UNITED STATES OF AMERICA

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

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Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 1st day of August 1973.

FORWARDED TO:
Hon. Alexander P. Butterfield
Administrator
Federal Aviation Administration
800 Independence Avenue, S. W.
Washington, D. C. 20591

SAFETY RECOMMENDATION I-73-2

The newest surface transportation vehicle in use at the Dulles International Airport, as well as other airports, is a mobile lounge called the Plane-Mate. This is a special purpose vehicle that is used to transport up to 150 arriving or departing air passengers between the terminal and large commercial jet aircraft parked at remote distances from the terminal.

The Dulles Airport is owned and operated by the Federal Aviation Administration (FAA). Accordingly, ownership and operating responsibility for the Plane-Mate vehicles falls under FAA. These mobile lounges used at other airports are owned and operated either by individual airlines or by the terminals.

This new vehicle has many new features not found on the older mobile lounges currently in use at the Dulles Airport, although the basic operating concept of the older and later units is fundamentally the same.

The new vehicle consists of a passenger pod suspended on a chassis which may be raised by the driver-operator to mate with the entrance to the jet aircraft, and lowered to chassis level for intransit operations. The maximum height to which the pod may be raised is to a point where the floor is 18 feet 8 inches above the ground level, although the normal operating height for the aircraft interface is approximately 14 feet.

The vehicle is driven from the front end, and mates with both the aircraft and the terminal dock at the front end of the pod by the means of an extendible loading ramp operated by the driver. There also are two emergency escape doors at the rear of the pod, each of which contains an electrically powered extension stair.

The chassis is made up of the frame, the suspension system, the steering and braking system, and the pod raising and lowering equipment. The propulsion engine, a V6 diesel and transmission, is mounted on the frame. This engine is fed by a 50-gallon fuel tank through flexible hoses. The accessory electrical power generator is driven by a 3-cylinder diesel engine mounted on the frame opposite the propulsion engine. Fuel for this engine is contained in a 40-gallon tank installed beside the propulsion tank.

A recent review of the Plane-Mate vehicle has revealed some safety problem areas in which the hazards and risks do not appear to have been fully evaluated. These safety problem areas are of concern to the National Transportation Safety Board.

There are two areas of particular concern to the Safety Board. First is the possibility of a fire on the Plane-Mate as a result of the large fuel tanks, the location of those tanks in proximity to heat sources, and the use of flexible hoses as fuel lines. Second is in the area of passenger escape should a fire occur when the pod is partially or fully raised to mate with the aircraft.

Experience has shown that in aircraft accidents which produce a post-crash fire, the maximum time available for the passengers to escape from the fuselage before the effects of the fire become intolerable varies from approximately 1 1/2 to 2 minutes.

The Plane-Mate is not unlike an aircraft fuselage in material makeup or design.

Several operating situations with this vehicle involve hazards that constitute significant risks. For example, in the worst case situation that could be postulated, the mobile lounge would be parked in the correct position to load an aircraft with the pod raised, the front ramp not extended, and the door closed, when a fire occurred in the chassis area. The fire would threaten the safety of the passengers and the driver so that it would be necessary for them to evacuate the vehicle. If the accessory generator motor continued to operate, the driver could extend the ramp, get the aircraft door open, and direct his passengers into the aircraft. This would be

accomplished under panic conditions, with flame and smoke rising around the windows. The rear doors on this model can be opened by any one, and the stairs extended. If this were done, the bottom of the stairs still would remain from 10 to 14 feet above the ramp, depending on the height to which the pod had been raised, necessitating a large drop to be executed by the passengers.

If the generator motor should fail because of the fire or other reasons, it would be impossible for the driver to extend the off-load ramp to the aircraft or to lower the rear escape stairs since, according to the schematic drawings of the electrical power system, the motors driving these systems would be without power. Thus, to effect evacuation, the driver could lower the pod into the fire at chassis level, which would require approximately 1 minute, and then evacuate the passengers through the front exit beneath the plane which would include a 3- to 4-foot drop to the ground from the end of the ramp. This evacuation would be difficult to achieve in less than 1 minute. In fact, the pod could not be lowered at all if the battery power were interrupted by the fire or a failure. A manual lowering release located on the chassis probably could not be reached and operated in such a fire.

If the propulsion engine continued to be operable, the mobile lounge could be backed away, which would remove the danger from the aircraft, but cut off the route for the passengers to evacuate into the aircraft. On the other hand, if the passengers were to be evacuated into the aircraft, it would be necessary for the flightcrew not to move the aircraft. If the fire in the mobile lounge were of sufficient intensity, it could endanger the aircraft. Depending upon the location of the mobile lounge and the other surrounding obstacles, it might not be possible to move the aircraft without literally running it through or over the lounge or some other vehicle or structure with the further risk of transferring the fire to the aircraft itself. Depending upon the intensity of the fire and the success of firefighting forces, it probably would be advisable for the aircraft captain to order an emergency evacuation of the aircraft, using the emergency evacuation slides on the side of the aircraft opposite the fire.

The fire could be caused by several different means and involve the approximately 90 gallons of fuel carried in the tanks. Some examples are:

1. The flexible hoses between the tank and the engine might catch on a foreign object and pull loose at the engine end, allowing fuel to syphon onto the ramp beneath the hot engine mufflers.

2. A utility or other vehicle or an aircraft might go out of control or otherwise accidently hit the Plane-Mate chassis in the fuel tank area, either rupturing the tanks or damaging the flexible hoses, releasing fuel to ignite.

3. A short in the 12-volt D. C. battery and the associated wiring could result in an electrical fire.

Although the likelihood that a fire as postulated above may occur is probably small, the Safety Board is concerned that there is no documented evidence that these risks have been considered, and the total vehicle system analyzed to determine whether these or other hazards exist.

The National Transportation Safety Board therefore recommends that the Federal Aviation Administration:

I-73-5 Initiate an investigative safety effort for the Plane-Mate vehicle to assess the risks described above, and to identify any other existing hazards and risks. This program might include design studies of the fuel system, and operational demonstration tests as practicable, as well as safety analysis of the vehicle system to identify any hazards that may exist in other than the fire area.

The results of these efforts should be applied to removing the hazard, or reducing the likelihood that the hazard will be activated into an accident, so that the risks are understood and controlled.

Areas that might be considered in the potential fire and evacuation problem might include for example:

1. A design study of the tanks to determine their frangibility on impact, and the possibility of fuel syphoning in the event that the flexible fuel lines are torn loose.

2. A determination of the time required to exit 90 to 150 people under various operating conditions. Special emphasis might be placed on the pod elevated, using existing equipment in the present configuration with the motor generator both operating and shut down.

3. An operational evaluation to determine the vulnerability of the vehicle to collisions as suggested above or by other means.

4. The ability of the pod/vehicle raceway, and the control wire harness to retain integrity during a fire. Some fire rating should be established that would allow continued operation for passenger escape.

5. The trade-off decisions to be made by the driver and the alternatives available at the time these emergency conditions occur should be determined and documented for use both in driver training and as emergency operation rules. For example, the decision of whether to lower the pod or to use an alternative evacuation route must be made. The driver needs some criterion available to guide these decisions.

6. The merit in replacing the present rear stairs assembly with the stairs optional equipment which reach the ground from any pod elevation, to be powered both by the generator and the battery as a backup.

7. The suitability of the rear stair-lowering controls as to location and method of operation by passengers, under panic or near panic conditions.

8. The adequacy of the escape door width to accommodate all sizes of passengers.

9. The feasibility of adding a driver-operated fire extinguishing system beneath the pod.

10. The resistance of the pod underfloor and side wall surfaces to heat impingement versus the time required for passenger escape, and the arrival of emergency firefighting equipment.

The National Transportation Safety Board anticipates that the hazards and risks identified by the above recommended test and safety analysis effort, together with the corrective actions taken, would be made available to other terminals or airlines currently using these vehicles. Also, these

data should be made available to the manufacturers of these vehicle equipments for use in future design efforts.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendation.

By John H. Reed
Chairman

THIS RECOMMENDATION WILL BE RELEASED TO THE PUBLIC ON THE ISSUE DATE SHOWN ABOVE. NO PUBLIC DISSEMINATION OF THE CONTENTS OF THIS DOCUMENT SHOULD BE MADE PRIOR TO THAT DATE.