

Log No. 1011227 Rev. 1-75-17  
**NATIONAL TRANSPORTATION SAFETY BOARD**  
WASHINGTON, D.C.

ISSUED: May 15, 1975

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Forwarded to:

Honorable Asaph H. Hall  
Acting Administrator  
Federal Railroad Administration  
400 Seventh Street, S.W.  
Washington, D.C. 20590  
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SAFETY RECOMMENDATION(S)

R-75- 17

A new electric locomotive, class E60CP, built by the General Electric Company for Amtrak derailed on February 24, 1975, during a test run on the Penn Central. The locomotive was pulling a test car and seven coaches southward on track 3 at about 100 mph when the locomotive derailed on a tangent after emerging from a 0°34' curve. The National Transportation Safety Board conducted a preliminary investigation of the derailment because of the involvement of a new type locomotive.

Instrumentation of the front truck indicated that excessive vibratory yawing occurred as the locomotive approached the point of derailment and that the derailment occurred after 10 to 15 oscillations. (See Figure 1.) Records of previous runs of about 80 mph on February 6 and 100 mph on February 13 show similar vibratory yawing of the locomotive at the same track location. The records indicate that, with the locomotive traveling at 100 mph over that section of track, some relationship between the track and the locomotive induced vibratory yawing and oscillations sustained for 8 to 16 cycles at a frequency of about 3.5 Hz. The frequency corresponded approximately to the number of joints passed by one wheel in one second.

The locomotive was designed in compliance with FRA regulations. An inspection of the locomotive following the derailment disclosed no deviation from the design specifications that is believed to have been capable of inducing this yawing nor any other condition that would explain the oscillation. It is very evident, however, that heavy lateral vibratory forces were being applied to the rails by the vibratory yawing and that one of the rails overturned while such forces were being applied.

An inspection after the derailment disclosed that while the track in general was maintained in accordance with Federal Track Safety Standards for Class 6 track, there were several joint locations immediately north of (before) the point of derailment, where the gage was excessive for Class 6 track. This excessive gage at joints could have resulted from the operation of the test train on February 21st. The fact that yawing was detected at this location on previous runs, however, suggests that some unusual relationship existed between the track and the locomotive at this location which induced the vibratory yawing.

The Penn Central advised the Board that an inspection of the track following the previous test run when yawing was encountered on February 13, 1975, disclosed that it complied with all Class 6 requirements. Many passenger trains, including both metroliners and other types of heavy electric locomotives were operated daily over this track without difficulty between February 13, 1975, and the date of the derailment. The vibratory yawing to this magnitude has been observed only with this locomotive and at one track location. It occurred once at 80 miles per hour and once at 100 miles per hour.

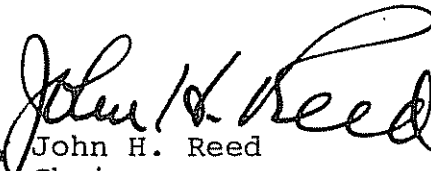
The General Electric Company contends that the locomotive is safe for operation at 100 mph. However, it is apparent that the particular locomotive which derailed sustained vibratory yawing on a track which caused no reported problem to other trains.

The derailment in this case caused little damage. However, because locomotives of this design are intended for high speed passenger service it is imperative that the sources of the vibratory yawing be identified and that the problem be definitively corrected before the locomotive type is placed in service. The Board is aware of the proposed modifications and tests by the General Electric Company and the Penn Central.

Therefore, to safeguard the public, the National Transportation Safety Board recommends that:

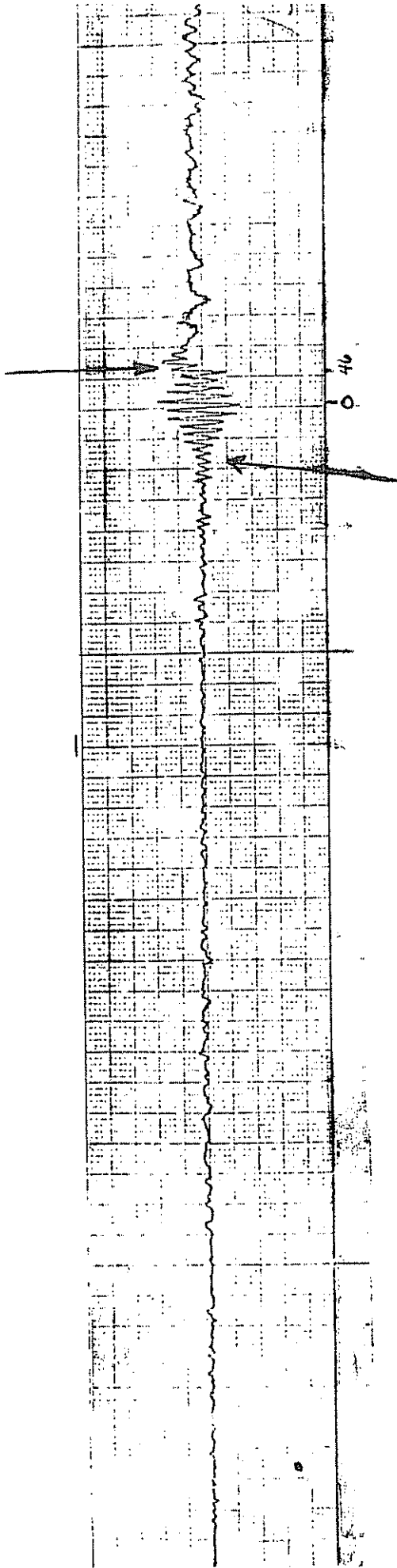
1. The Federal Railroad Administration monitor the testing of the E60CP locomotive and determine that the conditions which caused the derailment are corrected before the locomotive is placed in service, utilizing its authority under Section 203 of Federal Railroad Safety Act of 1970.

Reed, Chairman; Haley, McAdams, Thayer and Burgess, Members, concurred in the above recommendations.

  
by John H. Reed  
Chairman

VERTICAL DISTANCE  
ONE BLOCK = 1 DEGREE  
LATERAL DISTANCE  
ONE BLOCK = 1 SECOND

DERAILMENT



APPROACHING  
MILE POST 46

100 mph = 146.6 feet/ second  
3.8 oscillations per second = 38.5 feet/ oscillation

TRACE OF LOCOMOTIVE YAW  
E-60-CP ELECTRIC LOCOMOTIVE  
AMTRAK NO. 9650

FIGURE 1