when tested at the Sperry Gyroscope Co.

The C-2A Gyrosyn compass was found to have been subjected to high heat which had extensively damaged its internal components. Its compass card was seized at an indicated heading of 153 deg. The gyro assembly was found to be in gimbal lock position. The compass card was free from the rotor shaft and the shaft was free to move. The signal and Selsyn rotors were also loose on their shaft. The A-12 Gyrosyn compass had been almost completely consumed by fire; only the upper frame containing the compass card was found. The gyro assembly was found attached to the bottom of the frame by metal slag. Its compass card was still legible and seized at an indicated heading of about 179 deg. Both turn-and-bank indicators and the captain's gyro horizon indicator were recovered but fire damage was so extensive no useful information was obtained by their examination.

The electrical system of the aircraft was largely destroyed in the ground fire that followed impact. The four d.c. generators, Bendix model 30EO2, were recovered, disassembled, and examined. Although they had suffered impact and fire damage there was no indication that they had failed electrically or mechanically before the accident.

Instruments Recovered

In addition to the examination of recovered instrument components the Board initiated and supervised tests in which electrical system malfunctions were simulated in a similar aircraft and the effect upon the flight instruments noted. Laboratory tests were also performed wherein a gyro horizon indicator and a turn-and-bank indicator of the type installed in the aircraft were supplied with electrical power of abnormal voltage and frequency and their behaviors recorded. The results of these tests were made a part of the investigative record and will be discussed in the Analysis section of this report.

According to crew testimony, the checklist and engine runup were completed and the radios set in the following manner before takeoff.

The No. 1 VHF navigation receiver was tuned to the Caldwell VOR which presented a plan view or map-like display on the captain's course indicator. The cross pointer indicator located on the left of his instrument panel presented information received from the same radio range. The No. 1 ADF receiver was set to Paterson radio beacon. The lower right cross pointer indicator was displaying the La Guardia ILS which was tuned on the first officer's receiver.

The No. 2 VHF navigation receiver was tuned to the La Guardia ILS presenting a pictorial display on the first officer's indicator. The first officer's cross pointer indicator and the captain's lower right cross pointer indicator also presented information from the La Guardia ILS. The No. 2 ADF receiver was tuned to the La Guardia low frequency range.

The ADFs were initially checked for bearings while the aircraft was on a heading of 285 deg. The C-2A Gyrosyn compass was checked against the magnetic compass on that heading.

The captain's course indicator was not checked at runup position. The first officer's, however, was checked for direction against the magnetic compass but not against the captain's C-2A. When lined up on the runway for takeoff, the C-2A read 43-44 deg. and the first officer's No. 2 ADF indicator lined up with the La Guardia range.

Takeoff Procedure

On the takeoff Capt. Marsh handled the throttles and requested the flight engineer to "level" them off at 59½ in. Marsh also handled nose wheel steering. During the roll down the runway, the first officer monitored the airspeed and called off V_1 and V_2 speeds. He handled the control yoke until V_1 at which time Capt. Marsh took control. First Officer Dixwell testified that all flight and engine instruments appeared normal during the takeoff run. He toggled the No. 1 propeller switch to bring the rpm. back to 2,800. The captain lifted off at V_2 and went to instrument references. At this time Dixwell did not notice any deviation from course on his deviation indicator nor did he notice any deviation for the remainder of the flight. Immediately after breaking ground, the landing gear was retracted by the flight engineer on the captain's order.

At 125 kt., Capt. Marsh called for zero flaps and the flap control was actuated by the first officer. Marsh testified that at this time he concentrated on the airspeed, rate of climb, and direction. When questioned about directional instruments he stated that they would include the C-2A, artificial horizon, the turn-and-bank, and the ADF. He would be especially interested in the ADF, this being a primary and ideal instrument to use for direction. He also stated that he used the ADF as a directional instrument and that his course indicator was not utilized. He observed the rate of climb to be 800 fpm. which reduced to 400 fpm.

First Officer Dixwell testified that he saw the flap indicator move toward zero as he monitored the flight instruments. He also observed that the airspeed continued to increase and that the rate of climb was normal. Further, he observed a heading of 40-45 deg. on his course indicator azimuth card; this was the last heading that he recalled. During this time Dixwell acknowledged the tower's instruction to change radio frequency. Capt. Marsh testified that as the aircraft accelerated through 130-135 kt., he glanced at the flap indicator and noted that the flaps were retracting. He immediately looked back at his rate of climb, airspeed, and directional instruments. He had no recollection of looking at his altimeter this early in the flight.

Further testimony indicated that at 140 kt., Capt. Marsh called for METO power and observed the flight engineer starting to reduce power. First Officer Dixwell heard this command, took his eyes from the flight instruments, and monitored the flight engineer's actions, observing him reduce manifold pressure and propeller control. Quite a few second later his attention was attracted to the outside; he saw the ground through his own windshield and immediately yelled, "Al, ground!"

Meanwhile, according to Capt. Marsh, everything was normal. He believed that his only observation of altitude was going "through" 200 ft. before, suddenly, Dixwell yelled, "Al, ground!" He immediately pulled back on the yoke, looked up, saw the ground, saw that he was in a left bank and started correction which was interrupted by ground impact.

ANALYSIS

Conditions at the destination and alternate were still good at the time of actual departure and forecast to remain so. The maximum takeoff allowable gross weight computation was considered still valid in view of the weather conditions at La Guardia. Therefore, an amended release was not issued by Northeast dispatch center at Miami for Flight 823 nor was one required.

Between 1350 and the time of the accident 29 weather observations were taken at La Guardia Field. This would indicate that an adequate and close watch on terminal weather was being maintained. The terminal forecasts issued were accurate relative to the prevailing weather at La Guardia on the afternoon of Feb. 1.

Below freezing temperatures at the surface and aloft produced snow which did not adhere to vertical surfaces and virtually eliminated any danger of significant clear icing. The aircraft had encountered no icing during its descent into La Guardia on its northbound flight, which was completed about 1250. No ice formation was noted on the wings during the snow removal. Other aircraft parked outdoors at La Guardia all afternoon also exhibited no ice formation. No aircraft departing La Guardia while the Northeast DC-6 was there reported difficulties from snow or ice on external surfaces. One aircraft did begin to pick up some wing icing at 4,000 ft. but this was readily corrected by the use of the thermal de-icing system.

Ceiling and visibility were above the pertinent company takeoff minimums at the time of takeoff. Neither instability nor gustiness existed at low levels and any turbulence encountered by the flight would have been negligible and none was reported by the crew.

It is apparent that snow did not affect flight characteristics and that the snow removal operation was effective. The aircraft, loaded to near maximum weight for the runway used, left the runway normally in the usual break ground area and the flight crew testified that a steady climb and increasing airspeed prevailed thereafter until they reached an approximate altitude of 300 ft. The captain also stated there was no indication of buffeting or abnormal control "feel."

Intense Fire

It is believed that because of the sliding ground impact of not too great severity there were no fatalities or serious injuries caused directly by the impact or ground movement. The cabin floor remained fairly intact, before the fire, and the seats were not loosened from the floor. Unfortunately, the intense fire, fed by 3,000 gal. of fuel, caused the many fatalities and serious injuries. There was obviously some deformation of the fuselage during the 1,500-ft. slide which jammed the main cabin door, and possibly other exits as well. Civil Air Regulations require that aircraft doors and

AVIATION WEEK, April 14, 1958