

Facts.. Facts.. Facts..

About the

**OPERATION AND USE
OF CTA BUS DOORS**



Report to Chicago Transit Board

Thursday, March 8, 1956

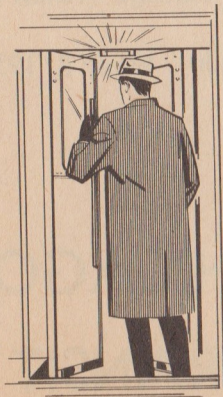


**CHICAGO
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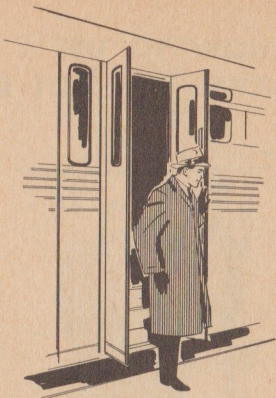
HOW TO USE PUSH-OUT BUS EXIT DOOR



- 1** Signal operator for your stop; **WAIT** for signal light over door to come on.



- 2** With left hand push on the left panel of the door near the leading edge. Both panels of the door will open.



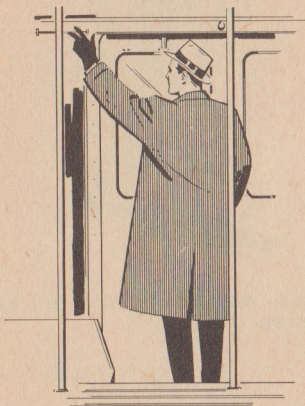
- 3** Holding door panel open with left hand, step to street or curb.



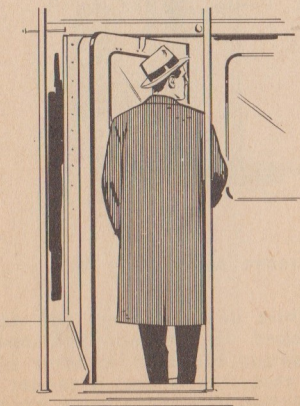
- 4** Promptly move away from bus.

NOTE: While door is open, the accelerator is locked to prevent the operator from starting the bus. Another safety feature of this door is that it cannot be unlocked by the operator while a passenger is applying pressure to the door panel.

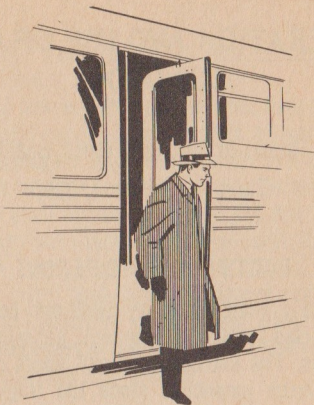
HOW TO USE TREADLE-TYPE BUS EXIT DOOR



- 1 Signal operator for your stop; stand on treadle step. Your weight on treadle step will activate the door when operator positions door-opening switch.



- 2 When door opens, step to curb or street.



3 Promptly move away from bus.



4 Door closes automatically when your weight is no longer on the treadle step.

NOTE: While door is open, the accelerator pedal is locked to prevent the operator from starting the bus. Sensitive edges on door panels cause door to re-open if it strikes an object while closing.

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FACTS FROM THE REPORT

Chicago Transit Authority owns and operates a fleet of 3,142 LP-Gas (odorless propane), gasoline, diesel and electric buses. The entrance and exit doors of all of these buses have been inspected since the tragic accident of Sunday, February 19, 1956, and our experience with bus doors has been reviewed, dating from October 1, 1947, when CTA became an operating agency. Industry use of and experience with the push-type, passenger-controlled center exit door, a relatively recent development, has been reviewed.

These pertinent facts are disclosed:

Types of Bus Doors

1. All front doors on CTA buses are operator controlled.
2. Center exit doors are of two general types - (a) automatic, treadle-operated door with sensitized rubber edges that cause the door to reopen if its sensitive rubber edges strike an object while the door leaves are closing; (b) push-type door that is under complete control of the passenger once the door is unlocked by the operator.
3. In each type of center exit door, the accelerator is locked out when the door is open, preventing the operator from starting the bus until the door is closed and locked. Only the push-type, passenger-controlled door, however, fails safe.
4. In CTA's bus fleet, 571 units are equipped with push-type center exit doors.

Accident Exposure

1. During an average month, front entrance and center exit bus doors are used more than 134,600,000 times by CTA

passengers. This is a high rate of exposure to bus door accidents.

2. Almost all passengers use the front door when entering a bus. Field checks disclose that at least 50 per cent of the passengers alight from center exit doors.
3. During an average month, treadle-operated center exit doors are used approximately 27,530,000 times by CTA passengers; push-type, passenger-controlled center exit doors are used approximately 6,120,000 times. Buses equipped with push-type, passenger-controlled center exit doors constitute only 18 per cent of CTA's bus fleet. Consequently the use of treadle-type center exit doors is considerably greater.

Accident Frequency Rate

1. In 1954, the first full year of CTA use of push-type, passenger-controlled, center exit doors, push-type doors had an accident frequency rate of .54 compared with an accident frequency rate of .74 for treadle-operated center exit doors; in 1955, the frequency rate for push-type doors was .39 compared with .86 for treadle-operated doors.
2. Compared with 1954, the accident frequency rate of push-type, passenger-controlled doors improved 27.8 per cent in 1955, while the accident frequency rate for treadle-operated doors worsened 16.2 per cent. This comparison demonstrates that the accident frequency rate of push-type, passenger-controlled center exit doors has improved, and will continue to improve, as passenger familiarity with this type of door increases.
3. From January 1, 1956 to and including February 20, 1956, push-type exit doors had an accident frequency rate of .06 compared with .22 for treadle-operated exit doors.
4. Accident frequency rate is the number of bus door accidents by types of doors for each 100,000 bus miles operated.

Fatal Accidents

1. Since October 1, 1947, CTA's bus fleet has operated a total of 595,000,000 miles. There have been four fatal

accidents attributed to bus door movements in this period of eight years and five months.

2. Two of the fatal accidents involved front doors, which are operator controlled.
3. One of the fatalities involved a treadle-operated center exit door.
4. The most recent bus door fatality involved the push-type, passenger-controlled center exit door. The accident frequency rate for this type of door is improving sharply, and gives every indication of continuing to improve as use of and passenger familiarity with this type of door increases.

Bus Door Inspection

1. Every CTA bus is inspected regularly at 21-day intervals under the inspection schedule set-up for CTA garages. This 21-day inspection includes an inspection of bus door condition and bus door operation. For the purposes of this report, a special inspection of the front and center doors of all CTA buses, a total of 3,142 units, was ordered.
2. Also included in this special inspection was a check of the time required for each center door to close, a check of the amount of pressure required by a passenger to open a push-type, passenger-controlled center exit door, a check of the permissible gap between leading edges of door panels, and a check of the horizontal alignment of door panels.
3. This special inspection was completed Saturday, March 3, 1956. A total of 73,000 individual inspections was made of the various components of bus door equipment.
4. The results were as follows:

Components of motor bus front doors rated 96.4 per cent compliance with CTA's rigid inspection specifications; trolley bus front door components rated 98.5 per cent; components of motor bus push-type, passenger-controlled center exit doors rated 91.0 per cent; components of trolley bus push-type, passenger-controlled center exit doors rated 96.0 per cent; components of motor bus treadle-operated center exit doors rated 96.7 per cent; components of trolley bus treadle-operated center exit doors rated 99.2 per cent.

Industry Use of Push-Type, Passenger-Controlled Center Exit Doors

1. Approximately thirty transit companies throughout the nation are now operating buses equipped with push-type center exit doors. Their installation of doors of this type was prompted by the outstanding safety performance of these doors in field tests, and in regular daily operations.
2. Transit companies in other large cities are accumulating performance data on the push-type door, and Cleveland, Ohio, for example, is now installing the push-type center exit door on recently purchased buses.

Extensive Studies Preceded CTA Use of Push-Type, Passenger-Controlled Center Exit Door

1. For more than three years, CTA equipment engineers studied the performance record of push-type, passenger-controlled center exit door in other cities, accumulating extensive data on transit industry experience with this type of door.
2. On the basis of these data, all favorable to the push-type door, the decision was reached in mid-year 1951, to test a door of this type on CTA properties.
3. The initial test installation was made September 25, 1952 on Bus No. 9325. The performance of this test unit was highly satisfactory, and resulted in a decision to expand the test by installing push-type doors in 45 additional units.
4. On the basis of the very satisfactory performance of the push-type doors in this expanded test, the decision was made to equip new buses with doors of this type.

Further Studies and Improvements

1. CTA engineers are continuously engaged in efforts to improve the safety and reliability of all equipment. Through their studies and efforts a number of improvements have been achieved. Extensive performance records are maintained to aid them in their efforts to enhance the safety and reliability of CTA equipment and operations.

2. Close contact is also maintained with transit operators and engineers throughout the nation to learn and profit from their experience, and to keep abreast of industry developments that concern improved safety, reliability and performance of equipment, and improved operating procedures.
3. Equipment manufacturers are also consulted at frequent intervals about problems that arise, and about their research and plans for improving their products. The National Pneumatic Company, for example, has recently advised CTA that their engineers are redesigning the push-type door mechanism to step up its already high safety and reliability.
4. CTA employees, both technical and non-technical, are enlisted in CTA's continuous efforts to enhance the safety, efficiency and economy of CTA operations. Employees are making a substantial contribution toward attainment of these objectives by submitting their ideas and plans to CTA's Employee Suggestion System.

Comments from Transit Operators on Push-Type, Passenger-Controlled Center Exit Door

Comments from the American Transit Association, and from transit companies using the push-type, passenger-controlled center exit door, follow:

Merwyn A. Kraft, Director of the Department of Personnel and Accident Prevention, American Transit Association:

"With respect to question now being raised in Chicago relative to the safety of push-type door operation on buses, the fatality which CTA experienced recently is the only one connected with this type of door operation to come to my attention in the more than 18 years that I have been working on accident prevention for the transit industry. I have made many observations and my department has made several studies and surveys, all with the same result. Operations with push-type doors have substantially lower frequencies of accidents of passengers and a greatly lower severity. I hold to my firm conviction that the push-type

door for center exit on buses provides a greater amount of protection for the safety of alighting passengers than any other door control now available."

John Gerson, Vice President, Atlanta, Georgia, Transit System:

"All new equipment being ordered with push-type doors mainly for safety reasons. Recent six months analysis indicates rear treadle door accident rate nearly twice push door rate per vehicle mile."

J. P. Jones, President, Cincinnati, Ohio, Transit Company:

"All our 593 vehicles equipped with push-type doors since 1952. Fleet equipped progressively from early 1940's through 1951. Front and rear door accident record not kept separately. Percentage changes, based on previous year door accidents, were: 1950, 8.68; 1951, 16.74; 1952, 16.30; 1953, 14.9; 1954, 19.8 - - reduction, Year 1955, 5.7 increase. Based on observations in operation, good public and operator acceptance, and accident trend, we conclude the push-type door is more desirable than treadle-type doors."

D. C. Hyde, General Manager, Cleveland, Ohio, Transit System:

"Push-type doors specified on last order for buses after reviewing report from most companies using them. Push-type doors brought about a decided reduction in accidents for such companies."

L. W. Tate, Executive Vice President, Dallas, Texas, Transit Company:

"We have used center exit push-type doors since 1936. Have never had a fatal accident; very few serious accidents. They were caused by mechanical defects rather than type of door. Have this door on all our vehicles except ten buses. Our experience indicates safest exit door we have ever used."

C. B. Frazer, President, Houston, Texas, Transit Company:

"This company has used push-type center exit doors for many years and have found them most satisfactory."

W. Marshall Dale, President, Indianapolis, Indiana, Transit System, Inc.:

"Last sixty-two buses delivered in 1951 were equipped with push-type doors, following which date we started a program of installing push-type doors on all other equipment and project was completed at end of 1953. Center door alighting accidents per million passengers carried follows:

1951, 4.64; 1952, 3.03; 1953, 2.15; 1954, 1.14; 1955, 1.07.

Push-type doors were installed in interest of passenger safety, the benefits of which are clearly indicated in the reduction of alighting accidents quoted."

Roane Waring, President, Memphis, Tennessee, Street Railway Company:

"Our entire fleet is equipped with push door operation. We went into this operation at great expense because of its safety factor, our experience well warranting going to this door. It has almost entirely eliminated liability accident on alighting."

Laurence Wingerter, President, San Antonio, Texas, Transit Company:

"In 1946, all our center exit doors were air-operated without treadles. In 1947 and early 1948, all our buses were converted to push-type center doors. In 1946 prior to push-type doors, we had 145 accidents at the center door. In 1955, center door accidents dropped to 48, and none of these was of a serious nature. With air-operated doors, we frequently had serious and expensive injuries, the last being a death case in 1946. We are convinced that the lowest center door accident frequency and severity rates can be achieved with push-type center doors."

