



VICTIM OF AVIATION 'BUG' - An airliner of paradox, the Lockheed Electra has been thoroughly tested, scrupulously designed, carefully built - yet it was the victim of the most freakish "bug" in commercial aviation history and one that caused two fatal accidents. Above, parts of an Electra that crashed Oct. 4, 1960, are laid out in the original relationship to the plane for study. (UPI Telephoto)

Electra Defect in Wing Compared To Wheel Vibration on Automobile

By ROBERT J. STERLING (Second in a Series)

Washington - (UPI) - What went wrong with the Lockheed Electra?

Contrary to all rumors, reports and statements, it does not have a structurally deficient wing. Its difficulties originated not in the wing, but rather the mounts holding the outboard engines in their nacelles.

This was the weakness which touched off a deadly, freakish chain reaction culminating in the destruction of two Electras at Buffalo, Tex., and Tell City, Ind. In chronological order, this is what happened.

1. Under certain strains and stresses, such as a hard landing or severe turbulence, these mounts could be weakened - and unquestionably were in both the Texas and Indiana accidents.

2. Once weakened, the mounts were exposed to a potential source of trouble - the normal sound vibration created by the flexing of the wings, the spinning jet turbines and the propellers themselves; wing vibration on all aircraft, it must be remembered, is at a much lower rate than engine-prop vibration.

3. Each aircraft was traveling more than 400 miles an hour when it encountered turbulence; the combination of speed and gusty air "excited" the already weakened engine mounts and the affected outboard engine began to wobble in its nacelle.

4. The wobbling engine transmitted its uneven motion to the whirling propeller, destroying its delicate synchronization; the effect was similar to what happens to a spinning gyroscopic top

that begins to stagger as it slows down.

5. A vibration "coupling" then occurred - literally, the vibration of the engine and prop slowed down to the same vibration rate of the wing; the moment the two vibration rates touched the same level, a massive oscillation shook the entire wing structure like the plucking of a giant guitar string. Structural failure followed.

Orders Speed Cut

That is what happened at Tell City and Buffalo. That is why the Federal Aviation agency ordered all Electras to be flown at reduced speeds, slowing the 400-mile-an-hour turbo-props down to the relative speed of a DC-6. That also is why the speed restrictions made even unmodified Electras safe - the vibration difficulty, known as the "whirl phenomenon," could occur only at high speed and for, that matter, only at a certain speed.

It might be compared to an out-of-balance wheel on your own car. It will start shimmying only when you touch a certain speed and the shimmy dampens out when you exceed that speed. The FAA order, of course, makes it impossible for any Electra to come even close to the speed range at which the whirl phenomenon can take place.

The obvious question is how such a deadly bug could have slipped through the Electra's rigid test program. Here is how Lockheed board chairman Robert E. Gross answers that one:

"The conditions that caused the two accidents in Texas and Indiana were not disclosed in the thousands of tests to which the Electra was subjected," Gross says. "They were unpredictable within

the then existing state of the art. It is some consolation to realize that the state of the art has advanced as the result of our finding."

Quesada Resists Pressure
Another question is why the plane wasn't grounded when it was obvious, after Tell City, that structural failure was involved. Some Civil Aeronautics board safety experts actually recommended grounding. The man who kept the Electra flying was Federal Aviation Administrator Elwood R. Quesada, who resisted all grounding pressure from both the CAB and congressmen.

Neither Quesada nor anyone else knew what was wrong at that point. But the FAA chief was sure that a combination of high speed and turbulence were at least contributing factors, and that the speed restrictions provided a safety margin.

"He had the guts of a burglar," one CAB official admits. "If another Electra had gone down, Pete might as well have been aboard it."

To Quesada, however, it wasn't a real gamble. He was convinced of the plane's inherent soundness and felt a freak bug was responsible. He turned out to be right.

Some of his congressional critics noted that Quesada was a former Lockheed vice president - the implication being that it was this business connection and not his belief in the Electra that prevented the grounding. The implication was not only unfair but false. Quesada had no reason to be loyal to Lockheed; he left the company because of a major disagreement over policy.

Next: The Electra "fix" and the plane's future.

Court Records

MUNICIPAL COURT
Earl Patrick O'Hara, 64, formerly of White City, disorderly conduct, 30 days, suspended on condition he leave city for veterans home in Portland.
Robert William Gillespie, 1832 North Riverside ave., assault and battery, \$1, suspended on grounds that assault "was more than likely justifiable."
Lloyd Dean Rickard, 22, of 1231 North Riverside ave., driving while operator's license suspended, \$100.
Frederick William Whitman, disobeyed stop sign, \$10.
Barbara Jean House, disobeyed traffic signal, \$5.
Barbara Jean Marshall, following too close, \$25.
David Champy McCollom, violation of basic rule, \$10.
Glenn Edward Nelson, disobeyed traffic signal, \$10.
John William Fisher, disobeyed right turn, \$10.
Margaret Cecilia Lotter, violation of basic rule, \$10.
Samuel Benjamin Lew, improper right turn, \$10.
James William Harrison, violation of basic rule, \$25.
Jens Ove Myhre, violation of basic rule, \$25.

Daniel Lee Coghill, violation of basic rule, \$25.
Robert Gerald Zundel, violation of basic rule, \$10.
Milton Francis De Marco, violation of basic rule, \$10.
Frank Exevior Samson, disobeyed traffic signal, \$10.
Phyllis Laub Andrews, improper right turn, \$10.
Elmer Floyd Magle, excessive noise, \$10.
James Phillips, disobeyed stop sign, \$10.
Joseph Leach Hendricksen, disobeyed stop sign, \$10.
Emma Hanby, improper left turn, \$10.
Richard Theodore Childress, no operator's license, \$5.
William Donovan Dillree, violation of basic rule, \$25.
George Merle Deets, no Oregon operator's license, \$5.
Milton Dean Smith, violation of basic rule, \$10.
Larry Donald Little, violation of basic rule, \$10.
Melinda Grace Lake, violation of basic rule, \$10.
Raymond Winter Fernlund, disobeyed stop sign, \$10.
Everett Roland Christian, failure to yield right of way, accident, \$15.
James Douglas Bailey, operating a vehicle on a learner's permit without a licensed driver in car, \$3; disobeyed traffic signal, \$10.
Bernard Del Hughes, disobeyed traffic signal, \$10; no operator's license in possession, \$5.
Jimmy Lella Deum, violation of basic rule, \$10.
John Michael Bauer, inadequate muffler, \$10.
Darrall Charles Wilson, violation of basic rule, \$10.
Wanda Jean Head, no operator's license, \$5.
Patricia Anne Jacobs, disobeyed stop sign, \$10.
Gretchen Zona Call, improper left turn, \$10.
Frederick William Whitman, expired license plates, \$5; no operator's license, \$5.
Curtis Lee Graham, disobeyed traffic signal, \$10.
Albert Matlock Watson, violation of basic rule, \$25.
Loretta Jeanne Rose, violation of basic rule, \$12.50.
Reginald Randolph Sampson, disobeyed traffic signal, \$10.
Jerry Lewis Sadden, no operator's license, \$5.
Frank Charles McDowell, four in front seat, \$10.
Jake Albert Toews, violation of basic rule, \$10; no operator's license, \$5.
Frederick William Whitman, no operator's license, \$5.

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Local Architects Named for School

The architectural firm of Payne and Struble, 1005 East Main st., has been selected to design a new junior high school for Sutherlin, the architects announced today.

Junior high schools in Ashland and Salem and additions to Jewett school and the Central Junior High school were recently designed by the firm. Other work in progress includes the Phoenix branch, First National Bank of Oregon, an addition to the Medford office of the state employment service, wing three of The Mall, and the Hawthorne Garden apartments to be located near the Medford Shopping center.

Duluth - More than 50 million tons of bituminous coal were moved over the Great Lakes in one shipping season.