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Final Report
WBS 16 CAR

Passenger Vehicle End Door Study

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1 INTRODUCTION

1.1 General

Despite the excellent safety record of the rapid transit industry there has been a continuing concern on the part of government and the public regarding the hazards associated with passenger movement between cars. For over six years the National Transportation Safety Board (NTSB) has been foremost in emphasizing the need for a "safe passageway" between cars (9,12). Then in April 1982, the NTSB published a report specifically addressing the injuries and fatalities that occurred to passengers between the coupled cars at the NYCTA between 1977-1981 (1). The report also identified safety features and policies at 11 other U.S. rapid transit systems.

1.2 Purpose

The Southern California Rapid Transit District (SCRTD) is concerned about the potential hazards encountered by a passenger moving between cars. As a result, this study was conducted to identify the procedures, policies, and safety-related equipment in use on other rapid transit systems that affect between-car passenger movement. Additionally this study includes recommendations which may be adopted as end-door policy.

The purpose of this report is to present the results of our investigation and provide information to be considered by the SCRTD when specifying the design requirements to procure transit vehicles.

1.3 Acronyms

BART Bay Area Rapid Transit District
CTA Chicago Transit Authority
GCRTA Greater Cleveland Regional Transit Authority
MARTA Metropolitan Atlanta Regional Transit Authority
MBTA Massachusetts Bay Transportation Authority
NYCTA New York City Transit Authority
PATCO Port Authority Transit Corporation
PATH Port Authority Trans-Hudson Corporation
SEPTA Southeastern Pennsylvania Transportation Authority
WMATA Washington Metropolitan Area Transit Authority
MDCTA Metropolitan Dade County Transit Agency

MTA-MD Mass Transit Administration of Maryland

CTCUM Commission de Transport de la Communaute Urbaine de
Montreal (Montreal Urban Community Transit Commission)

TTC Toronto Transit Commission

2 SUMMARY OF CONCLUSIONS & RECOMMENDATIONS

2.1 Conclusions

Based upon the findings of this study the following is concluded:

2.1.1 Of the 12 United States and 2 Canadian transit systems contacted, only BART permits passengers to pass freely between moving cars.

2.1.2 Interior consist car end doors are kept unlocked except at the MBTA and on the R44/R46 cars at NYCTA.

2.1.3 Except for BART all transit system operating rules and policies forbid passenger movement between moving cars in either emergency or normal situations. Signs are the primary means used to enforce the rules and policies.

2.1.4 All the transit systems permit passenger movement between standing cars in an emergency. However, at NYCTA a crew member must unlock the doors.

2.1.5 Except for BART, NYCTA, and CTA, transit systems' policy forbids intercar movement on standing cars except in an emergency.

2.1.6 Besides BART, the MARTA type enclosure design-wise is apparently more effective in preventing passengers from falling between cars. However, the configuration is not always compatible with civil alignments and procedures.

2.1.7 End door signs, public information brochures, PA announcements by train operators and efforts on the part of transit employees have been successful in minimizing injuries and fatalities by limiting movement between coupled cars.

2.1.8 No overall, quantifiable, direct relationship is apparent between end door features and car design.

2.2 Recommendations

2.2.1 Recommend that SCRTD favorably consider a policy which forbids intercar movement except in an emergency on stopped trains.

2.2.2 Recommend 2.2.1 be reenforced by signs, public education, employee training, and PA announcements.

2.2.3 Recommend that SCRTD consider a policy which maintains inner doors unlocked.

2.2.4 Recommend that SCRTD specify an intercar configuration similar to that used for Baltimore, Miami, and Washington.

3 DISCUSSION

3.1 Methodology

3.1.1 General

The work plan (8) identified the following three tasks:

- "1. Assimilate existing end door studies from Miami and Baltimore and others as available.
2. Perform end door study that fills the gap from the completion of prior studies to the present.
3. Compile #1 and #2 into a final report."

Task #1 and #2 will be discussed in more detail in this section.

3.1.2 Task #1 - Assimilate existing end door studies from Miami and Baltimore and others as available.

Although intercar closures have been the subject of discussion and controversy for many years, the studies and investigations performed in this area are limited. The most comprehensive effort to date is the National Transportation Safety Board's special report on accidents involving passenger movement between coupled cars in the New York City Transit Authority. The report does not attempt to quantify the accidents, such as an accident rate per billions of passenger miles, or passenger risk per train mile. The report does, however, present the intercar safety features and operating policies in-place at 12 U.S. transit properties.

The other material reviewed included the 1977 APTA survey of safety features and policies (11), and reports generated for intercar design features on the Baltimore-Miami cars (2,3,4). No analyses or reports were found for other vehicles or properties, although each of the 14 properties contacted was requested to identify any known studies involving intercar safety features and related policies/policy changes.

3.1.3 Task #2 - Perform an end door study that fills the gap from the completion of prior studies to the present.

The 1982 NTSB report, being the most recent and in many aspects the most extensive, was used as the baseline. Table 4, Policy on Passenger Movement on Rail Rapid Transit Systems (1), was modified to obtain additional information. Columns on communication capabilities were added, as were questions on the following:

- o types of intercar protection
- o types of end doors
- o recent policy changes
- o public education regarding end door use.

The modified table (See Figure 1) was sent to 14 properties, all of which responded. These were:

BART	MDCTA	PATH
CTA	MTA-MD	SEPTA
GCRTA	CTCUM	TTC
MARTA	NYCTA	WMATA
MBTA	PATCO	

CTCUM and TTC were added to the NTSB list. Also MTA-Houston was contacted, but the information has not been included.

The results of the survey are shown in Table 1, Safety Features and Policy Regarding Passenger Movement Between Cars. Each of the 9 columns in Table 1 will be briefly discussed. However, of the systems surveyed, BART is the only one designed to permit passengers to move freely between moving cars.

3.2 Findings

3.2.1 Column (1) - Intercar Walkway Protection

The protection can generally be categorized in 4 ways:

- o chains and/or pantograph gates
- o grab bars
- o diaphragm closure
- o no extra measures

The chains tend to be favored by the older properties: CTA, GCRTA, NYCTA, PATH, SEPTA, and TTC, and also PATCO. TTC uses pantograph gates, as does MBTA. However, the MBTA locks end doors, which is discussed under column (3).

Cited advantages of chains include: a perception of safety measures and minimal initial cost and replacement cost.

In all the fatalities at NYCTA, chains were present and intact, except in one case when the victim unhooked the chain and in another when the clasp was broken (1). One must question the effectiveness of chains in preventing falls, since the other properties using them report little intercar movement, except CTA, which permits movement between standing cars. Without field data identifying the level of movement, the conclusions are based upon a qualitative judgement, not quantitative.

Pantograph gates have the advantage of protecting patrons, including the blind, from falling off the platform between cars.

Grab handles are on the Baltimore (MTA-MD) and Miami (MDCTA) cars. An analysis of the condition was made (2,3,4) and grab handles were concluded to provide an adequate level of safety (2). The distance between the anticlimbers is 4 inches, increasing to approximately 12 inches at the doors (See Figure 2). The handles reduce the passway area distance to approximately 8-3/4 inches, which is much less than the shoulder depth of 5th percentile and higher patrons, but about 2 inches greater than the chest breadth of the 5th percentile male college student and equal to the 5th percentile female college student. The handles are well within the reach of the 5th percentile female, which is approximately 26 inches. Another consideration was the lateral movement of end doors in #6 turnout. The crossing area was reduced approximately 30%, and 50% in a 250 ft. curve.

WMATA's distance between anticlimbers is 3 1/2 inches, and between end doors, 11 inches. No protection is provided, nor is there any at CTCUM, where the end door separation is 2-3 feet.

During the recently conducted simulated emergency drills at WMATA and PATH, no intercar movement problems were reported.

MARTA's intercar closure consists of a 3-piece, rubber, weather-proof diaphragm and plate at the R ends and a half-height closure and plate at the F ends. Design-wise it provides the increased protection against falling between cars. However, PATH, for example, has stated that plates would create a hazard on its shorter radius curves and the turnouts (11).

3.2.2 Column (2) - Door Type

The properties are mixed regarding end door type between swinging and sliding, with the majority preferring the swinging type. Advantages of swinging doors included: passengers are more familiar with them; it's a more natural response motion in an emergency; less susceptible to jamming, and; easier to open when moving between cars. Many newer cars also have high visibility between cars. A disadvantage is it is more difficult to open from inside in a crushloaded situation.

Sliding doors avoid the above stated disadvantage of swinging doors.

3.2.3 Column (3) - Inner Door Locked

Except for the NYCTA R44/R46 and MBTA, properties leave the inner, or train interior, doors unlocked. The safety advantage in an emergency is considered to outweigh the hazard potential associated with unlocked doors. At NYCTA a crew member is to unlock doors in an emergency. The MBTA has a pin release mechanism which unlocks the door. A crew member must relock the door once the pin has been removed.

The NTSB report (1) discusses the no-motion door interlocks and its technical problems previously installed at NYCTA.

3.2.4 Column (4) - Passenger Movement Permitted Between Cars - Normal Conditions

BART permits movement under normal conditions, but posts a sign that reads "Do Not Stand Between Cars". Both CTA and NYCTA on its R10/R42 cars permit movement between standing cars (1,11). At CTA most movement apparently occurs at terminal stations. Train operators are not to move as long as passengers are between cars, and employees/security personnel are alerted to look for this situation.

As stated previously, the R44/R46 doors are kept locked for stated safety reasons - excessive lateral movement. On the older cars, some of which are not air conditioned, passing between moving cars or riding in the intercar area is not uncommon, and according to the NYCTA President, John D. Simpson, rider habits will not change (7).

Signs are used to enforce no crossing at all properties, and those which forbid it under normal operating conditions report success, although isolated cases have been noted at properties.

Based upon NYCTA fatality statistics, approximately 81% of the victims are men, with an average age of approximately 27 years. The eldest victim was a 71-year old man and the youngest a 4-year old girl. Table 3 shows a breakdown of the facilities listed in (1) by time of day, sex, age, and location of accident. Eleven occurred in or near the station and the next highest number, 8, occurred on curves. Factors such as acceleration, deceleration, jerk rate, quality of ride, swept intercar area and intercar safety features all contribute, but to an unknown, nonquantifiable degree.

3.2.5 Column (5) - Passenger Movement Between Cars in Emergency

The policy at all properties (except BART) is to forbid movement between moving cars and to permit movement in standing cars.

3.2.6 Column (6) - Communications

Capability exists in most transit systems for making PA announcements to discourage between-car movement. This capability varies however. Column 6 tabulates the capabilities of the transit systems surveyed.

3.2.7 Column (7) - PA Announcement by Operator to Discourage Movement Between Cars

The majority or ten (10) of the systems have or will have the operator make PA announcements to discourage intercar movement. Of these, six also use some form of public literature, such as brochures and notices, to inform the public of the danger in moving between moving cars.

The value of educating the public through available media must in part contribute to transit industry's excellent safety record. Positive advantages lie with early indoctrination.

3.2.8 Column (8) - Signage Used to Discourage Movement Between Cars.

All properties use some form of signage to restrict movement, and Table 2 lists those used.

The explicitness of the signs vary, from "DO NOT ENTER. NO PASSAGE EXCEPT IN AN EMERGENCY" to an implicitly less restrictive sign which limits passage to when the train is not in motion. However, in all but two of the latter type of signs, such movement has been forbidden by policy, and policy has been almost categorically followed by passengers.

3.2.9 Column (9) - Public Information Program Regarding End Door Use.

The intent was to identify combined approaches to public awareness, and the results were discussed under column (7).

3.2.10 NYCTA Fatality Rate

The NYCTA moves approximately 3.4 million passengers per average weekday or nearly one billion per year. This equates to an estimated 10 billion passenger-miles per year, with a fatality rate of 2.1×10^{-9} per passenger mile.

3.2.11 Policy Changes

No property identified any recent policy changes regarding end door use and passenger movement between moving or standing cars.

4. CONCLUSIONS

4.1 A total of 14 systems were contacted: 12 U.S. and 2 Canadian. Most operate in married pairs; CTCUM operates in a three-car consist, with 9-car trains. Of these only BART has an intercar closure which is designed to permit passengers to move freely between moving cars. MARTA, which has a similar configuration, forbids intercar movement except in an emergency.

4.2 The concern for safety is a major consideration on all systems. In an emergency passengers must be able to evacuate a car, through end doors if necessary, so except for MBTA and NYCTA - R44/R46 cars - inner end doors are not locked. At the NYCTA a crewman is expected to unlock the end doors. The NYCTA considers the relative lateral movement of facing end doors a safety problem, which is the reason the end doors are locked. MBTA uses the removable pin lock mechanism.

4.3 Except for BART, the transit systems' operating rules and policies forbid passenger movement between moving cars. The rules and policies are enforced primarily through signs on the end doors, which include bilingual signs at CTA, NYCTA and CTCUM, and pictographs/symbols.

4.4 Except for BART, NYCTA (R44/R46) and CTA, transit systems' operating rules and policies forbid passenger movement between standing cars except in an emergency. Although some signage is more explicit and restrictive on several properties, the overall results are statistically very successful.

4.5 There have not been any reported recurrent maintenance problems with the closures installed on the MARTA vehicles. Design-wise these are more effective in directing passenger movement between cars and preventing falling than are chains, pantograph gates, and grab handles. Chains have not prevented the fatalities at NYCTA, and the effectiveness of the other techniques have not been quantified. Analytically, grab handles appear to be satisfactory for the civil alignment and use intended, whereas the MARTA-type closure might not be.

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Factors that impact intercar closure design include:

- o radii of curvature
- o civil alignment
- o lateral movement of facing end doors
- o coupling/uncoupling procedures
- o policy regarding end door use
- o platform distribution
- o actual and perceived security

4.6 Transit Safety Record

Statistically, the transit industry has an excellent safety record regarding injuries and fatalities related to intercar passenger movement. However, the lack of field data establishing the level of intercar movement makes qualitative judgements necessary.

4.7 Car Design

A decision to be made is whether to procure an off-the-shelf vehicle or specify a new design. There are major advantages in the areas of cost, reliability, and safety, as examples, in an off-the-shelf buy: proven hardware in like operations.

Any modification to existing hardware, such as adapting the MARTA type enclosure to vehicles other than SFB and Hitachi, must take into consideration the civil alignment as well as the car design.

5. RECOMMENDATIONS

5.1 Recommend procurement documents reflect an intercar configuration similar to that used for Baltimore, Miami, and Washington.

5.2 Recommend the SCRTD consider an operating policy which would forbid intercar passenger movement except in emergency conditions, and then only if the train is not moving.

5.3 Recommend that SCRTD enforce 5.2 through: published procedures; as part of the employee indoctrination, training and recertification program; end doors signs to include a symbol; periodic PA announcements by the train operator; use of public information brochures, and; a public awareness program which would include the schools.

5.4 Recommend inner doors be unlocked. If inadvertently locked, inside or out, doors should be able to be opened by passengers on the inside without special tools or knowledge, and from the outside quickly by employees/emergency forces by key or tool.

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6. REFERENCES

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3. Booz-Allen & Hamilton, "A Review of Property End Door Operating Rules and Safety Equipment Provisions", March 1979, Baltimore, Maryland.
4. Kaiser Transit Group, "System Safety Analysis, Patron Movement Between Transit Vehicles and Protection Requirements for the Dade County Rapid Transit System", May, 1978, Miami, Florida.
5. Letter, J. Burnett, Chairman NTSB, to W.J. Higgins, Transportation Coordinator, MDCTA and D.A. Wagner, Administrator, MTA-Maryland, Subject R-82-25, dated May 26, 1982.
6. Letter, W. J., Higgins to J. Burnett, Chair NTSB, dated June 30, 1982.
7. New York Times article, dated June 6, 1983.
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9. National Transportation Safety Board, Safety Recommendation R-77-19, dated July 18, 1977.
10. National Transportation Safety Board, Remarks by Kay Bailey, Vice Chairman, to ATPA, May 17, 1977, Norfolk, Virginia.
11. APTA, Property Responses to FRA, 1977.
12. National Transportation Safety Board, Safety Recommendations, R-77-18.

TABLE I
SAFETY FEATURES AND POLICY REGARDING
PASSENGER MOVEMENT BETWEEN CARS

SYSTEM	INTERCAR THE-JOINT PROTECTION			FLOOR TYPE			(1) Doors Locked (e)		(2) PASSENGER MOVEMENT PERMITTED BETWEEN CARS NORMAL CIRCUITING		(3) PASSENGER MOVEMENT PERMITTED BETWEEN CARS IN EMERGENCY		(4) COMMUNICATIONS		(5) ANNOUNCEMENT BY OPERATOR TO DISCOURGE MOVING BETWEEN CARS		(6) SIGNAGE USED TO DISCOURGE AND RESTRICT MOVEMENT BETWEEN CARS		(7) PUBLIC INFORMATION PROGRAM REGARDING END DOOR USE		
	CHAINS	CLOSURE	GLASS BARS	PANTOGRAPH GATES	F-SWINGING	R-SWINGING	YES	NO	STANDING	MOVING	STANDING	MOVING	YES	NO	YES	NO	YES	NO	YES	NO	
	NONE	GLASS	GLASS																		
1. BART		X			X	X	X		YES	(4)	YES	(4)	X		(e)		X	(e)			X
2. CTA	X				X	X	X		YES	NO	YES	NO				X	X		(f)		
3. GCRTA	X				X	X	X	X	NO (g)	NO	YES	NO	X			X	X				X
4. MARTA		X			X	X			NO	NO	YES	NO	X	X		X	X				X
5. MBTA				X	X	X	(h)		NO	NO	YES	NO	X	X		X	X				X
6. MDCTA			X		X	X	X	X	NO	NO	YES	NO	X	(e)	X (i)	X	X			X (i)	
7. MTA-MD			X		X	X	X	X	NO	NO	YES	NO	X	(e)	X (i)	X	X			X (i)	
8. CTCUM	X				X	X	(j)		NO	NO	YES	NO	X	(e)	X (k)	X	X			X (l)	
9a. NYCTA R10-42	X		(m)	(m)	X	X	X		YES (n)	NO	YES	NO	X	X	X	X	X				X
9b. NYCTA R44-48	X				X	X	(h)		NO	NO	YES	NO	X	X	X	X	X				X
10. PATCO	(n)	(p)			X	X	X	X	NO (g)	NO	YES	NO	X		X	X	X				X
11. PATH	X				X	X			NO (g)	NO	YES	NO	X	X	X	X	X				X
12. SEPTA	X				X	X	X	X	NO	NO	YES	NO	X	X	X	X	X				X
13. TTC	X		X	(q)			X	X	NO	NO	YES	NO	X	X		X	X				X
14. WMATA	X				X	X	X	X	NO	NO	YES	NO	X	(e)		X	X				X

- (e) TRAIN END DOORS LOCKED OR CHAINED
- (f) NO CONSIST END DOOR EXCEPT ON NEW "C" CARS
- (g) REQUIRES OPERATOR ACTION
- (h) BART DESIGNED TO PERMIT PASSAGE AT ALL TIMES
- (i) "DO NOT STAND BETWEEN CARS"
- (j) AS RELATES TO EMERGENCY EVACUATION
- (k) HOWEVER SIGNAGE DOES NOT PROHIBIT MOVEMENT WHILE TRAIN STANDING
- (l) KEPT LOCKED OPENED IN AN EMERGENCY BY CREW MEMBERS
- (m) SYSTEM NOT YET OPERATIONAL
- (n) OPERATES ON 9 CAR TRAINS, WITH 3 CAR CONSISTS. NO END OF CONSIST DOORS
- (o) ANNOUNCEMENTS MADE BY CENTRAL
- (p) PLANNED
- (q) TWO CONFIGURATIONS OF THE R-40 OPERATE. SLANT FRONT CARS HAVE PANTOGRAPH GATES AND HANDHOLDS
- (r) A MORE RESTRICTIVE SIGN IS TO BE POSTED
- (s) 4 CHAINS ONLY AT R ENDS
- (t) HANDHOLDS AT F ENDS
- (u) ONLY GLOUCESTER CARS HAVE SWINGING DOORS

TABLE 2
END DOOR SIGNS

1. **BART** - DO NOT STAND BETWEEN CARS
2. **CTA** - ENGLISH/SPANISH: WARNING DO NOT CROSS WHILE TRAIN IS MOVING (a)
3. **GCRTA** - WARNING: DO NOT PASS BETWEEN CARS WHILE TRAIN IS MOVING
4. **MARTA** - DO NOT ENTER NO PASSAGE EXCEPT IN EMERGENCY
5. **MBTA** - NO PASSING THROUGH/DO NOT LEAN AGAINST THE DOORS
6. **MDCTA** - DO NOT CROSS BETWEEN CARS. EMERGENCY USE ONLY SYMBOL PROHIBITING MOVEMENT
7. **MTA-MD**: DO NOT CROSS BETWEEN CARS. EMERGENCY USE ONLY SYMBOL PROHIBITING MOVEMENT
8. **CTCUM** - FRENCH/ENGLISH: IT IS FORBIDDEN TO PASS THROUGH THIS DOOR
9. **NYCTA** - ENGLISH/SPANISH: WARNING DO NOT CROSS BETWEEN CARS WHEN TRAIN IS MOVING (b) SYMBOL PROHIBITING MOVEMENT
10. **PATCO** - SYMBOL PROHIBITING MOVEMENT. DO NOT PASS BETWEEN CARS WHILE TRAIN IS IN MOTION
11. **PATH** - PASSING TO NEXT CAR PROHIBITED WHILE TRAIN IS IN MOTION
12. **SEPTA** - NO PASSING THROUGH (c)
13. **TTC** - 1. DO NOT WALK BETWEEN CARS (PICTOGRAPH)
2. IN EMERGENCY PRESS LEVER DOWN - SLIDE DOOR OPEN
14. **WMATA** - NO PASSAGE - EXCEPT IN EMERGENCY

(a) ENGLISH: COLORS ARE WHITE LETTERS ON RED
SPANISH: COLORS ARE BLACK LETTERS ON WHITE

(b) NYCTA PLANS TO POST A NEW SIGN IN BOTH ENGLISH AND SPANISH WHICH WILL CONVEY THE FOLLOWING TYPE MESSAGE, "DO NOT USE THIS DOOR. FALLING BETWEEN CARS KILL MORE RIDERS THAN ALL OTHER ACCIDENTS COMBINED."

(c) THE NEW BROAD STREET CARS SIGN. THE OLD CARS, WHICH ARE BEING PHASED OUT, HAVE THE FOLLOWING SIGN "DO NOT PASS WHILE TRAIN IS IN MOTION."

TABLE 3
NYCTA FATALITIES - BETWEEN CAR MOVEMENT

	TIME	SEX	AGE	STATION			TUNNEL	CURVE	# CARS	PEAK PERIOD	
				AT	APPR	LEAVE					
1	1952	M	22		✓				5		
2	1950	M	33						10		
3	1207	M	24			✓			5		BOARDED B/W CARS
4	1634	F	4	✓					8	✓	
5	2030	M	29			✓			5		
6	1831	M	15	✓					10	✓	
7	1634	M	40				✓		8	✓	
8	1627	M	31				✓	✓	11	✓	
9	2058	F	18				✓		8		
10	2022	F	50				✓		10		
11	2115	M	71				✓				
12	2040	M	16				✓		10		
13	1810	M	54			✓		✓	10	✓	
14	1717	M	24					✓	8	✓	
15	2018	M	31			✓			4		
16	2017	F	17			✓		✓			
17	1707	M	32	✓					9	✓	ATTEMPTED DETRAIN FROM B/W
18	1758	M	20	✓						✓	ATTEMPTED DETRAIN FROM B/W CARS
		M	21	✓							
19	1928	M	22				✓		10		
				5	1	5	3	8			

FIGURE I
MODIFIED NTSB TABLE 4

Policy on passenger movement on rail rapid transit system

	Is Passenger Movement Permitted in Emergency?		Passenger Permitted to Pass Between Moving Cars Normally		Walkway Protection e			Subcar Protection f		Are End Doors Locked?		Public Address Announcements By Operator Discouraging Movement Between Moving Cars		Total Between-Car Accidents 1977-1981		Communications Between Operator and Passengers		Communications Between Central & Passenger	
	Standing	Moving	Yes	No	Chairs	Yes	No	Standing	Moving	Yes	No	In	Fat	Yes	No	Yes	No		
					0	2	3												
1. BART	Yes	Yes	X		0				No	No			0	0					
2. CTA	Yes	No		X					No	No			1	2					
3. GCRTA	Yes	No		X					No	No			0	0					
4. MARTA	Yes	No		X					No	No			0	0					
5. MBTA	Yes c	No		X					Yes	Yes			0	0					
5a. NYCTA 44-46	Yes	No		X					No	No			164	21					
5b. NYCTA R44-R-46	Yes	No		X					Yes	Yes			4	0					
7. PATCO	Yes	No		X					No	No			0	0					
8. PATH	Yes	No		X					No	No			4	1					
9. SEPTA	Yes	No		X					No	No			2	1					
10. WMATA	Yes	No		X					No	No			0	0					
11. MDCTA	Yes	-	-	-	-	-	-	-	No	-	-	-	-	-					
12. MTA-MD	Yes	No	-	-	-	-	-	-	No	-	-	-	-	-					

D to permit passage while moving (completely enclosed)
N removed as a safety hazard
When crew unlocks doors
NYCTA injury data not reported by type car

END DOOR SIGNS

- 1. BART - DO NOT STAND BETWEEN CARS
- 2. CTA - English/Spanish: WARNING DO NOT CROSS WHILE TRAIN IS MOVING
- 3. GCRTA - WARNING: DO NOT PASS BETWEEN CARS WHILE TRAIN IS MOVING
- 4. MARTA - DO NOT ENTER NO PASSAGE EXCEPT IN EMERGENCY
- 5. MBTA - NO PASSING THROUGH DO NOT LEAN AGAINST THE DOORS
- 6. NYCTA - English/Spanish: WARNING DO NOT CROSS BETWEEN CARS WHILE TRAIN IS MOVING
- 7. PATCO - DO NOT PASS BETWEEN CARS WHILE TRAIN IS IN MOTION
- 8. PATH - PASSING TO NEXT CAR PROHIBITED WHILE TRAIN IS IN MOTION
- 9. SEPTA - DO NOT PASS WHILE TRAIN IS IN MOTION
- 10. WMATA - NO PASSAGE EXCEPT IN EMERGENCY
- 11. MDCTA - System not in operation, policy to be determined
- 12. MTA-MD - System not in operation, policy to be determined

e. Another method of walkway protection? _____

f. Type of protection. Diaphragm _____ Pantograph gates _____ Other _____

g. Type of doors @ R & F ends (sliding, swinging) R _____ F _____

h. Any recent policy changes re end doors? _____

i. Public education program re hazards associated with use of end doors?
In schools _____ Printed data _____

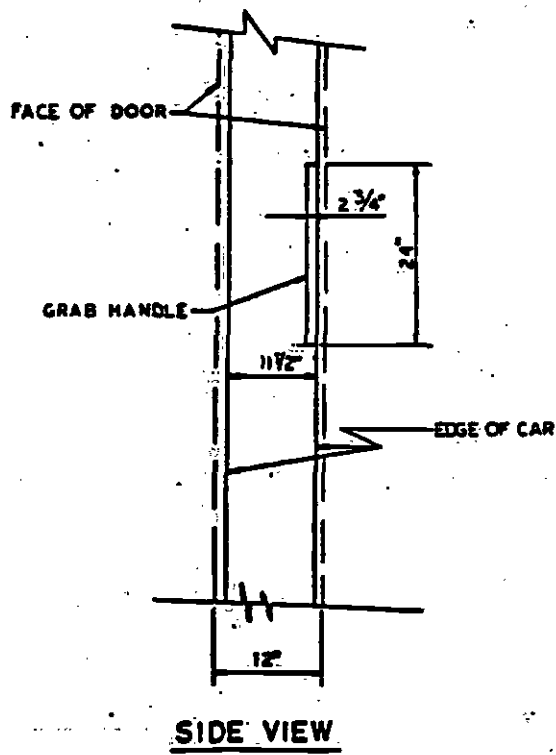
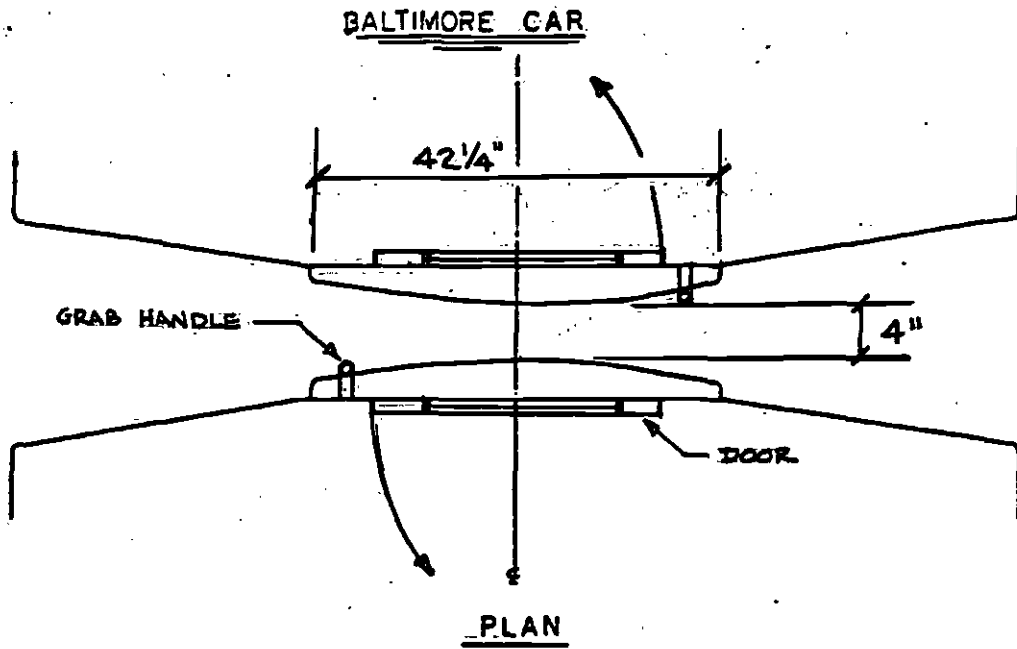


Figure 2 - Baltimore Car: Intercar Separation