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15. Supplementary Notes

This report does not contain safety recommendations.

16. Abstract At 2221 e.s.t. on October 28, 1973, Piedmont Airlines Flight 20 (N751N), a B-737, ran off the end of runway 14 after landing at the Greensboro-High Point-Winston-Salem Regional Airport, in Greensboro, North Carolina. There were 92 passengers and 4 crewmembers aboard; 4 passengers and 1 flight attendant were injured slightly. Flight 20 made an ILS approach to runway 14 and touched down at a faster-than-normal airspeed 2,600 feet beyond the approach end of the runway. The landing was executed during heavy rain showers and with a following wind. The aircraft ran off the end of the runway, and the three landing gears collapsed as the aircraft crossed a service road, 610 feet beyond the runway. The aircraft was damaged substantially.

The National Transportation Safety Board determines that the probable cause of this accident was ineffective braking action caused by dynamic hydroplaning on a rain-flooded runway. Additional factors which contributed to the accident were: (1) An unstabilized downwind approach; (2) a relatively long, fast touchdown on a downsloping runway; (3) delayed development of the automatic spoilers; and, (4) failure of the crew to deploy the spoilers manually.

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File No. 1-0019

AIRCRAFT ACCIDENT REPORT

PIEDMONT AIRLINES
BOEING 737, N751N
GREENSBORO, N.C.
OCTOBER 28, 1973

ADOPTED: May 22, 1974

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
Report Number: NTSB-AAR-74-7

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AIRCRAFT ACCIDENT REPORT

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SYNOPSIS

At 2221 e.s.t. On October 28, 1973, Piedmont Airlines Flight 20 (N751N), a B-737, ran off the end of runway 14 after landing at the Greensboro-High Point-Winston-Salem Regional Airport, in Greensboro, North Carolina. There were 92 passengers and 4 crewmembers aboard; 4 passengers and 1 flight attendant were injured slightly.

Flight 20 made an ILS approach to runway 14 and touched down at a faster-than-normal airpseed 2,600 feet beyond the approach end of the runway, during heavy rain showers. The aircraft ran off the end of the runway, and the three landing gears collapsed as the aircraft crossed a service road, 640 feet beyond the runway. The aircraft was damaged substantially.

The National Transportation Safety Board determines that the probable cause of this accident was ineffective braking action caused by dynamic hydroplaning on a rain-flooded runway. Additional factors which contributed to the accident were: (1) An unstabilized downwind approach; (2) a relatively long, fast touchdown on a downsloping runway; (3) delayed deployment of the automatic spoilers; and, (4) failure of the crew to deploy the spoilers manually.

I. INVESTIGATION

1.1 History of the Flight

Piedmont Airlines Flight 20 (N751N), a Boeing 737-222, was a scheduled passenger flight from Memphis, Tennessee, to Norfolk, Virginia, with en route stops at Nashville, Tennessee, and Charlotte and Greensboro, North Carolina. Ninety-two passengers and 4 crewmembers were aboard the aircraft.

At 1940 e.s.t. [1] on October 28, 1973, Flight 20 departed Memphis. At 2158, the aircraft departed Charlotte for an 18-minute flight to the Greensboro-High Point-Winston-Salem Regional Airport at Greensboro.

About 2209, Flight 20 made initial radio contact with Greensboro approach control. The Greensboro approach controller advised the crew that the runways were wet, that they could expect "considerable weather" during the approach, and that there had been reports of light to moderate turbulence and light to heavy rain. The controller vectored Flight 20 to the instrument landing system (ILS) localizer course of runway 14. At 2215, when the flight was about 5 miles from the outer marker (OM), it was cleared for an ILS approach. At 2217, the controller advised the flight, "Piedmont 20, you're 4 miles from the marker. You're cleared to land, the wind now is three two zero at eight." When the flight passed the OM, the crew requested a wind check, and the controller replied, "Wind is two eight zero at eight."

After passing the OM, the first officer reported to the captain, "I got the rabbit and that's all." Shortly thereafter, the captain asked that the windshield wipers be turned on and that a "shot of Rain-Boe" [2] be applied to the windshield. After "Rain-Boe" was applied, visibility through the right windshield was blurred and remained so through the approach. Two altitude callouts were made by the first officer. The first was, "Five hundred foot over (everything) [3] checks," and the second, "Now you are two hundred feet over your minimums." The audible middle marker (MM) signal was recorded 6.5 seconds later.

1/ All times are eastern standard time based on the 24-hour clock.

2/ A rain repellent fluid.

3/ Words or phrases enclosed in parentheses are questionable. The logical interpretation is used.

The next pertinent transmission recorded on the cockpit voice recorder (CVR) was, "Lights in sight," followed by, "Plus eight down eight." The flightcrew explained that the latter comment meant that the aircraft was 8 knots above the reference speed which was 128 knots, and descending at 800 feet per minute. The captain reported that he had made a "visual approach" after the first officer had reported that the lights were in sight. According to both pilots, after they had started the visual portion of the approach, they referred again to the cockpit instruments and saw that the aircraft was high on the glide slope. The first officer said that the glide-slope indicator bar had been almost halfway down to full scale deflection.

Immediately after touchdown, normal engine reverse thrust and braking were applied, which seemed to slow the aircraft very little. The captain then applied maximum reverse thrust and braking until the aircraft ran off the end of the runway.

The aircraft continued about 640 feet, crossed a service road, and stopped on an incline 820 feet from the runway. (See Appendix D.)

The accident occurred at night at longitude 79° 57'W and latitude 36° 06'N, and at an elevation of 926 feet.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	0	0	0
Nonfatal	1	4	0
None	3	88	

1.3 Damage to Aircraft

The aircraft's nose section, wings, engines, and fuselage were damaged substantially.

1.4 Other Damage

None.

1.5 Crew Information

The crew of Flight 20 was properly certificated and trained for the flight. (See Appendix B.)

1.6 Aircraft Information

The aircraft's maintenance records were examined; N751N had been maintained according to FAA-approved company procedures and regulations. (See Appendix C.)

The gross weight of the aircraft as it departed Charlotte was 98,542 pounds. If a normal fuel burnoff of 2,100 pounds is assumed, the aircraft was below its maximum allowable gross landing weight of 97,700 pounds. The computed center of gravity was within limits. The critical tailwind for this landing was 8 knots, and the maximum allowable tailwind component was 10 knots. The last wind report acknowledged by the crew was 280° at 8 knots, a 7.5-knot effective tailwind component. Before the aircraft touched down, the tower announced that the wind was 290° at 10 knots (an 8.5-knot effective tailwind component).

During certification, the Boeing 737 was not flight-tested to determine stopping distances on wet runways. Instead, the manufacturer applied a factor of 115 percent to the dry runway field length to meet the requirements of 14 CFR 121.195. These stopping distance data are included in the airplane flight manual.

1.7 Meteorological Information

The Greensboro 2157 weather observation for October 28, 1973, was: "Record Special, 400 feet scattered, measured ceiling-1,500 feet overcast, visibility-1 mile, light rain showers, fog, temperature-55° F, dew point-53° F, wind-330° at 8 knots, altimeter setting-29.84 inches, runway 14 runway visual range more than 6,000 feet."

An observation made at 2225 was. "Special, measured ceiling-400 feet broken, 1,500 feet overcast, visibility-1.5 miles, heavy rain showers, fog, wind-300° at 12 knots, altimeter setting-29.85 inches."

The recorded surface weather observations reported rain showers from 2018 until after the accident. The showers were light and changed to moderate at 2205. At 2215, 6 minutes before Flight 20 landed, the rainfall intensity increased to 1.25 in/h and continued at that rate until after the accident. The National Weather Service classifies rainfall intensity of more than 0.3 in/h as heavy.

The accident occurred in darkness.

1.8 Aids to Navigation

The ILS glide-slope angle is 2°32' and intersects runway 14 at a point 1,350 feet past its approach end. The Jeppeson approach chart contained a note that the glide slope was unusuable below 1,126 feet [4/] (200 feet above the ground). The chart also cautioned that 5,030 feet of runway was available for landing beyond the ILS intersect point.

The tower and approach facilities and the navigation aids were operational at the time of the accident. After the accident, the FAA flight checked the ILS glide slope and found it to operate within prescribed tolerances. The localizer could not be flight checked because the wreckage interfered with the radiation pattern.

1.9 Communications

Air-to-ground communications were normal.

Pilots who used the ILS approach to runway 14 shortly before the accident reported no discrepancies of the glide slope. Before the accident, there were no alarms on the ILS glide slope monitor. The pilots of Flight 20 reported that there were no instrument flags observed in the cockpit to indicate a malfunction of the ILS or of the equipment in the aircraft.

1.10 Aerodrome and Ground Facilities

Runway 14 is 6,380 feet long and 150 feet wide. An asphaltic concrete overlay was installed in 1968. The touchdown area of runway 14 has a downhill, longitudinal gradient, which ranges from 0.32 to 1.04 percent. Runway elevation decreases from 926 feet at the threshold to 900 feet, 3,350 feet past the threshold. The runway is crowned and has a transverse gradient of 1.0 percent from the centerline to 50 feet on either side of the centerline. The remaining runway width has a 1.5 percent transverse gradient.

Runway 5/23 is 8,201 feet long and 150 feet wide. Runway 23 is served by a VOR DME approach, with a published minimum descent altitude of 1,260 feet (368 feet above the runway elevation). An ILS to serve runway 23 is being installed. Installation is scheduled to be completed in June 1974.

4/ All altitudes and elevations are mean sea level, unless otherwise indicated.

On May 20, 1973, the airport was certificated for scheduled air carrier operations under the provisions of 14 CFR 139.

1.11 Flight Recorders

N751N was equipped with a Fairchild flight data recorder (FDR) model F-5424, serial No. 5413, and a Fairchild cockpit voice recorder (CVR) model A-100, serial No. 1757. Both recorders were installed in the aft section of the aircraft. Neither recorder was damaged in the accident.

The flight recorder readout indicates that touchdown occurred at 139 KIAS. Six seconds after touchdown, the aircraft began to decelerate. Fourteen seconds later, deceleration became more rapid.

1.12 Wreckage

Tire tracks began where the right main tires contacted the runway, 2,600 feet from the approach threshold and about 10 feet left of the centerline. Tracks of the nose wheel tires began 2,900 feet down the runway; tracks from the left main tires began at 3,000 feet. The left main wheels rolled to within 9 feet 10 inches of the left side of the runway, and 5,400 feet down the runway at which point the tracks turned toward the center of the runway. When the aircraft crossed the end of the runway, the tracks of the left main tires were 47 feet 6 inches from the left edge of the runway.

The nose gear was found in the forward electronics equipment compartment; its retract drag strut was broken. The left and right main gears separated from the aircraft.

The right engine separated from the aircraft and came to rest upside down, about 10 feet outboard and 6 feet forward of its normal position. The left engine remained attached to the aircraft. Both thrust reversers were in the "reverse thrust" position. The right thrust reverser was separated from the engine, and the left thrust reverser was bent upward.

The pitot static port water drains were dry, and the pitot static probes were undamaged. When the altimeters were examined, they indicated the field elevation.

The flaps were extended 40°, and the leading edge devices were extended fully.

The spoilers were extended randomly; however, because there was no hydraulic pressure at the actuator, they moved freely when a slight amount of pressure was applied. The loss of hydraulic pressure and lack of electrical power prevented spoiler retraction after the aircraft was damaged. The CVR transcript indicates that the speedbrakes were armed and the green light illuminated before the landing.

Two "antiskid inoperative" and two "antiskid off" amber warning lights are mounted on the instrument panel. The crew did not recall that any of these lights had illuminated.

The brakes were examined and found in satisfactory condition, with 15 percent service life remaining on the left side and 40 percent on the right. The four wheel-speed sensors and the antiskid control box were put on another aircraft and tested. They operated satisfactorily.

About 1/4 to 1/2 of the original tread remained on the tires. The rubber was not reverted. The inner sidewalls of the left outboard and right inboard main landing gear tires were cut and abraded.

1.13 Medical and Pathological Information

Four passengers and one crewmember were treated for minor lacerations, abrasions, and sprains. They were released after examination and treatment.

1.14 Fire

A small fire observed in the right engine was extinguished by the aircraft's fire extinguishing system. Since the engine had separated from the wing, the fire was not near the fuel that drained from the ruptured wing tank. The fuel that drained from the tank ran down the slope on which the aircraft rested and collected in a pool away from any ignition sources. The ambient temperature and the temperature of the fuel were below the vaporization temperature of Jet A fuel (125° C.).

1.15 Survival Aspects

When the aircraft left the runway, the cabin lights went out, and the emergency lighting system illuminated. The level of illumination aided an orderly evacuation. The flight attendant in the forward cabin saw the fire on the right side of the aircraft and did not attempt to open the right forward exit. The left forward door had opened partially after the aircraft left the runway. However, it opened fully after the aircraft came to a stop and the evacuation slide inflated properly.

The rear cabin flight attendant's seat was occupied by a flight attendant and a deadheading crewmember. The outboard roller assembly bracket broke at the seat pan frame. The seat failure however, did not cause problems for the occupants. After the aircraft stopped, the deadheading crewmember opened the left rear door and exited the aircraft. He remained at the bottom of the evacuation slide and assisted passengers leaving the aircraft. The flight attendant attempted to open the right rear door but noticed the fire on that side of the aircraft and abandoned her attempt.

No significant damage occurred in the cabin. The evacuation through both the left forward and rear doors was orderly. One of the passengers opened the left overwing emergency exit, and several passengers escaped through that exit. The evacuation was completed in about 60 to 75 seconds, according to a Piedmont pilot who was a passenger on the aircraft.

1.16 Tests and Research

On November 1, 1973, at the request of the National Transportation Safety Board, the National Aeronautics and Space Administration (NASA) conducted slipperiness and drainage tests on runway 14.

The slipperiness test, conducted on an artifically wetted runway which simulated light to moderate rainfall, indicated that an average stopping distance ratio (SDR) [5/] in the aircraft's wheel tracks was 1.58:1, and along the runway centerline the SDR was 1.85:1. A SDR

5/ SDR is the ratio of the wet runway stopping distance and the dry runway stopping distance for an aircraft of the same weight, speed, and configuration.

of 1.92:1 is based on the wet runway landing requirements specified in 14 CFR 121.195 and 25.125. Based on a drainage test and on information gathered during similar tests, it was estimated that the rainfall intensity of 1.25 in/h resulted in a water depth of 0.09 to 0.15 in. on runway 14 when Flight 20 landed.

The depth of water on a runway surface at the time of a landing determines the type of hydroplaning phenomena that could occur during the landing. With 0.05 - 0.10 inch of water on the runway, all three types of hydroplaning (dynamic, viscous, and reverted rubber) could occur. Aircraft ground speeds must be greater than the tire dynamic hydroplaning speed (approximately 9 times the square foot of the tire pressure) for dynamic hydroplaning to occur. In the case of Flight 20, the ground speed for dynamic hydroplaning was 103.4 knots. No evidence of viscous or reverted rubber hydroplaning was found.

At the Board's request, the manufacturer calculated the dry runway stopping distance for this landing, with the following assumptions:

Landing weight	96,242 pounds
Pressure altitude	1,000 feet
Tailwind	8 knots
Runway slope	-0.4 percent
Touchdown speed	128 knots
Flap setting	40 degrees
Auto spoilers	deployed

A ground roll of 220 feet before brake application was included in the calculation. It was also assumed that International Standard Atmosphere temperature existed and that reverse thrust was stopped at 60 KIAS.

Under these conditions, the stopping distance with reverse thrust was calculated to be 2,144 feet. The stopping distance without reverse thrust was calculated to be 2,285 feet.

1.17 Other Information

Two tower controllers stated that the aircraft had touched down near the intersection of taxiway G and runway 14, which is about 3,200 feet from the approach end of runway 14.

The Boeing 737 Operations Manual states:

> "For all landings at or near the runway limited gross weight, close attention to landing technique is desirable. In particular, it is advantageous to avoid excess final approach speeds or touchdown beyond the intersection of the ILS glide slope and the runway should also be considered . . . . Automatic deployment of the speed brakes is dependent upon a spin-up signal from the main landing wheels. This spin-up signal could be delayed when landing in standing water or extremely slippery runways; therefore, the pilot should be prepared to operate the speed brake lever manually, if required."

The Piedmont Airlines B-737 Operations Manual includes the following instructions for landing on standing water, wet snow, slush, or ice:

> "Landing under these conditions induces hydroplaning. Hydroplaning is the tendency of the wheels to float on top of standing water, wet snow or slush, thereby greatly reducing braking effectivity. Under these conditions, stopping capability becomes increasingly dependent on reverse thrust. Presented below is the landing length required under these conditions. These lengths include the distance required in flare and for manual spoiler deployment and are valid in depths up to 1/2 inch.

	30 Flaps	40 Flaps
Brakes and Spoilers Only	8400 feet	7600 feet
Reversers, Brakes and Spoilers	5500 feet	5000 feet"

There are two methods of operating the ground spoilers and speed brakes at touchdown. One is by manually placing the spoiler handle in the "UP" position after landing; the other is placing the handle in the "ARMED" position before landing, so that the system will operate automatically.

The Boeing 737 Operations Manual states:

> "The ground spoilers and flight spoilers (speed brakes) operate in conjunction to reduce landing roll. A ground spoiler shutoff valve prevents the ground spoilers from extending until the right main landing gear OLEO has been compressed on landing.
>
> "With the speed brake handle in the 'ARMED' position and the speed brake armed light 'ON', the speed brakes will rise fully on touchdown if:
>
> 1. At least one antiskid switch is on and operating.
>
> 2. Either two left wheels or two right wheels or both inboard or outboard wheels are rotating approximately 50 knots. The ground spoilers will rise only when the right main gear OLEO is compressed on landing and conditions 1 and 2 above are met."

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

This was a survivable accident. All emergency systems functioned properly, and the evacuation was orderly and timely.

There were no failures to seats in the passenger compartment. The minor injuries sustained by the occupants did not inhibit their escape from the aircraft.

The flight attendants seat was occupied by a flight attendant on the inboard side and a deadheading crewmember on the outboard side. The failure of the outboard roller assembly bracket was probably the result of excessive forces applied to the seat when the landing gear failed. The failure of the bracket did not cause any injury to the occupants of the seat or inhibit their ability to perform their evacuation duties.

Conditions for dynamic hydroplaning existed when Flight 20 touched down on runway 14. Heavy rainshowers which began about 6 minutes before the flight landed, flooded runway 14 with more than 0.15 inch of water at the time of the landing. Correlation between the FDR readout

and markings on the runway indicates that adequate cornering and braking coefficients did not exist until the aircraft had reached a point about 1,000 feet from the end of the runway. At that point, the aircraft's groundspeed decreased below the tire dynamic hydroplaning speed of 103.4 knots. The aircraft's speed was about 80 knots when the plane crossed the end of the runway.

Several other factors contributed to the unsuccessful attempt to stop the aircraft on the runway.

(1) The approach was not stabilized. The approach airspeed was higher than the prescribed speed, and the aircraft was not kept on the glide slope. The high speed and high altitude during the approach resulted in a touchdown beyond the normal touchdown point which left only 3,780 feet of runway in which to stop.

(2) The deceleration rate of the aircraft was less than that expected on a wet runway. Despite the use of maximum braking and reverse thrust, the aircraft decelerated only about 40 knots during 2,780 feet of travel. As speed decreased below 100 knots, the deceleration rate increased. However, insufficient runway remained on which to stop the aircraft. The aircraft traveled another 820 feet over muddy, but fairly level, terrain before it stopped.

The condition of the aircraft's tires and brakes after the accident was satisfactory, and they apparently developed as much deceleration as could be expected considering the runway condition.

(3) Reverse thrust, which had little effect in decelerating the aircraft, probably contributed to the distance the aircraft drifted to the left of the centerline; the reverse thrust vector might have aggravated the drift, when the aircraft weathercocked into the crosswind from the right.

(4) The captain did not deploy the spoilers manually and the spoilers may not have deployed automatically after landing. Automatic deployment of spoilers depends on landing gear wheel spin up to 50 knots. The hydroplaning of the wheels could have kept them from spinning up to 50 knots, and this, in turn, could have prevented the spoilers from deploying automatically. However, when the aircraft

speed decreased to the point where effective braking and cornering was established, the wheels would have spun up to 50 knots or more, and the spoilers would have deployed automatically.

The pilot was advised that the runway was wet and that he could expect rain and turbulence on the final approach. Other pilots had reported light to moderate turbulence and light to heavy rain. Federal Aviation Regulations do not require that a pilot be advised of standing water on the runway, nor is it the carrier's policy to provide this information to a pilot. However, when the heavy rain was encountered on the final approach, the pilot should have expected water on the runway and should have taken measures, such as crossing the threshold on the glide slope at or near reference speed, which would have provided additional runway for the landing and decelerating. Also, the pilot should have ensured deployment of the spoilers to increase the aerodynamic drag and to further reduce the landing roll.

The lack of available flight test data on Boeing 737 stopping performance on wet or flooded runways precludes making any calculation regarding the stopping distance for this flight.

Runway 23 was available and had been used by another flight 7 minutes before Flight 20 landed. Runway 23 is 8,201 feet long and more nearly alined with the wind than runway 14. The published minimum descent altitude for a VOR DME approach to runway 23 was 1,260 feet, and the reported weather would have allowed an approach to that runway. An approach and landing on that runway would have provided a longer rollout area and therefore a greater margin of safety in the event that inadequate braking existed. However, the pilot of Flight 20 elected to make his approach using the ILS rather than the less precise VOR approach which served the longer runway.

2.2 Conclusions

(a) Findings

1. The flight was advised that light to heavy rain had been reported and that the runways were wet.

2. The flightcrew was aware of the reported wind direction and velocity.

3. The aircraft touched down at a faster-than-normal airspeed.

4. The aircraft touched down 1,250 feet beyond the glide slope intercept point.

5. Runway markings indicated that significant cornering and braking coefficient did not occur until the aircraft was about 1,000 feet from the end of the runway.

6. The aircraft's speed was about 80 knots when it rolled off the end of the runway.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was ineffective braking action caused by dynamic hydroplaning on a rain-flooded runway. Additional factors which contributed to the accident were: (1) An unstabilized downwind approach; (2) a relatively long, fast touchdown on a downsloping runway; (3) delayed deployment of the automatic spoilers; and, (4) failure of the crew to deploy the spoilers manually.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

May 22, 1974

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified of this accident at 2315 e.d.t., October 28, 1973, by the Federal Aviation Administration. An investigator from the Safety Board's Dulles Field Office went to the scene the following morning and arrived at 0930, October 29, 1973. Other members of the investigation team also went to the scene on October 29, 1973. Working groups were established for operations, airworthiness, human factors, weather and flight recorders. Parties to the investigation included: Piedmont Airlines, Inc., Federal Aviation Administration, Boeing Company, Pratt and Whitney Aircraft Division of United Aircraft Corp., and Air Line Pilots Association.

2. Hearing

A public hearing was not held.

APPENDIX B

CREW INFORMATION

Captain H. G. O'Conner

Captain H. G. O'Conner, 46, held Airline Transport Pilot Certificate No. 1233860 with type ratings in the Martin 202/404, Fairchild 27/227, YS-11, and Boeing 737 aircraft. At the time of the accident, he had accumulated 10,368 hours flying time, of which 627 hours had been in the Boeing 737, and 2,674 hours had been flown at night. His last proficiency check in the B-737 was completed satisfactorily on March 27, 1973. He possessed a current first-class medical certificate, dated April 3, 1973, with the limitation: Must wear correcting lense for distant vision. The captain was wearing his glasses during the approach and landing.

First Officer J. T. McCann

First Officer J. T. McCann, 39, held Airline Transport Pilot Certificate No. 1687706 with type rating in the YS-11 and commercial privileges, single engine land. At the time of the accident, he had accumulated about 5,000 flight-hours of which about 400 hours had been in the Boeing 737. He had flown 1,934 hours at night. His last proficiency check in the Boeing 737 was completed on February 5, 1973. He possessed a current first-class medical certificate, dated January 27, 1973. There were no waivers or limitations attached to the certificate.

Both pilots had the required rest and both had been on duty 8 hours 25 minutes before the accident. Both pilots had flown 2 hours 1 minute before the accident.

Flight Attendants

Miss J. Dawn Hodges and Miss Leslie C. Kovach were employed by Piedmont Airlines on September 15, 1967, and October 2, 1969, respectively. Their records showed satisfactory completion of required training.

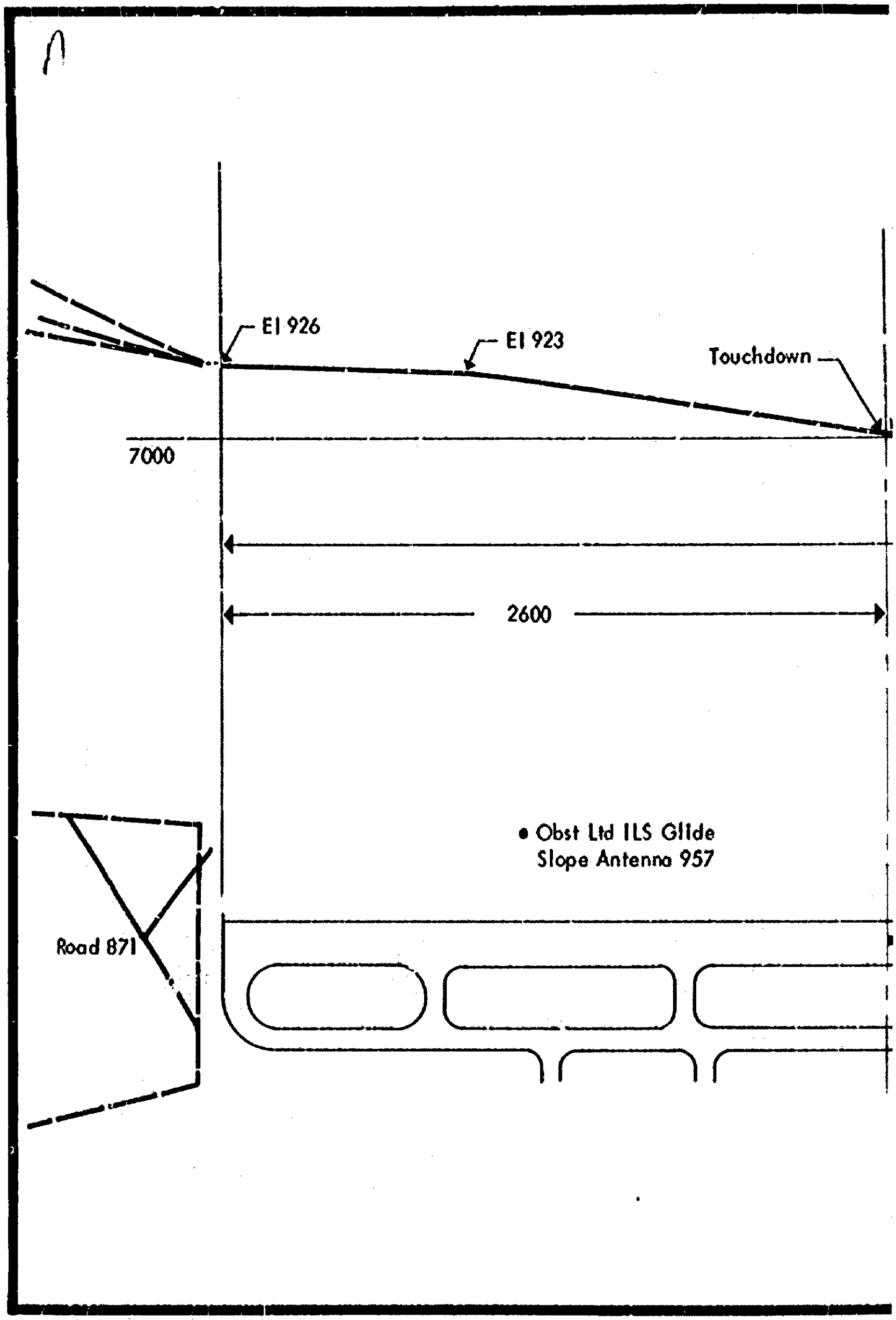
APPENDIX C

AIRCRAFT INFORMATION

Make and Model	Boeing 737-200
Registration	N751N
Serial No.	19548
Date of Manufacture	1968
Total flight hours	9,046.3
Flight hours since last line inspection	75.4
Engines	Pratt & Whitney JT8D-7A

Engines

No.	S/N	TOTAL TIME	SINCE OVERHAUL
1	P655991B	10,259.7	3,416.5
2	P656041B	9,005.3	2,338.0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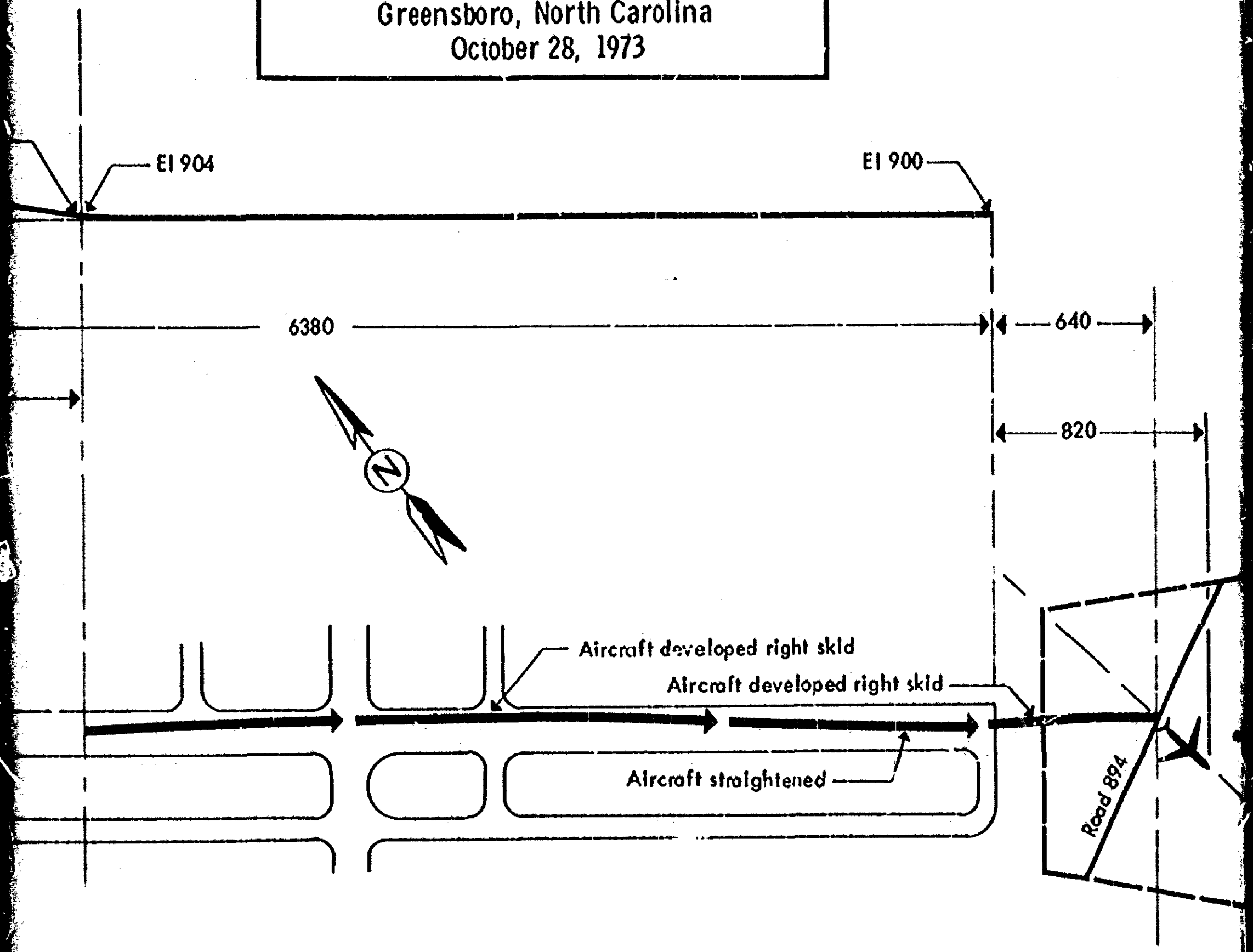
EI 923
Touchdown
7000
2600
• Obst Ltd ILS Glide
Slope Antenna 957
Road 871

NATIONAL TRANSPORTATION SAFETY BOARD

Greensboro, High Point, Winston Salem
Regional Airport

Piedmont Airlines B737
Greensboro, North Carolina
October 28, 1973



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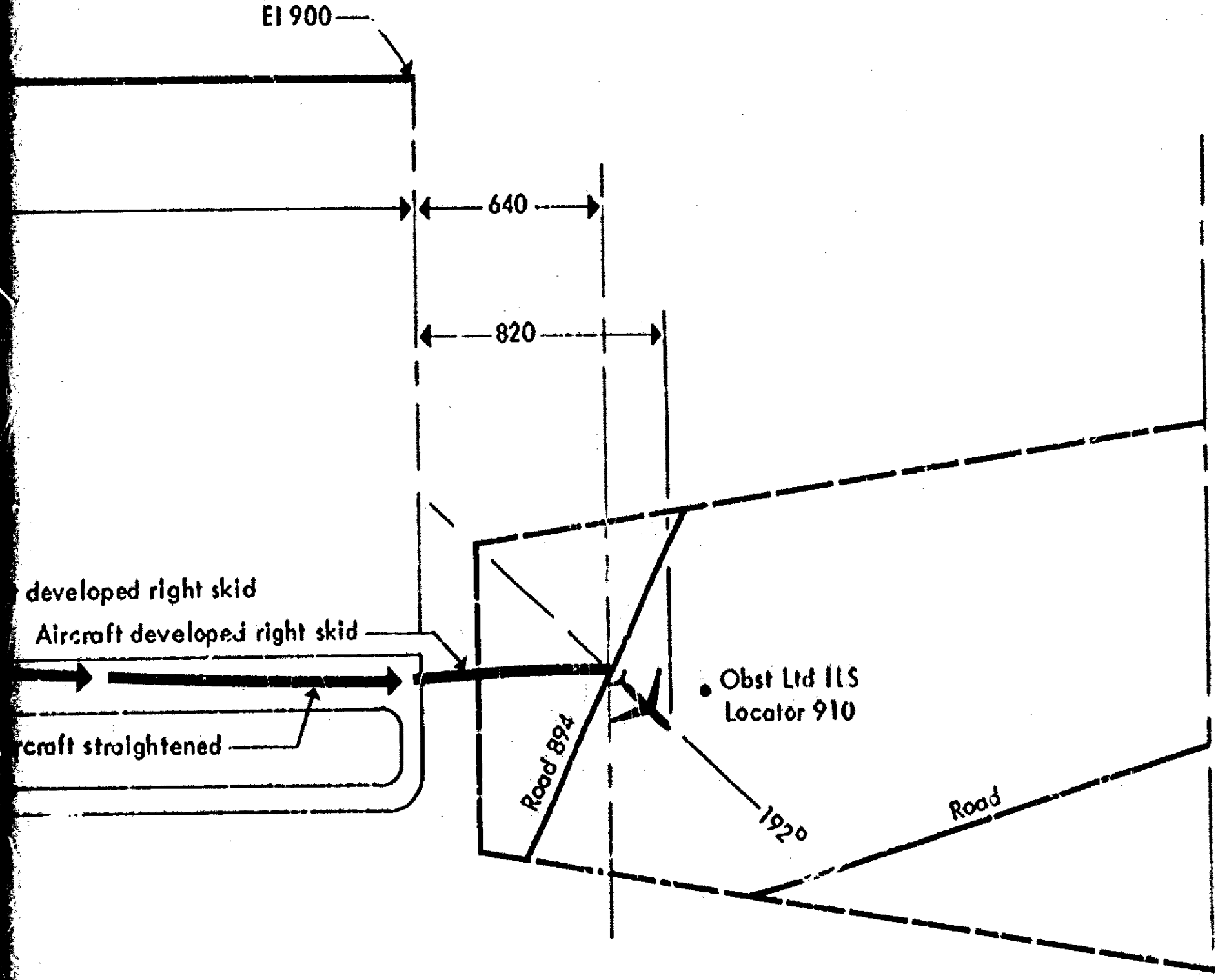

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