Docket No. SA-138 File No. 6127-46

CIVIL AERONAUTICS BOARD

ACCIDENT INVESTIGATION REPORT

Adopted: April 4, 1947 Released: April 21, 1947

TRANSCONTINENTAL & WESTERN AIR—SHANNON, EIRE—DECEMBER 28, 1946

The Accident

Transcontinental & Western Air's Flight 6963, a Lockheed Constellation, Model 049, NC-86505, crashed at 0209Z* December 28, 1946, approximately one mile WNW of the Shannon airport during a landing approach to that airport. Five of the 14 passengers and 4 of the crew of 9 were fatally injured and the aircraft was demolished by impact and subsequent fire..

History of the Flight

NC-86505, hereinafter referred to as Aircraft 505, was scheduled for a regular flight between Paris, France and New York, New York via Shannon, Eire and Gander, Newfoundland. The flight departed Orly Field, Paris at 2316 December 27, 1946 on an instrument flight plan with its destination Shannon and its alternate Prestwick, Scotland. The flight from Paris to Eire was routine.

At 0135 the flight transmitted a report to Shannon Radio indicating its position as over the Irish coast at 7,000 feet At this time the flight was cleared to cross the Limerick marker at 5,000 feet. Shortly thereafter Shannon Radio advised the flight of the Shannon weather Visibility 2 miles, 10/10 cloud cover at 900 feet, 3/10 at 500 feet, wind 160 degrees, 5 knots, altimeter setting 30 04 inches. At 0153 the flight reported over the Shannon radio range station at 5,000 feet and was given clearance to descend on the SE leg While in the procedure turn at 0200 the flight transmitted a position report to Shannon Radio and, in acknowledgment, received a later Shannon weather report Rain and drizzle, visibility 2 miles, 10/10 cloud cover at 900 feet, 6/10 at 400 feet, wind 120 degrees, 5 knots, altimeter setting 30 04 Receipt of this weather report was acknowledged and the Shannon control tower cleared the aircraft for approach to Runway 14

At 0206 the flight reported over the range station at 1,200 feet at which time Shannon Tower advised Aircraft 505 that Shannon was reporting 10/10 cloud cover at 400 feet, 4/10 at 250 feet, visibility 1 mile, wind 120 degrees, 5 knots. Upon receiving acknowledgment from the flight Shannon Tower requested the pilot to make a ceiling check. This request was also acknowledged by the flight. At approximately 0208 personnel at Shannon Airport observed Aircraft 505 approach the field on a heading parallel to Runway 32. The aircraft appeared to continue on this heading until over the airport at which time it turned to the right to a heading of approximately north Shortly thereafter the aircraft disappeared from sight At approximately 0209 these observers saw a brilliant flash WNW of the airport and heard a loud noise. Realizing that Aircraft 505 had crashed, tower personnel immediately initiated rescue operations and dispatched emergency crews to the scene of the accident

*All times referred to in this report are Greenwich Time and based on the 24-hour clock

Investigation

During the evening of December 27 a low pressure area was centered at a point approximately midway between Greenland and Iceland at a latitude of approximately 60 degrees. A warm front associated with this "low" extended southward paralleling the west coast of Eire and from this area to the northern coast of Spain At the time of take-off this front was located approximately 45 miles west of Shannon and was approaching Shannon at a rate of approximately 14 miles per hour. As the elapsed time of the flight was slightly less than three hours, the warm front would, according to the weather synopsis then available, reach Shannon at almost the same time the flight arrived. As the front approached Shannon the winds changed their direction from westerly to southerly eventually developing a slight easterly component and the ceilings in the vicinity of the airport lowered. An aftercast of the weather in the Shannon area indicates that this front was over Shannon approximately 30 minutes after the accident occurred.

The topography in the vicinity of Shannon is such that winds from the southwest quadrant are descending Unless the velocity is light, therefore, westerly or southwesterly winds are generally not accompanied by low ceilings and visibilities However, when the wind direction is east of south or when the velocity is light (approximately 10 miles per hour or less) low ceilings and visibility become likely. The early forecasts issued by Shannon for the period of the flight anticipated lowering of the ceilings, but did not indicate ceilings of less than 1,000 feet Presumably these forecasts were based on the assumption that the wind velocity would remain sufficiently high to prevent formation of low ceilings in the Shannon area However, the gradient weakened considerably during the night of December 27 and the movement of the warm front slowed appreciably after reaching the Irish coast thus creating conditions ideal for low ceilings and visibilities

The weather observations provided the flight were apparently made in the Shannon control tower As far as can be determined at this time, the conditions existing at the time of the accident are correctly reflected in those observations transmitted to the flight

At 2200 a revised forecast was issued by the weather station at Shannon which indicated lower trends than those contained in earlier forecasts. This forecast indicated that occasional ceilings could be expected at 600 feet during precipitation However, the Shannon forecasts did not anticipate that the ceilings would lower to the extent which the subsequent weather observations indicate The 2200 forecast, though broadcast by Shannon, was not available to the crew at Paris for the preflight planning, although the flight departed at 2316

The flight plan under which Aircraft 505 was operated indicated that the flight was designated as No 6963-23 Two thousand two hundred gallons of gasoline were aboard at the time of departure and it was estimated that the elapsed time would be 2 hours and 40 minutes Inspection of the passenger, mail and cargo manifests indicates that the total weight of the aircraft was less than the maximum allowable gross

Radio communications records revealed that the flight was entirely routine until its arrival at Shannon The position reports contained in the Shannon tower records and the aircraft radio log indicate that the flight followed the standard instrument approach procedure for Shannon Airport The initial approach at the range station was made at 5,000 feet. The aircraft descended outbound on the SF leg and accomplished the procedure turn at 2,500 feet. The descent was continued inbound and the station was crossed on final approach at 1,200 feet These altitudes were reported on the basis of the indications of the altimeters in the aircraft At least one observation containing a ceiling of 10/10 cloud cover at 400 feet with lower scattered clouds was acknowledged by the crew

Following the accident, Captain Herbert Tansey, pilot of Aircraft 505, stated that the flight had passed over the field at an indicated altitude of approximately 600 feet and on a heading parallel to Runway 32. When reaching the end of Runway 32, the captain turned 45 degrees to the right and held this heading for approximately 30 seconds He then banked to the left, intending to turn directly to the final approach for Runway 14, and descended to 500 feet With approximately 45 degrees of this turn uncompleted, the airport lights suddenly disappeared from view and immediately thereafter the aircraft struck the ground This statement was corroborated by First Officer Sparrow who also survived the accident

Several witnesses on the airport observed the aircraft approach the field and their testimony reveals a consistent pattern with respect to the flight path of the aircraft. When first observed, Aircraft 505 was east of Shannon Airport and on a heading parallel to Runway 32. The above witnesses indicated that the aircraft crossed the northern boundary of the airport at an altitude between 200 and 300 feet During this time, the landing lights were turned on, however, they were evidently turned off immediately after the aircraft passed over the field While over the airport, the aircraft was seen to turn to the right and shortly thereafter disappear from view northwest of the airport in a manner indicating that it might have entered low clouds The aircraft was not seen again until after it had crashed

It was determined that Aircraft 505 had struck an island approximately one mile WNW of the boundary of the Shannon Airport Inspection of the marks of impact on the ground indicated that the left wing tip had contacted the ground while the aircraft was in a left bank preparatory to landing on Runway 14 The elevation at the point at which the accident occurred was approximately one foot above the level of Shannon Airport, which is 15 feet above sea level Immediately after impact of the left wing, the left horizontal stabilizer struck the ground and the entire empennage separated from the fuselage The nose-wheel strut and the main landing gear were torn from the aircraft and bore conclusive evidence that they were extended at the time of impact The four engines were torn from the wings and came to rest ahead of the main fuselage sections It was apparent that all engines were delivering power at the time of impact.

No evidence was disclosed of failure or malfunctioning of the major aircraft structure prior to contact with the ground The disintegration of the structure was apparently the result of impact and subsequent explosion in the left wing However, immediately after the crash fire broke out, consuming the major portions of both wings, the center section, and that portion of the fuselage between the cockpit and trailing edge of the wings Although the control system was considerably damaged by fire, examination failed to disclose any evidence of malfunctioning prior to the accident No indication was revealed that any malfunctioning had occurred in the hydraulic system, fuel system, electrical system, or air conditioning system No evidence was disclosed which indicated fire in flight

The settings of all altimeters were found to be within .02 of an inch of the last recorded altimeter setting at Shannon Airport The discrepancies among the three altimeters recovered from the wreckage, the indicated altitudes of which could be read from the instruments, were such that no conclusions could be drawn as to their altitude indications at the time of impact In tracing the pitot-static lines from the primary and alternate sources to their respective connections in the static valve behind the pilot and co-pilot instrument panels, it was discovered that the alternate and primary lines were reversed from their normal positions It was apparent that an error in installation had been made in some prior maintenance activity Such an installation would result in actuating both pilot and co-pilot altimeters from the alternate static source when the cockpit selector switches were placed in the primary source position Company maintenance records indicated that the pilot and co-pilot instrument panels had been removed from the aircraft December 16, 1946, and the investigation disclosed that during the reinstallation of these panels the static lines had been inadvertently reversed

Company maintenance records indicate that at the completion of this activity an inspection, known

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C I V I L A E R O N A U T I C S B O A R D

ACCIDENT INVESTIGATION REPORT

TRANSCONTINENTAL & WESTERN AIR, INC. - SHANNON, EIRE, DECEMBER 28, 1946

AMENDMENT

The accident investigation report adopted April 4, 1947, and released April 21, inadvertently indicated that five of the fourteen passengers aboard the Transcontinental & Western Air "Constellation" were fatally injured at Shannon, Eire, December 28, 1946. This accident resulted in the death of nine passengers.

as Operation No. 2, was accomplished. This inspection includes a requirement that a test be made of the static system for possible leaks, and the maintenance forms for this operation were initialed by the mechanic responsible for this test in a manner indicating that this test had been accomplished. These records also indicate that on December 24, 1946 an inspection known as Operation No. 1 was completed and the report for this activity indicates that a test for leaks had been made on the static system. Such tests, however, could not have been accomplished without the reversal of the static lines being discovered. It, therefore, can be concluded that the mechanics involved failed to make the tests as required and nevertheless initialed the maintenance forms to indicate compliance with that requirement.

The primary static pressure is obtained from two pitot heads located on either side of the nose of the aircraft and exposed to the free air flow The alternate static pressure, however, is obtained from the nose-wheel well. When the nose-wheel is retracted and the nose-wheel door closed, a maximum discrepancy in altimeter indication of approximately 40 feet when using alternate source can be expected. However, opening of the nose-wheel door and extension of the nose-wheel changes the characteristic air flow over this area of the fuselage. The resultant flow creates a relatively low pressure within the nose-wheel well causing an altimeter utilizing alternate pressures from this area to read higher than the true altitude *

A review of the engineering data prepared by the manufacturer discloses that an error in altimeter indication of between 120 and 280 feet, at airspeeds from 145 to 170 mph, could be expected when the alternate static source is being used and the landing gear is extended. In all instances, the errors in altimeter indications were such that the altitude indicated on the instrument was higher than the correct altitude of the aircraft. The pilot stated that the airspeed shortly before the accident occurred was approximately 150 mph and it is apparent that the maneuvers of the aircraft in the vicinity of the airport were accomplished at airspeeds between 150 and 160 mph The error of the altimeters would not, therefore, be constant, but could be expected to vary between 125 and 185 feet in this airspeed range.

The Shannon radio range, transmitting on 278 kc and located 3.7 miles east of the airport, is the only navigational facility serving Shannon Airport. Neither instrument low approach facilities nor high intensit approach or runway lights are yet installed. Other than at the airport, few lights are located in this area of Eire which would serve as navigational fixes or provide visual attitude reference for flights landing at Shannon at night.

The problem of aligning Aircraft 505 with the active runway was further complicated by a tendency of the windshields in the Model 049 to become fogged after a descent to low altitudes. This difficulty is partially alleviated by a pan-type, infra-red heater in the windshield panels immediately in front of each pilot, as well as the action of anhydrous silica-gel upon the air between the double plates of these panels However, the remaining seven panels in the cockpit are provided no such remedy for water condensation and, as a result, the visibility of the flight crew is restricted. The pilot stated that the windshields on the left side of the cockpit, except for the panel directly in front of the pilot, were fogged and that some restriction to visibility was experienced. Two of the total of nine panels, one beside each pilot, may be opened in the event normal visibility is sufficiently restricted However, neither of these windows was opened in this instance

Discussion

It is apparent that neither the company nor the personnel of the Shannon Meteorological Station accurately anticipated the extent to which the ceilings and visibility in the Shannon area would lower during the period of the flight. It is further evident that the most recent and most accurate of the forecasts broadcast from Shannon was not available to the crew either prior to or during the flight, although this forecast was filed at Shannon more than one hour prior to take-off. However, since the crew were constantly provided the latest weather observations at Shannon while en route, and were completely informed concerning the actual weather conditions existing at Shannon, the non-receipt of this forecast apparently did not affect the conduct of the flight in this instance.

The original dispatch and clearance of the flight from Paris appeared to have been in order. No conditions were encountered en route which required diverting the flight from the proposed route, and no information was received by the crew indicating that the operation to Shannon was to have been other than routine.

Because the latest weather reported to and acknowledged by the flight was Ceiling 400 feet, visibility 1 mile, and since the minimums for TWA at the Shannon airport at night are Ceiling 500 feet, visibility 2 miles, it is apparent that both the ceiling and visibility at Shannon at the time of the accident were reported below authorized minimums. It is evident, however, that the pilot chose to complete the instrument approach in order to check the weather visually. When "contact" between the range station and the airport, the pilot believed the ceiling to be considerably higher than reported because of an error present in the altimeters. His decision to attempt a landing, therefore, apparently was based on a belief that the ceiling was still higher than the minimum permissible approach ceiling **

In view of the complete consistency of the statements of the pilots with respect to the indicated altitudes and also those of the ground witnesses with respect to the observed altitude of the aircraft, it appears that a substantial error was present in both the pilot and co-pilot altimeter indications. It is apparent that between 125 feet and 185 feet of this error was caused by the reversal of the static lines, although it is possible that a greater error resulted from this factor. Because the altimeter itself can be guaranteed only

*For history of the static source installation and corrective action taken, see appendix I, p 6

**For discussion concerning scheduled air carrier approach and landing limitations see appendix II, p 7

within 20 feet and because the total static installation, including the instrument, may not be accurate within 75 feet, these inherent errors may have contributed to the total error in this instance In addition, it must be considered that the instruments from which the altimeter settings are derived at the meteorological station are accurate within 02 of an inch of mercury or the equivalent of 18 feet of altitude An error of equal magnitude may reasonably be expected in applying the altimeter setting to the air-borne instruments by the pilot. However, it would be difficult to account for more than 300 feet of error in altitude indication under the conditions of this flight. In view of the fact that a maximum of 300 feet of error can be attributed to the altimeter and, because the discrepancy between the observed altitude and the indicated altitude of the aircraft appeared also to be 300 feet, it can be assumed that this figure represents the maximum error present in the altimeters of Aircraft 505.

In reconstructing the flight path, therefore, it is evident that the aircraft passed over the northern boundary of the field at an altitude of approximately 300 feet, although the pilot believed the flight to be at 600 feet After passing beyond the airport the pilot no longer had any ground reference by which to determine either attitude or altitude, Shannon Airport being the only well lighted area in that section of Eire. He therefore continued his procedure solely by reference to instruments. After passing over the airport he descended to an indicated altitude of 500 feet or an actual altitude of approximately 200 feet above the ground. In the subsequent turn to the left a loss of altitude of at least 150 feet was experienced, during which the wing tip struck the ground. The accident occurred at a location with respect to the approach end of Runway 14 at which, because of its proximity to the airport, it would have been normal for the pilot to begin a descent, had the aircraft been at an altitude in excess of 500 feet Such a maneuver cannot be regarded as completely satisfactory, however, in view of the limited visibility and the existing wind direction and because of the absence of straight-in approach facilities to the particular runway used, alternate approach procedures were not practicable.

In this portion of the flight it would have been necessary for the pilot to look over his left shoulder and through fogged windows to keep the airport in sight. As the turn continued, a progressively greater percentage of his attention was required outside the cockpit and it is probable that in the final stages of the turn the nose of the aircraft was depressed, either consciously or inadvertently, permitting the left wing to contact the ground. During these maneuvers the aircraft descended to an altitude sufficiently low that at least one small hill lay directly between the flight and the airport. This fact may have accounted for the testimony of ground observers who lost sight of the aircraft at this time and may also have accounted for the statement of the pilot that the airport lights suddenly disappeared from his view immediately prior to the crash.

There is no doubt that this accident would have been prevented had a "circle-underneath" approach been avoidable and, in this respect, this type of accident illustrates the extent to which modern air carrier operations and aircraft require the use of instrument low-approach facilities. The need for instrument low approach facilities is by no means limited to Shannon but also exists in this country. The Board is advised that a localizer-glidepath facility (ILS) has been procured by the Irish Government for Shannon and is being installed at that airport The program for installation of additional approach facilities at Shannon also includes high intensity approach and runway lights

The restriction of visibility from the cockpit occasioned by condensation on the windshields of original Model 049 aircraft requires corrective action. In this respect the Board is informed that both the operator and the manufacturer are presently engaged in remedying this deficienc by installation of additional heating elements. Model 049 aircraft presently in construction are being provided with integral wire heating elements in all but the sliding panels which it is anticipated, will alleviate this difficulty.

Findings

On the basis of all available evidence, the Board finds that.

1. The company, aircraft, and crew were properly certificated.

2. During a routine maintenance check on December 16, 1946, the pilot and co-pilot instrument panels in the aircraft were removed and in the subsequent reinstallation the alternate and primary source static lines to these panels were inadvertently reversed.

3. No test was made of the static system subsequent to the above installation, although the maintenance forms for at least two separate inspections indicate that such tests had been completed.

4. Since the date of the above installation, the pilot and co-pilot altimeters were actuated by the alternate static pressure source when the cockpit valve was turned to the primary source.

5. The alternate source of the static pressure in this aircraft was located in the nose-wheel well.

6. When the landing gear is extended, an error in altimeter indication of between 125 and 185 feet in an airspeed range from 150 to 160 mph can be expected when using this type alternate source.

7. The maximum error from all sources in the altimeters in this aircraft under the conditions of this flight was approximately 300 feet.

8. Prior to departure from Paris the total weight of the aircraft was less than the maximum allowable gross and the weight was distributed with respect to the center of gravity within approved limits

9. That portion of the flight from Paris to Shannon was completed without difficulty and the let-down at Shannon was accomplished in accordance with approved procedures for use on the Shannon radio range.

10. During the let-down all the windshield panels on the pilot side other than the one directly in front of the captain became fogged sufficiently to restrict vision from the cockpit.

11. While on final approach with the landing gear extended, the pilot sighted the airport when over the range station at an indicated altitude

of 1,200 feet, at least 900 feet above the ground

12 The aircraft descended to an indicated altitude of 600 feet over the northern border of the airport, or an altitude at least 300 feet above the ground

13 While headed north, away from the airport, the aircraft descended to an indicated altitude of 500 feet, or at least 200 feet above the ground

14 While turning to the left for final approach to Runway 14, the aircraft passed behind a low hill which blocked the airport lights from the pilot's vision.

15 During this turn the aircraft lost at least 150 feet of altitude and the left wing tip struck the ground

16 At least one left wing tank exploded upon impact and, after coming to rest, a major portion of the aircraft was consumed by fire

—S-983

Probable Cause

The Board determines that the probable cause of this accident was an error in altimeter indication, the primary reason for which was the reversal of the primary and alternate static source lines which led the pilot to conduct his approach to the airport at a dangerously low altitude A contributing factor was the negligence of maintenance personnel in certifying to the satisfactory functioning of the static system although the tests required to determine such a condition were not accomplished. A further contributing factor was the restriction of vision from the cockpit resulting from fogging of the unheated windshield panels

BY THE CIVIL AERONAUTICS BOARD

s J. H. Lunsford
s Oswald Ryan
s Harllee Branch
s Josh Lee
s Clarence M. Young

Appendix I

HISTORY OF STATIC SOURCE INSTALLATION, AIRCRAFT MODEL 049

Altimeter aneroids are actuated by static atmospheric pressure The sources for static pressure are located at such points on the aircraft structure as will permit a measurement of free atmospheric pressure at the altitude of flight without introducing possible discrepancies resulting from abnormal pressure areas caused by the airflow about the aircraft structure. Until recently the primary source for static pressure in Model 049 aircraft has been two pitot heads which project into the airflow on either side of the aircraft nose. This source of static pressure is used at all times except when the pitot heads for the static lines from this source are restricted by ice or otherwise prevented from indicating accurately the atmospheric pressure at that flight level. For such an emergency an alternate source is provided. In this model aircraft the alternate source was located in the nose-wheel well because this area cannot be affected by surface icing or by the pressure changes resulting from pressurization of the fuselage.

As a result of correspondence between Lockheed Aircraft Corporation and various air carriers during the latter part of 1945, Lockheed conducted a series of tests to determine the altimeter errors resulting from use of the alternate static source located in the nose-wheel well The readings of the pilot and co-pilot altimeters were calibrated with a "trailing bomb" type static source which is regarded as the most accurate source of static pressure. These flight tests indicate that, with the landing gear retracted, errors at airspeeds below 140 mph are within 50 feet of the true altitude and are in all instances lower than true. At airspeeds above 150 mph no error exists. However, extension of the landing gear produces erroneous indications which are in all cases higher than true and which, at 130 mph, average 115 feet, at 150 mph, 125 feet, at 160 mph, 185 feet, and at 170 mph, 280 feet. This information was contained in Service Information Letter No. 34, published by Lockheed March 6, 1946, and was transmitted to all using agencies for their information.

Prior to this time Lockheed had begun development of a new alternate source employing a flush-type installation on each side of the fuselage Extensive flight testing was required in order to determine that location on the aircraft which supplied the most accurate static pressure When this location was determined it was discovered that the flush-type static source, when properly installed, was superior to the original primary static source located in the pitot head. Since October, 1946, therefore, all new aircraft of this model have been manufactured with the primary static pressure obtained from a flush-type source and the alternate static pressure from the pitot static tube. Lockheed has been engaged in the manufacture of modification kits to permit the various operators to modify aircraft in service to the currently standard installation. Before the date of this accident these kits were not available to TWA and this modification, therefore, had not been accomplished in Aircraft 505. However, all Model 049 aircraft in service are currently being provided with the latest installations.

Altimeter flight tests conducted by TWA subsequent to the accident revealed a pattern of errors which was roughly compatible with the findings of the Lockheed tests. However, the calibration of the pilot's altimeter was accomplished by reference to the navigator's altimeter and no compensation was made for possible errors in the latter instrument. Therefore, although the TWA reports indicate a maximum error of 410 feet due to the use of the alternate source and with the wheels extended, this finding cannot be regarded as completely accurate. However, these reports clearly disclose that no two altimeter installations in Model 049 aircraft react in precisely the same manner and that considerable variance may be expected in the relative accuracy of these systems.

The installation of the instrument panels in Model 049 aircraft requires the mechanic to work from the cockpit when connecting the static pressure tubing to the valve. During this operation the panels may be pulled away from the supporting structure approximately seven inches. This distance is sufficient to permit the mechanic to complete the reconnection, but will not permit him to observe the back of the valve. Because the fittings on both lines and on the valve are the same size, no check other than visual reference to the tubing identification existed as a precaution against inadvertent reversal. The primary source position of the selector valve is on the left side of the valve when viewed from the cockpit, however, the primary static line must be connected to the right side of that portion of the valve behind the panel (see sketch). Because such marking is misleading, TWA has changed the size of the fittings on the valve and of the static pressure lines so that these lines cannot be reversed. A similar result has been achieved by Lockheed by the use of reversed threads on these two fittings in new Model 049 aircraft.

Appendix II

SCHEDULED AIR CARRIER APPROACH AND LANDING LIMITATIONS

At the time of the accident, sections 41 432 and 61 752 of the Civil Air Regulations prevented scheduled air carriers from attempting instrument approaches to domestic airports at which a "measured" ceiling was reported below that prescribed by the Administrator of Civil Aeronautics However, several air carrier accidents have occurred in the United States during the past six months involving attempted approaches to airports at which ceilings other than those classified as "measured" were being reported as below the prescribed minimums. Investigation of these accidents indicates that only a small percentage of ceilings reported as below minimums are designated as "measured" ceilings It therefore became apparent that the above restrictions were inadequate to prevent low approaches under marginal weather conditions

The Board found that the public interest required a revision of these sections of the Civil Air Regulations and, therefore, in January and February, 1947, adopted emergency amendments which required that "No instrument approach procedure shall be executed or landing made at an airport when the latest United States Weather Bureau report for that airport indicates the ceiling or visibility to be less than that prescribed by the Administrator for landing at such airport." This amendment deleted the condition that the Weather Bureau reports, to which reference is made, be applied only when ceilings contained therein are classified as "measured." The entire domestic problem of instrument approach procedures and terminal weather minimums as correlated with existing navigation facilities is being given joint study by the air carriers, the CAA, and the Board for the purpose of establishing a more permanent policy with respect to air carrier approach and landing limitations.

While the basis for regulation of United States air carriers in overseas operation is identical to that for domestic operation, pilots in overseas service are in some instances given wider latitude in determining the conditions under which the appropriate Civil Air Regulations apply than are pilots in domestic service. Because of the lack of uniformity in procedures for weather observation and systems of reporting weather conditions throughout the world, current United States requirements permit a pilot in overseas operation to descend to the minimum approved altitude, when he considers it advisable, in order to determine visually whether or not weather existing at that airport affords conditions satisfactory for a safe landing This problem is currently being considered by the Provisional International Civil Aviation Organization in an attempt to obtain more uniform standards for instrument approach limitations in international operation

Supplemental Data

Investigation and Hearing

The Civil Aeronautics Board was notified of the accident during the morning of December 28, 1946, and an investigation was immediately initiated in accordance with the provisions of section 702(a) (2) of the Civil Aeronautics Act of 1938, as amended Air Safety Investigators of the Board's New York and Washington offices departed New York City December 29 and arrived at Shannon, Eire December 31 That portion of the investigation conducted at Shannon was accomplished by the Civil Aviation Branch of the Irish Department of Industry and Commerce, with the assistance of personnel of Lockheed Aircraft Corporation, Transcontinental and Western Air, Inc., and the United States Civil Aeronautics Administration Subsequent phases of the investigation were completed in London, England, New York, New York, and Wilmington, Delaware, during which these investigators of the Board were assisted by other personnel of the Safety Bureau staff. A public hearing was ordered by the Board and was held in New York City, January 30 and 31, 1947

Air Carrier

Transcontinental & Western Air is incorporated under the laws of Delaware and has established its headquarters in New York, New York. On the date of the accident, TWA was operating under a currently effective Certificate of Public Convenience and Necessity and an Air Carrier Operating Certificate issued pursuant to the provisions of the Civil Aeronautics Act of 1938, as amended These certificates authorize TWA to engage in the transportation of persons, property and mail between various points in the United States and abroad, including Paris and Shannon

Flight Personnel

Captain Herbert Tansey, age 33, of Falls Church, Virginia, was pilot of the aircraft and possessed an Airline Transport Pilot Rating Until the date of the accident he had accumulated a total of 2,964 hours' flying time, of which 114 hours were obtained in Model 049 aircraft First Officer Clifford Sparrow was co-pilot of the aircraft at the time of the accident and possessed a Commercial Pilot Certificate and an Instrument Rating. He had obtained a total of 1,978 hours, of which 70 hours had been accumulated in Model 049 aircraft. Both pilots were properly certificated and the captain was qualified over the route.

Aircraft

NC-86505, a Lockheed Constellation, Model 049, had been operated a total of 1,098 hours since original manufacture It was equipped with four Wright 745C18BA engines with Hamilton Standard hydromatic propellers installed. The Number 1, 2, 3, and 4 engines had been operated a total of 837 hours, 1,041 hours, 945 hours, and 762 hours, respectively, and all engines had accumulated 137 hours since the last major overhaul. At the time of departure from Paris, the total weight of the aircraft was less than the maximum gross and the weight was distributed with respect to the center of gravity within approved limits

FIG. 1

APPROXIMATE FLIGHT PATH
OF AIRCRAFT 505

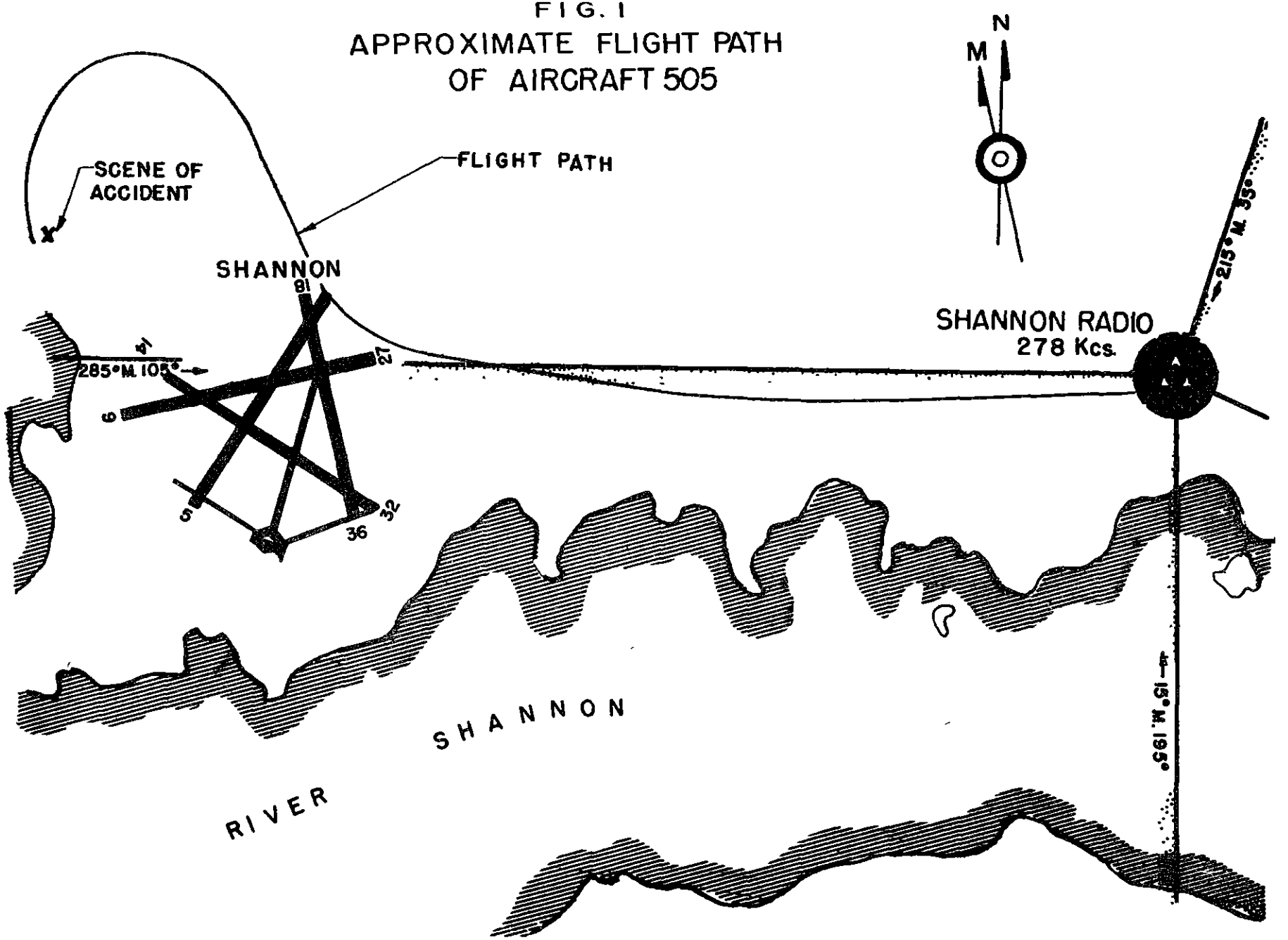
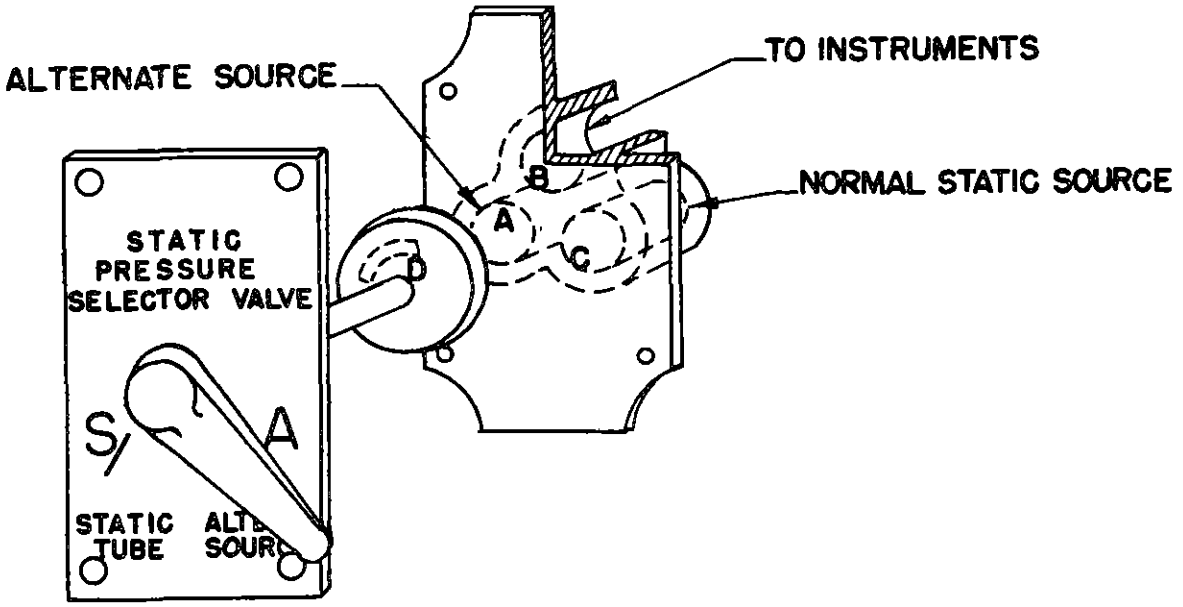


FIG. 2



STATIC VALVE – ALTERNATE POSITION
WITH HANDLE IN POSITION "A" CHANNEL "D"
CONNECTS "A" (ALTERNATE STATIC SOURCE)
TO "B" (INSTRUMENTS)..

NOTE:
IT WILL BE OBSERVED THAT THE CONNECTION FOR THE NORMAL STATIC SOURCE IS ON THE SAME SIDE AS THE "ALTERNATE" POSITION OF THE VALVE LEVER WHEN VIEWED FROM THE COCKPIT. THE LINES LEADING TO CONNECTIONS A AND B IN BOTH THE PILOT AND CO-PILOT SELECTOR VALVES WERE REVERSED IN AIRCRAFT 505.