

MIFACE Investigation Report: #13MI019

Subject: Bus Driver Died While Attempting To Open Bus Doors While Bus Was Moving

Summary



Figure 1. Overview of Incident Scene

In winter 2013, a female bus driver in her 40s died when she was run over by her bus while attempting to re-enter the bus as it moved forward in a parking lot. The decedent arrived at her last stop on the north end of her bus run and drove her bus into the parking lot. The bus faced east and was positioned near the top of a slight downward slope in the parking lot. The bus wheels were turned to the right. The decedent opened the front bus door and the only passenger on the bus de-boarded. The back door of the bus was closed when the decedent de-boarded after the passenger. The bus transmission was in Drive. The decedent did not set the parking brake. The back door was closed - if the back door was open, the bus would not move. After she de-boarded, the bus began to move forward and the front door closed. In an attempt to stop the moving bus, she ran alongside it and tried to place her hands between the front door flaps to push the doors apart so she could re-board the bus. The front wheels of the bus ran over her foot and up her leg, causing her to fall down. A bystander attempted to move her away from the path of

the bus, but was unsuccessful. As the bus continued to move forward, the rear wheels ran over her. Witnesses called for emergency response. The bus stopped after colliding with two parked, unoccupied vehicles. The decedent was transported to a local hospital by ambulance and was declared dead at the hospital.

MIFACE investigators identified the following items as key contributing factors in this incident:

- Standard operating procedures for shutting down the bus were not followed - the bus was not placed in Neutral with the parking brake applied when the decedent disembarked.
- Attempting to re-enter moving vehicle
- Safety checks made by the safety officer did not include bus shutdown procedures

RECOMMENDATIONS

- Employees should be instructed to never try to re-enter a moving bus.
- Transit authorities should extend the bus driver audit of driving work practices to include the driver's conformance to bus securement policies when leaving the bus unattended.
- Transit authorities should label bus door controller positions for clarity.
- Employers who require commercial motor vehicle (CMV) drivers to be medically certified (either by law and/or per company policy) should require the use of medical professionals knowledgeable of the requirements of 49 CFR 391.41-.49 to determine the physical fitness of the driver.
- Police departments should ensure an adequate number of radio dispatchers are on duty to handle radio traffic in a timely manner.

Recommendation to Bus Manufacturers: Install a seat safety switch or similar interlock mechanism to turn the engine off and apply a parking brake if the driver leaves the seat prior to placing the bus in Park.

BACKGROUND

In winter 2013, a female bus driver in her 40s died when she was run over by her bus while attempting to re-enter the bus as it moved forward in a parking lot. MIFACE was notified of this fatality by the MIOSHA 24-hour ASAP hotline. MIFACE contacted the transit authority's Director of Fixed Route Services (FRS Director), who agreed to speak with the MIFACE researcher. The FRS Director escorted the MIFACE researcher to the bus garage and permitted the researcher to take pictures of a similar make and model of bus involved in the incident. During the course of writing this report, MIFACE reviewed the decedent's death certificate, medical examiner and police reports, and the MIOSHA file. Pictures used in the report are courtesy of the responding police department (Figures 1, 2, and 3) and those taken during the MIFACE on-site visit (Figure 4). The pictures have been altered to remove transit authority identifiers.

The transit authority has been in business for more than 50 years and employed more than 400 individuals. Approximately 150 individuals had the same job title as the decedent, bus driver. The decedent was a full time, hourly worker and was represented by a union. The decedent was not wearing any personal protective equipment. The decedent was hired in as a bus driver. She worked 8-hour days with no overtime. It was unclear when her work shift started; the MIOSHA compliance officer indicated it began at 10:00 a.m. and the FRS Director indicated it started at 6:30 a.m. She had been employed for 5 years and had 5 years experience driving this type of bus.

The transit authority had a written health and safety plan in English. There were written safety rules and procedures in place for the specific task being performed by the decedent. The company developed these procedures in-house. The transit authority's FRS Director had on-the-job experience and had taken some safety classes. The FRS Director reported to the Managing Director who reported to the Transit Authority Board.

The transit authority required each bus driver to have a base Chauffeur license in addition to a Michigan Commercial Driver's License (CDL) with "Passenger" and "Air Brake" endorsements. The transit authority was designated as an excepted intrastate employer for CDL purposes; thus no medical certificate was required by law for the bus drivers. The transit authority exceeded federal/State CDL requirements and mandated each bus driver have their personal physician medically certify them per DOT protocol as physically qualified to operate a commercial motor vehicle (bus) and issue the driver a medical examiner's certificate (also known as a medical card) signifying such. The drivers were responsible to provide copies of the medical card to the transit authority.

In addition to the CDL-required training, the transit authority provided a significant number of hours of classroom and on-the-job safety training to each bus driver. The decedent had attended these training sessions. Training records were maintained and training effectiveness is measured by both testing and demonstration. Prior to driving alone, the drivers were accompanied by experienced drivers and/or the safety manager to show they were competent in performing the bus driving tasks before being allowed to drive the bus alone. After demonstrating their competence, random audits of bus operators while driving their routes were made by the safety manager to document compliance with traffic laws and transit authority policies and procedures and indicate what retraining may be necessary when the driver was observed to not comply with traffic laws and transit authority policy and procedure.

There was a health and safety committee composed of both management and labor representatives. The Committee met as needed. Safety meetings were held monthly at the time of the incident. There is a written disciplinary policy.

Company Response to Death

- The transit authority has increased the number of safety meetings from once a month to at least two times per week.

- A follow-up survey was conducted regarding driver work habits pertaining to bus securement during their break times. The survey found that a number of drivers were not following the company procedure for bus securement – they were not placing the bus in neutral and applying the parking brake when leaving the bus driver seat. Retraining was conducted with each bus driver regarding the proper bus securement procedure.

Standard Operating Procedures relevant to this incident were Securing a Bus and Door Controller. The Procedures are contained in Appendix A.

MIOSHA General Industry Safety Division compliance personnel did not issue violation citations to the transit authority at the conclusion of its investigation.

INVESTIGATION

The bus involved in the incident was a 1996 New Flyer Model D40LF. Two safety features of the bus included the: 1) a back passenger exit door interlock system designed to back the throttle down to idle and hold the vehicle in place while passengers were de-boarding and, 2) automatic front door closing when bus speed exceeded three miles per hour (mph). The two front half-doors of the bus did not touch – there were two large rubber flaps that overlapped. The doors could be opened by placing two hands between the flaps and pushing the doors apart. Additionally, the doors could be pushed closed by hand. If the driver’s side window was open, bus drivers could open and close the front door by reaching in the window and using the door controller lever.

The decedent’s bus route was a familiar route for her. The decedent arrived at her last stop on the north end of her bus route. After entering the commercial strip mall parking lot via the roadway entrance

driveway, she drove the bus to the north end of the parking lot. It was cold that day. The parking lot asphalt surface was dry with clearly marked parking spaces. There were no obvious flaws in the parking lot that would have contributed to this

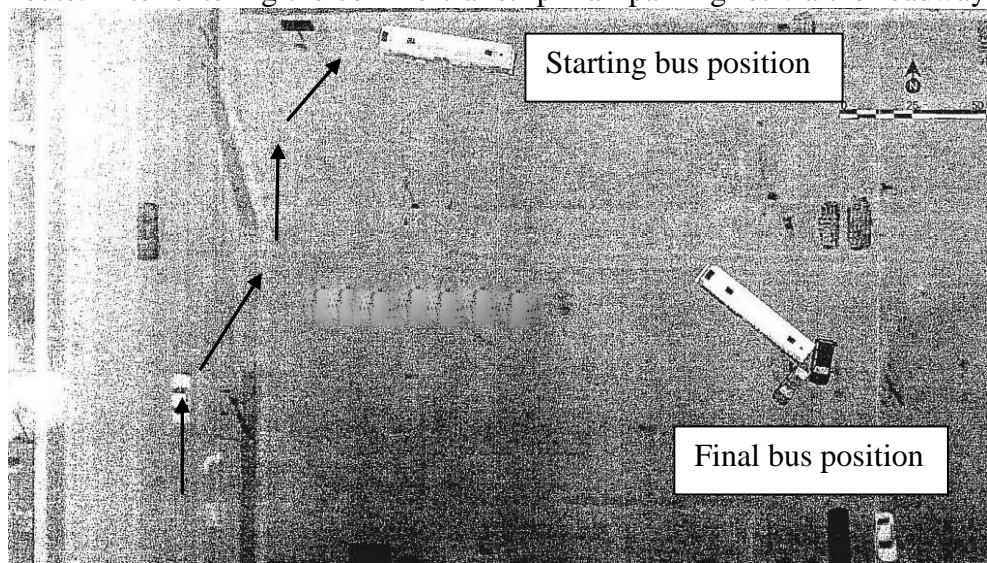


Figure 2. Police report overhead of incident scene

incident.

The bus was situated so it faced east and was positioned near the top of a slight downward slope in the parking lot. The bus wheels were turned slightly to the right, toward the center of the parking lot.

Witness A was the last passenger on the bus. Witness A left the bus via the front passenger door and the decedent followed him off the bus without setting the parking brake or placing the transmission in Neutral. The decedent was characterized as a heavy smoker by the FRS Director. The FRS Director postulated that she may have disembarked to smoke a cigarette.

As Witness A was walking toward the store he stated to the responding police department that he heard the decedent yelling “Whoa, Whoa, Whoa!” Witness A looked back to see the bus moving forward. Because the wheels were turned toward the center of the parking lot, the bus was moving forward toward the middle of the parking lot in a slight arc. Witness A stated he saw the decedent running alongside the bus, trying to push open the front doors with her hands. The front doors had automatically closed as the bus picked up speed and surpassed three mph. Witness B, who was walking to the bus with the intention of boarding the bus also saw the decedent running alongside the bus. Witness B stated that the decedent tried to get back into the bus, but that she had fallen under the bus. It appeared that the right front wheel first caught the decedent’s left leg, causing her to fall. The bus then ran over both of her legs. Witness A stated he ran back to try to pull the decedent out of the way of the moving bus, but was unsuccessful. The rear wheels of the bus ran over her upper body.

Emergency response was called. The bus continued across the parking lot and collided with two unoccupied parked vehicles, stopping its forward momentum. The police department was first on scene. After parking his vehicle and quickly surveying the incident scene, the police officer attempted to contact Central Communications by portable radio to advise them there was a subject down at the scene and to have medical personnel “step it up” due to the decedent’s medical issues. Due to the volume of radio traffic on the air, the officer was not able to get through to Central Communications. The officer noticed an ambulance traveling on a nearby roadway and flagged it down. Ambulance personnel responded and took over patient care. The officer then went to his patrol car and contacted Central Communications by radio, advised them of the incident



Figure 3. Final resting position of bus against parked cars

scene status (ambulance personnel and the decedent's medical status), the need for a paramedic, and to send investigation assistance.

Witness A who was assisting the decedent when police arrived stated he saw the bus hit the two parked cars. The police officer then went to the stopped bus. He entered the bus through a now open front door. He noted that the bus was in gear and the parking brake was not engaged. The officer located the transmission control panel and pushed the neutral button. The bus settled back slightly, indicating to the officer that the bus had shifted from drive to neutral when the neutral button was pressed. He also activated the parking brake.

Emergency personnel transported the decedent to a local hospital where she was declared dead.

CAUSE OF DEATH

The cause of death as listed on the death certificate was multiple blunt force injuries due to a pedestrian/bus collision. Blood toxicology contained prescription medication that may have been a factor in this incident.

RECOMMENDATIONS/DISCUSSION

- Employees should be instructed never to try to re-enter a moving bus.

An individual's natural instinct is to try to stop their moving vehicle by getting back into the vehicle. This obviously creates safety issues. Operators should be instructed that they are not to attempt to re-board a moving vehicle. The decedent's best safety action would have been to yell to warn pedestrians about the uncontrolled bus while staying out of the bus path and let the bus come to rest instead of trying to get back into the bus.

- Transit authorities should extend the bus driver audit of driving work practices to include the driver's conformance to bus securement policies when leaving the bus unattended.

Although the transit authority had a written Health and Safety Program, had specific standard operating procedures for securing a bus and the bus door controller, had performed training, including observing the driver both during the training period, and audited work practices while working alone, the tragedy still happened.

The transit authority, after the incident, found out through employee interviews, that a larger number than expected did not follow the bus securement procedure, even though they had been trained on the procedure. These drivers had developed the same work habits as evidenced by the decedent. Management systems and their associated policies and procedures depend upon the actions of individuals and groups for their successful implementation. The firm's safety program detailed the responsibilities of each individual, and the procedures reflected the desired intent and were written to provide the appropriate instructions. However, the successful execution of the program required the actions of properly trained individuals who understood the importance

of the underlying intent, who accepted their responsibility for the task, and who understood that taking a potentially unsafe shortcut would be, quite simply, wrong and not acceptable. This understanding did not occur and the tragedy resulted.

The transit authority conducted retraining with each bus driver regarding the importance of following the established procedures. As part of the Health and Safety Program, the transit authority conducts “spot checks” (audits) of driving behavior and conformance with traffic laws should be commended. MIFACE encourages the authority to also conduct a “spot check” of the driver’s conformance to bus securement.

- Transit authorities should label door controller positions for clarity.

The bus door controller positions were unlabeled, possibly contributing to the complacency of the driver as she left the bus. If the controller positions were labeled, it would be easy for the driver to see what position the controller is in and potentially trigger an awareness of the bus securement procedure.



Figure 4. Unlabeled Door Controller Lever

- Employers who require commercial motor vehicle (CMV) drivers to be medically certified (either by law and/or per company policy) should require the use of medical professionals knowledgeable of the requirements of 49 CFR 391.41-.49 to determine the physical fitness of the driver.

Because the transit authority was an *excepted intrastate* employer, it was not mandated by law to have the bus drivers (who drive a commercial motor vehicle (CMV)) receive a CMV driver medical examination to determine the driver’s physical fitness in accordance with the requirements of 49 CFR 391.41-.49.

The transit authority made the determination as part of their Health and Safety Program to require the CMV medical examination and receive a medical examiner certificate (medical card) indicating qualification for duty. MIFACE encourages other transit authorities to adopt this requirement for transit bus drivers.

The transit authority relied on the medical professional selected by the bus driver to conduct the medical examination. Upon receiving the medical examiner certificate (medical card), the driver was required to carry the card while on-duty and give a copy of the card to the transit authority’s human resources department.

Employers whose drivers are required to be medically certified or who voluntarily require medical certification should ensure that the medical professional selected be knowledgeable of the 49 CFR 391.41-.49 requirements and guidelines and be familiar with the driver's responsibilities and work environment to make the qualification determination. In addition to reviewing the Health History section with the driver and conducting the physical examination, the medical professional should discuss common prescriptions and over-the-counter medications relative to the side effects and hazards of these medications while driving.

On autopsy, it was found that the decedent was taking medications which would disqualify her from obtaining medical certification unless the medical examiner reviewed their usage and made a determination that the driver was fit to drive while using these medications. The FMCSA has issued Advisory Criteria to assist medical professionals to determine if a driver meets the physical qualifications for commercial driving. Medical professionals performing CMV examinations should be familiar with these Advisory Criteria.

As of May 21, 2014, a new program of the Federal Motor Carrier Safety Administration (FMCSA) will require medical professionals conducting medical certificate examinations and issuing medical certificates (medical cards) be listed on the National Registry of Certified Medical Examiners (National Registry). The National Registry will list medical examiners (MEs) who have been trained, tested and certified to perform medical examinations for commercial motor vehicle (CMV) drivers in interstate commerce. These MEs fully understand the medical standards in the FMCSA Regulations, related guidance and how they relate to the medical demands of operating a commercial motor vehicle.

Currently all interstate commercial motor vehicle (CMV) drivers are required to have a valid medical certificate signed by a medical professional. The only change created by the implementation of the National Registry is that by May 21, 2014, all CMV drivers must be examined by a ME who is listed on the National Registry. Unless excepted/exempt from the medical certificate requirements (which public transit drivers are), FMCSA requires all interstate drivers, **and Michigan law requires all intrastate drivers** to be medically certified, and starting in May 2014 only exams completed by a medical examiner in the national registry will be valid for either interstate **or intrastate drivers**.

The transit authority, by company policy, essentially utilized the medical standards mandated by the FMCSA to determine driver qualification for duty by requiring a medical examination and medical card. MIFACE recommends that the transit authority continue to use the FMCSA medical standards instead of creating their own medical standards for drivers after their medical card expires.

After May 21, 2014, the only individuals authorized to issue a medical certificate (medical card) will be individuals who are listed in the National Registry. MIFACE recommends that employers, who by current company policy require a CMV medical examination and medical

certificate continue to do so and either directly contract with or direct their employees to the [National Registry \(https://nationalregistry.fmcsa.dot.gov/NRPublicUI/home.seam\)](https://nationalregistry.fmcsa.dot.gov/NRPublicUI/home.seam) for the list of authorized medical professionals.

- Police departments should ensure an adequate number of radio dispatchers are on duty to handle radio traffic in a timely manner.

In this incident, the first time the responding police officer tried to make contact with dispatch using his portable radio, he could not because of the volume of radio traffic. Several minutes elapsed before the officer was able to make contact by using the radio in his patrol car. While in this incident, immediate contact with dispatch was not life threatening due to the extent of the decedent's injuries, a delay could be life threatening, not only to the individual but also to the responding officer.

Recommendation to Bus Manufacturers: Install a seat safety switch or similar interlock mechanism to turn the engine off and apply a parking brake if the driver leaves the seat prior to placing the bus in Park.

In this incident, the bus driver left the seat with the bus in gear and the engine running. It appeared that this was a common practice among this entity's bus drivers. This model of bus is equipped with an interlock that prevented the bus from moving when the back door was open, indicating that the bus drive train was capable of accepting an interlock signal that prevented the bus from moving. Seat occupancy sensors are widely used in the automotive industry for controlling airbag deployment, for example, and seat occupancy switches are used to improve the safety of lawn tractors, forklifts, and other equipment.

To prevent a future similar incident, MIFACE recommends that bus manufacturers install a seat interlock switch that would prevent the bus from moving if the driver seat was not occupied.

KEY WORDS: Transit authority, bus driver, boarding bus, Transportation

RESOURCES

- Federal Motor Carrier Safety Administration (FMCSA) Subpart E - Physical qualifications and examinations § 391.41 Physical qualifications for drivers. <http://www.fmcsa.dot.gov/rules-regulations/administration/fmcsr/fmcsrruletext.aspx?reg=391.41>
- Transit Bus Resource Guide. <http://www3.cutr.usf.edu/bussafety/>
- Linx Operator's Guide and Work Rules. <http://www.transitoperations.org/distracteddriving/policies/Lynx.pdf>
- American Public Transportation Association <http://www.apta.com/Pages/default.aspx>

- MIFACE Investigation Report #03MI025: *DPW Worker Run Over by Pickup Truck While Exiting the Vehicle to Open an Overhead Garage Door.*
<http://www.cdc.gov/niosh/face/stateface/mi/03mi025.html>

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Appendix A

Securing a Bus

A properly secured bus is one that is parked in a safe place and all reasonable precautions have been taken to ensure the safety of the vehicle and its contents, until moved by an employee of the Authority. It must be protected from accidents, vandalism, and adverse weather conditions.

To properly secure a bus, the operator must:

- a) Place the gear selector control into neutral
- b) Set the emergency brake
- c) Turn the front wheels toward the curb
- d) Use emergency flashers when the application is necessary in your opinion
- e) Close all doors and windows
- f) Shut the vehicle off
 - a. When a Peak Route bus operator finds it necessary to leave their vehicle, the vehicle must be shut off and secured to prevent students or other unauthorized persons from entering the vehicle. (NOTE: When operating the RTS II Series IV follow the shut down procedure as noted on the bus known as Idle Down)

Door Controller

The door controller is a five position switch that allows you to open or close one or both doors. The driver is responsible for making observations and following safety procedures when operating the doors.

Please follow the instructions listed below to insure passenger safety.

1. Your vehicle must be at a complete stop before opening the door.
2. The doors should be closed before putting the vehicle into motion.
3. Before moving the handle;
 - a. With your foot firmly on the brake, look at the door you are preparing to open or close.
 - b. Front door - look in your outside mirrors, look at the approach, in front of the vehicle, beside the vehicle for approaching or departing passengers.
 - c. Back door - look in the convex mirror for passengers in stairwell, near the doors or near the side of the vehicle, Look in your side mirror for passengers standing near the vehicle.
 - d. Close one door at a time - make it a habit to look at the door you are closing, checking for passengers, then when clear, shut the door. Carefully check the other open door, follow safety procedures before shutting the door.
4. When the doors are closed, then prepare to put your vehicle in motion by focusing your attention on checking traffic lights, traffic conditions, pedestrian traffic and potential passengers. When clear and safe, proceed.
5. You may open both doors by pushing the handle all the way forward or pulling the handle all the way toward you. Before shutting any door, check the position the handle is in before moving it. You must take great care not to catch a passenger in a door, if you decide to close one door while leaving the other door open. Practice these steps to insure passenger safety.

(The handle is pushed all the way forward, the entire waiting passenger has boarded but several more passengers are exiting at the back door)

6. To close the front door while leaving the back door open:
 - a. Quickly pull the handle all the way toward you into the opposite, fully opened position.

- b. Move the Handle one position to close only the front door
 - i. Practice this when no passengers are present. Do not do this without thinking about it carefully or checking the system for correct operation.
- 7. The back door has an interlock system that is designed to back the throttle down to idle and hold the vehicle in place while passengers are de-boarding through the back door. Check operation by placing the back door in the open position and apply slight pressure to the accelerator. The accelerator should not work.

DO NOT USE THE BACK DOOR AS A PARK BRAKE. It can overheat and fail. The vehicle must be placed in neutral and the park brake applied whenever you will sit still for more than a minute.

If the door alarm rings when you close the back door, place the switch into the open position and check that there is not a passenger or any object in the doorway. If no person or object is present, shut the door. If the alarm continues to ring, place the door in the closed position, place your vehicle in neutral, and quickly turn the ignition switch to off then right back on. This cuts the electrical supply to the alarm and resets it to off.