opening
	Downtown Line	ZPTO	From opening
	Thomson-East Coast Line	ZPTO	From opening
	Bukit Panjang LRT	ZPTO	From opening
	Sengkang LRT	ZPTO	From opening
	Punggol LRT	ZPTO	From opening
Seoul			
	Line 1	TPTO	
	Line 2	TPTO	OPTO plans suspended as of 2024
	Line 3	TPTO	
	Line 4	TPTO	
	Line 5	OPTO	
	Line 6	OPTO	
	Line 7	OPTO	
	Line 8	OPTO	
	Line 9	OPTO	
	Shinbundang Line	ZPTO	
	GTX A	OPTO	
	GTX B	OPTO	Under construction, to open 2030
	GTX C	OPTO	Under construction, to open 2028
Incheon			
	Line 1	OPTO	



	Line 2	OPTO	
Busan			
	Line 1	OPTO	
	Line 2	OPTO	
	Line 3	OPTO	
	Line 4	ZPTO	
Daegu			
	Line 1	OPTO	
	Line 2	OPTO	
	Line 3	OPTO	
Daejeon			
	Line 1	OPTO	
Gwangju			
	Line 1	OPTO	
Madrid			
	Line 1	OPTO	
	Line 2	OPTO	
	Line 3	OPTO	
	Line 4	OPTO	
	Line 5	OPTO	
	Line 6	OPTO	ZPTO under development, to begin operations 2027
	Line 7	OPTO	
	Line 8	OPTO	
	Line 9	OPTO	
	Line 10	OPTO	
	Line 11	OPTO	
	Line 12	OPTO	
	Cercanías C-1	OPTO	
	Cercanías C-2	OPTO	
	Cercanías C-3	OPTO	
	Cercanías C-4	OPTO	
	Cercanías C-5	OPTO	



	Cercanías C-7	OPTO	
	Cercanías C-8a	OPTO	
	Cercanías C-8b	OPTO	
	Cercanías C-9	OPTO	
	Cercanías C-10	OPTO	
Barcelona			
	L1	OPTO	
	L2	OPTO	
	L3	OPTO	
	L4	OPTO	
	L5	OPTO	
	L6	OPTO	
	L7	OPTO	
	L8	OPTO	
	L9	ZPTO	
	L10	ZPTO	
	L11	ZPTO	
	L12	OPTO	
	S1	OPTO	
	S2	OPTO	
	R1	OPTO	
	R2	OPTO	
	R3	OPTO	
	R4	OPTO	
	R7	OPTO	
	R8	OPTO	
Istanbul			
	M1	OPTO	Will be upgraded to ZPTO
	M2	OPTO	
	M3	OPTO	
	M4	OPTO	
	M5	ZPTO	
	M6	OPTO	



	M7	ZPTO	
	M8	ZPTO	
	M9	OPTO	
	M11	ZPTO	
Beijing			
	1	OPTO	
	2	OPTO	
	3	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	4	OPTO	
	5	OPTO	
	6	OPTO	
	7	OPTO	
	8	OPTO	
	9	OPTO	
	10	OPTO	
	11	ZPTO	Beijing 2022 Winter Olympics Shuttle, extension planned
	12	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	13	OPTO	
	14	OPTO	
	15	OPTO	
	16	ZPTO	
	17	ZPTO	
	18	OPTO	Formerly 13B
	19	ZPTO	
	20	ZPTO/OPTO	Future service, with planned through-running with 3/12
	Yanfang Line	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	22	OPTO	
	Daxin Airport Line	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision



	Capital Airport Line	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	28	ZPTO/OPTO	Future service
	M101	ZPTO/OPTO	Future service
Guangzhou/ Foshan			
	1	OPTO	
	2	OPTO	
	3	OPTO	
	4	OPTO	
	5	OPTO	
	6	OPTO	
	7	OPTO	
	8	OPTO	
	9	OPTO	
	10	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	11	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	12	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	13	OPTO	
	14	OPTO	
	18	OPTO	
	21	OPTO	
	22	OPTO	
	24	OPTO	Future service
	28	OPTO	Future service
	Guangfo	OPTO	
	APM	ZPTO	
	F2	OPTO	
	F3	OPTO	
	F4	ZPTO	Future service
Chengdu			



	1	OPTO	
	2	OPTO	
	3	OPTO	
	4	OPTO	
	5	OPTO	
	6	OPTO	
	7	OPTO	
	8	OPTO	
	9	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	10	OPTO	
	13	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	17	OPTO	
	18	OPTO	
	19	OPTO	
	27	OPTO	
	30	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	S4	OPTO	
	S5	OPTO	
	S11	OPTO	
Shenzhen			
	1	OPTO	
	2	OPTO	Throughruns with 8
	3	OPTO	
	4	OPTO	
	5	OPTO	
	6	OPTO	
	6B	OPTO	
	7	OPTO	
	8	OPTO	Throughruns with 2
	9	OPTO	
	10	OPTO	



	11	OPTO	
	12	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	13	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	14	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	15	ZPTO/OPTO	Future service
	16	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	17	ZPTO/OPTO	Future service
	19	ZPTO/OPTO	Future service
	20	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	22	ZPTO/OPTO	Future service
	23	ZPTO/OPTO	Future service
	24	ZPTO/OPTO	Future service
	25	ZPTO/OPTO	Future service
	27	ZPTO/OPTO	Future service
	29	ZPTO/OPTO	Future service
	32	OPTO	Future service. Partial through running with 8
	Shenzhen-Dapeng Intercity	OPTO	China Rail Signaling Spec (CTCS) but operated by Shenzhen Metro
	Shenzhen-Huizhou Intercity	OPTO	China Rail Signaling Spec (CTCS) but operated by Shenzhen Metro
Chongqing			
	0	OPTO	Loop Line
	1	OPTO	Monorail
	2	OPTO	Monorail
	3	OPTO	
	4	OPTO	
	5	OPTO	
	6	OPTO	
	7	ZPTO/OPTO	Future service
	9	OPTO	



	10	OPTO	
	18	ZPTO/OPTO	Designed to be fully automatic, but regulations currently require supervision
	17	ZPTO/OPTO	Future service
	24	ZPTO/OPTO	Future service
	27	OPTO	
	Jiangtiao	OPTO	
	Yongchuan	OPTO	Future service
	Bitong	OPTO	Future service
Hong Kong			
	East Rail Line	OPTO	
	Tung Chung Line	OPTO	
	Tuen Ma Line	OPTO	
	Airport Express	OPTO	
	Disneyland Resort Line	ZPTO	
	Kwun Tong Line	OPTO	
	Tsuen Wan Line	OPTO	
	Island Line	OPTO	
	Tseung Kwan O Line	OPTO	
	South Island Line	ZPTO	

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