



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 14, 2001

In reply refer to: M-01-11

Mr. D. Howard Pierce
President
ABB, Inc.
501 Merritt 7
Norwalk, Connecticut 06856-5308

The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendation in this letter. The Safety Board is vitally interested in this recommendation because it is designed to prevent accidents and save lives.

This recommendation addresses the adequacy of engineering systems design. The recommendation is derived from the Safety Board's investigation of the fire on board the Liberian Passenger Ship *Ecstasy* near Miami, Florida, on July 20, 1998, and is consistent with the evidence we found and the analysis we performed.¹ As a result of this investigation, the Safety Board has issued twelve safety recommendations, one of which is addressed to ABB, Inc. Information supporting this recommendation is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendation.

The fire on board the *Ecstasy* started in the main laundry and migrated through the ventilation system to the aft mooring deck, where mooring lines ignited, creating intense heat and large amounts of smoke that damaged several deck areas in the aft two main vertical zones of the ship. The affected areas included the stern thruster room, an air conditioning room, an electrical equipment room, and the steering gear room. The fire and the heat that it generated caused the partial or complete failure of several engineering and emergency systems, including propulsion. Although the loss of propulsive power did not ultimately endanger the ship and its passengers in this accident, the potential threat to vessel safety from the failure of such a vital system is significant. Hazardous situations that may result from a ship losing propulsive power include vessel grounding, inability to avoid severe weather conditions, and passenger evacuation at sea.

¹ For further information, read: National Transportation Safety Board, *Fire On Board the Liberian Passenger Ship Ecstasy, Miami, Florida, July 20, 1998*, Marine Accident Report NTSB/MAR-01/01 (Washington, DC: NTSB, 2001).

The *Ecstasy* had been built to Lloyds Register of Shipping (LR) regulations, which stipulate the need to provide independent and isolated power supplies to essential components of the vessels engineering systems, such as propulsion. The *Ecstasy's* propulsion system had many redundant features and isolated components designed to provide reliability. However, the auxiliary voltage to the high-speed breakers for the starboard and port propulsion systems was routed through the same distribution panel, which was in an electrical equipment room on the deck above the mooring station. The auxiliary voltage was essential to the operation of both propulsion systems. When the distribution panel sustained heat damage, both systems failed.

The propulsion system was designed and manufactured by ABB, a subcontractor to Kvaerner Masa, the shipbuilder. The integration of the propulsion system into the ship's other systems, notably the electrical distribution system, was the responsibility of Kvaerner Masa's designers. ABB's specifications to the shipbuilder list the required voltage and current supplying the propulsion system. The specifications do not indicate that the voltage supply should be provided by independent sources. Kvaerner Masa elected to route the auxiliary voltage for both high-speed breakers through a single external interface.

The Safety Board is aware that ABB is a major supplier of cycloconverter propulsion systems to marine customers worldwide. The Safety Board is concerned that other shipbuilders might have installed ABB propulsion systems in the same manner as the *Ecstasy's* propulsion system.

The Safety Board, therefore, makes the following recommendation to ABB, Inc.:

Advise your customers owning ships with the same propulsion system design arrangements as the *Ecstasy* of the potential for system failure from the loss of auxiliary voltage to the high-speed breakers and recommend design changes to the propulsion system that would minimize these effects. (M-01-11)

The Safety Board also issued safety recommendations to the U.S. Coast Guard, American Classic Voyages, Carnival Corporation, Inc., Carnival Cruise Lines, Crystal Cruises, Disney Cruise Line, Norwegian Cruise Line, Orient Lines, P&O Princess Cruises International, Ltd., Radisson Seven Seas Cruises, Regal Cruises, Renaissance Cruises, Inc., Royal Caribbean Cruises, Ltd., Royal Olympic Cruises, and Silversea Cruises, Ltd., and the International Association of Classification Societies. In your response to the recommendation in this letter, please refer to M-01-11. If you need additional information, you may call (202) 314-6607.

Acting Chairman CARMODY and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

Original Signed

By: Carol J. Carmody
Acting Chairman