



## Geographic Disorientation: Landing at the Wrong Airport

*General aviation pilots commit this error more frequently, but trained airline crews manage to land their aircraft at the wrong airport too.*

by

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Each year or so, an airline aircraft is landed by its crew at the wrong airport, an occurrence upsetting to both crew and passengers. Thirtyfour examples of U.S. airline approaches to the wrong airport, most followed by actual landings, are listed in table one. The incidents cover a period of approximately two decades (1). The most recent incident was a B-737 on July 7, 1987, whose crew mistook the airport at Frankfort, Kentucky, for their destination airport at Lexington, Kentucky.

These airline incidents have not resulted in accidents; however, most of these incidents are associated with an increased hazard to flying. When a crew errs and performs an approach to the wrong airport, whether or not a landing is actually made, the crew has experienced "geographic disorientation". The actual landing at the wrong airport is simply the final consequence of the disorientation. Geographic disorientation in commercial and non-commercial general aviation operations has caused several accidents. Therefore, a study of examples of accidents due to geographic disorientation in general aviation should provide important clues to the factors that led pilots to the misidentification of one airport for another.

### Two Decades of Records Provide Facts

The NTSB has prepared a report of seven commercial general aviation accidents which occurred during the period 1966-1975, that resulted from landings at the wrong airport (2). Data

concerning this report is summarized on table two. The seven airplanes involved in these accidents sustained substantial damage. However, injuries to the aircrews and passengers were either minor or none. There were no fatalities.

In addition, NTSB 1983-1985 reports of accidents in non-commercial general aviation that were associated with landing at the wrong airport reveal sixteen accidents due to crew geographic disorientation (3). As a result of attempted landings at the wrong airport, fifteen airplanes suffered substantial damage and, in one case, an aircraft was completely destroyed (table three). In these accidents, two occupants died, three suffered serious injuries and five minor injuries (table four). In all of the cases there were no obstructions to vision and the average visibility was 15 miles (table five). It is seen that 63 percent of the accidents occurred on landing, and an equal percentage occurred during daylight (table five).

The common denominator for all of the cases was the lack of situational awareness. A mismatch existed between the external world reality and the "internal world" aircrew mental picture relative to the real world. This mismatch could have been prevented with more professional pre-flight planning, better cockpit organization of in-flight documentation and charts, and a continuing process of cross checks by the crew concerning the current position relative to the desired position. In addition, pilots let their "fantasies" over-ride the real facts of

time, speed and distance, mentally misidentifying the wrong airport as the correct one through a distortion of the facts of reality.

Tables five, six, seven, eight and nine, provide detailed information on the environment, operational circumstances, airport conditions and pilot information respectively.

## Major Factors

The pilots conducting the non-commercial general aviation operations ranged from the private pilot to the airline transport pilot certification levels (table eight). All of the pilots had received biennial flight reviews within the required 24 month period with 10 months average elapsed time. It was found that inadequate preflight planning plus poor in-flight planning are common findings relative to these geographic disorientations. The key factors associated with non-commercial general aviation accidents resulting from landing at the wrong airport can be summarized as follows:

### Summary of Non-Commercial General Aviation Accidents

1. Inadvertent landing at the wrong airport, airspeed misjudged, improper use of equipment/aircraft, diverted attention, distance misjudged, go around not performed, overrun, on-ground collision with terrain.
2. Inadvertent landing at the wrong airport, improper use of procedures, lack of familiarity with geographic area, go around not possible, failure to maintain directional control, overrun, on-ground collision with a ravine.
3. Inadvertent landing at the wrong airport, improper decision, lack of familiarity with geographic area, distance misjudged, air speed misjudged, go around not performed overrun, intentional ground loop/swerve.
4. Inadvertent landing at the wrong airport, became lost and disoriented, improper use of airport facility, lack of familiarity with geographic area, use of unsuitable terrain, runway/landing area-dirt bank, loss of control, on-ground collision with a tree.
5. Inadvertent landing at the wrong airport, improper pre-flight planning and preparation, runway/landing area-high vegetation, poor airport and runway maintenance, take-off airspeed not maintained, aborted subsequent takeoff, loss of control, overrun, on-ground collision collision with terrain.

6. Attempted landing at the wrong airport, became lost and disoriented, failure to maintain visual look out, in-flight collision with wires.
7. Inadvertent landing at the wrong airport, poor in-flight planning and decision, self induced stress, soft terrain, nose over.
8. Inadvertent landing at the wrong airport, light condition - dark night, overrun, on-ground collision with terrain.
9. Inadvertent landing at the wrong airport, terrain condition dirt-bank, crosswind, failure to maintain directional control, on-ground collision with terrain.
10. Attempted landing at the wrong airport, fuel exhaustion, refueling not possible, poor pre-flight planning and preparation, non-mechanical loss of power, forced landing, on-ground collision with an object.
11. Performed landing at the wrong airport, terrain condition-ditch, improper use of facility, complacency, on-ground collision with terrain during roll.
12. Inadvertent landing at the wrong airport, improper in-flight planning and decision, delayed go-around, excessive pull up, failure to maintain airspeed, loss of control, in-flight collision with trees.
13. Inadvertent landing at the wrong airport, overrun, on-ground collision with terrain.
14. Attempted landing at the wrong airport, inadequate in-flight planning and decision, attempted go-around, failure to maintain clearance, in-flight collision with trees.
15. Inadvertent landing at the wrong airport, poor in-flight planning and decision, became lost and disoriented, failure to use air/ground communications, mid-air collision with a navy jet.
16. Inadvertent landing at the wrong airport, attempted subsequent takeoff climb rate not maintained, in-flight collision with a fence, in-flight collision with terrain.

The following summaries describe the reported factors associated with commercial general aviation accidents that resulted from landing at the wrong airport.

## Summary of Commercial General Aviation Case Accidents

1. Inadvertent landing at the wrong airport, misjudged clearance during subsequent takeoff, in-flight collision with trees.
2. Inadvertent landing at the wrong airport, became lost and disoriented, selection of unsuitable terrain, overrun, on-ground collision with terrain.
3. Inadvertent landing at the wrong airport, became lost and disoriented, inadequate pre-flight preparation and/or planning, delay in initiating go around, improperly loaded aircraft-weight-and-center of gravity, on-ground collision with terrain.
4. Inadvertent landing at the wrong airport, became lost and disoriented, failed to initiate go-around, misjudged distance and speed, pilot was fatigued, overrun, on-ground collision with rocks.
5. Inadvertent landing at the wrong airport, selection of unsuitable terrain, downwind, on-ground collision with terrain/water.
6. Inadvertent landing at the wrong airport, became lost and disoriented, improper in-flight decisions or planning, in-flight collision with a fence.

### Types of Geographic Disorientation

Geographic disorientation can be classified in three categories according to distance from the intended location (see figure one):

1. Distant geographic disorientation: 2,500 feet/800 meters or more.
2. Intermediate geographic disorientation: 20 feet to 2,500 feet/6 meters to 800 meters.

3. Near geographic disorientation: 20 feet/6 meters.

Geographic disorientation include mistakenly moving to the wrong part of the airport ramp, taxiing on the wrong taxiway, departing or landing on the wrong runway, flaring 20 feet too high or too low on landing, becoming lost during flight, intruding into unauthorized airspace, taking a wrong airway and landing at the wrong airport. It is easy to categorize these errors in the above categories. This has the utility of suggesting the causes of these errors and leads to a practical approach to prevention.

### Causes and Prevention of Geographic Disorientation

The main cause of geographic disorientation is the incompatibility of the “mental image” of the aircrew with the real outside world. Pilots must be aware of this case. Thorough preflight planning and the use of all available cockpit resources are two powerful means to prevent geographic disorientation. It is also important to maintain the ability and flexibility to deal with unexpected in-flight deviations, and/or malfunctions while maintaining geographic orientation. This also includes diminished flight visibility. This can be accomplished by means of continuous study, flight practice and periodic proficiency checks.

Pilot education programs that call attention to the hazards resulting from operating an aircraft should also alert pilots about the risks involved in attempted landings at a wrong airport. A properly performed missed approach is always a last moment alternative that can prevent the occurrence of a potentially catastrophic landing on an unfamiliar airport. This circumstance, of course, should be prevented from the very beginning by not becoming geographically disoriented.

In addition, pilots should be aware of the detrimental effects of additional self-imposed stressors and should avoid them (or at least limit their influence). Such stressors include overall fatigue, visual fatigue, sleep deprivation, alcohol ingestion, and use of other addicting substances, including tobacco. Dealing appropriately with emotional upsets, preoccupations, and other disconcerting behaviors that interfere with mental concentration, are additional factors that are helpful in preventing pilot errors. ◇

**Table One**  
**Air Carrier Landings or Approaches to the Wrong Airport.**

<b>Original Destination</b>	<b>Wrong Destination</b>
Albany County, New York	Schenectady
Augusta, Georgia, Municipal	Daniel Field
Buffalo, New York, International	Niagara Falls Air Force Base
Cedar Rapids, Iowa	Iowa City
Columbia, Missouri	Fulton
Columbus, Ohio	Don Scott Airport
Corpus Christi, Texas, Municipal	Cabannis Navy Aux. Field
Dayton, Ohio	Wright-Paterson Air Force Base
Deadhorse, Alaska	Prudhoe Bay
El Paso, Texas, International	Biggs Army Air Base
Farmington, New Mexico, Regional	Aztec Airport
Fort Lauderdale, Florida, International	Fort Lauderdale Executive
Greenville-Spartanburg, South Carolina	Downtown
Houston, Texas, Hobby	Ellington Air Force Base
Huntsville, Alabama	Redstone Army Air Base
Lexington, Kentucky, Blue Grass	Frankfort Municipal
Memphis, Tennessee, International	Olive Branch Municipal
Miami, Florida, International	Opa-Locka
Nashville, Tennessee, Metropolitan	Smyrna Airport
Newark, New Jersey, International	Linden Airport
Oakland, California, International	Alameda Naval Air Station
Providence, Rhode Island, Green State Municipal	Quonset Point Naval Air Station
Rapid City, South Dakota	Ellsworth Air Force Base
Redmond, Oregon	Prineville
Ft. Myers, Florida, Regional Southwest	Page Field
San Diego, California, Lindbergh	North Island Naval Air Station
Santa Ana, California	El Toro MCAS
San Juan, Puerto Rico, International	Isla Grande
Savannah, Georgia, Municipal	Hunter Army Air Base
Sheridan, Wyoming	Buffalo
Seattle, Washington, International	Boeing Field
Louisville, Kentucky, Standford Field	Bowman Field
Steward, New York, International	Dutchess County, Poughkeepsie
Tampa, Florida, International	McDill Air Force Base

**Table Two**  
**Aircraft, Flight and Accidents Data Commercial General**  
**Aviation "Wrong" Airport Accidents**

<b>Case #</b>	<b>Aircraft Make/Model</b>	<b>Phase of Flight</b>	<b>Aircraft Damage</b>	<b>Pilot Certificate</b>	<b>Pilot Age (Yrs)</b>	<b>Total Pilot Flight Time (Hours)</b>	<b>Pilot Time Acft. Type (Hours)</b>
1.	Cessna 172	Takeoff	Substantial	Commercial	19	303	47
2.	Lear 23	Landing	Substantial	ATP	43	10,000	907
3.	Piper PA32	Landing	Substantial	Commercial	20	558	84
4.	Beech B55	Landing	Substantial	Commercial	34	1,389	48
5.	Cessna 402	Takeoff	Substantial	Commercial	38	4,142	64
6.	Beech 95	Landing	Substantial	ATP	32	2,540	95

**Table Three**  
**Aircraft, Flight and Accident Data: Non-Commercial**  
**General Aviation "Wrong" Airport Accidents**

Case #	Aircraft Make	Phase of Flight	Aircraft Damage
1.	Piper 161	Landing	Substantial
2.	Cessna 172	Landing	Substantial
3.	Beech M35	Landing	Substantial
4.	Piper 161	Landing	Substantial
5.	Piper 112	Takeoff	Substantial
6.	Grumman AA5	Descent	Substantial
7.	Cessna 182M	Landing	Substantial
8.	Piper 180	Landing	Substantial
9.	Piper 150	Landing	Substantial
10.	Mooney M20E	Landing	Substantial
11.	Cessna 172	Landing	Substantial
12.	Bellanca 31A	Descent	Destroyed
13.	Cessna 150L	Landing	Substantial
14.	Piper PA30	Approach	Substantial
15.	Cessna 150	Approach	Substantial
16.	Cessna 210L	Descent	Substantial

Ten (63%) accidents occurred during landing, three (19%) during descent, and two (13%) during approach. One case occurred during a take off that was preceded by a landing at the wrong site.

**Table Four**  
**Type of Injuries to the Occupants**

Occupant	Type Of Injury			None
	Fatal	Serious	Minor	
Crew	1	1	1	13
Passengers	1	2	4	21
TOTALS	2	3	5	34

There were 44 persons involved in these flights, 16 as pilots and 28 as passengers. Two deaths, three serious injuries and five minor injuries occurred.

**Table Five**  
**Environment**

Case #	Weather Briefing	Wind Speed	Visibility (SM)	Lowest Clouds	Lowset Ceiling	Ostruc. To Vision	Light Cond.
1.	Yes	240	10	Clear	None	None	Night
2.	Yes	Unkown	15	5,000	None	None	Daylight
3.	Yes	340/7	40	Clear	None	None	Daylight
4.	No	200/5	10	600	None	None	Daylight
5.	No	320/7	15	2,500	None	None	Dusk
6.	No	Variable	12	Clear	None	None	Daylight
7.	No	120/12	8	2,000	None	None	Daylight
8.	Yes	200/14	10	Clear	None	None	Night
9.	No	220/8	30	Clear	None	None	Daylight
10.	No	310/4	10	4,000	None	None	Daylight
11.	No	Calm	6	Clear	None	None	Dusk
12.	No	250/3	7	2,500	None	None	Night
13.	Yes	Unknown	45	Clear	None	None	Daylight
14.	No	150/6	10	3,000	25,000	None	Daylight
15.	Yes	270/4	7	2,000	None	None	Night
16.	No	330/3	7	Clear	None	None	Daylight

Of the 16 pilots, six requested a weather briefing. Wind speed at the airport vicinity ranged from 3 knots to 14 knots with an average of 6 knots to 7 knots. Visibility was better than six miles in all cases. For eight accidents the sky was reported to be clear, and for others, scattered clouds were noted. No obstructions to vision were reported. Ten flights took place during daylight, two during dusk, and four at night.

**Table Six**  
**Operations Information**

<b>Case #</b>	<b>Type Of Flight Plan</b>	<b>Approach And Landing</b>
1.	VFR	Traffic Pattern
2.	None	Traffic Pattern
3.	None	Full Stop
4.	None	Traffic Pattern
5.	None	Unknown
6.	None	Unknown
7.	None	Straight In
8.	None	Traffic Pattern
9.	None	Go Around
10.	None	Forced Landing
11.	None	Straight In
12.	None	Go Around
13.	VFR	Traffic Pattern
14.	None	Unknown
15.	None	Traffic Pattern
	None	Full Stop

**Table Seven**  
**Airport Information**

<b>Case #</b>	<b>Runway Ident.</b>	<b>Runway Length/Width</b>	<b>Runway Surface</b>	<b>Runway Status</b>
1.	24	3,785/75	Asphalt	Dry
2.	18	2,000/Unknown	Gravel	Unknown
3.	Unknown	1,300/Unknown	Grass/Turf	Wet
4.	Unknown	3,700/60	Asphalt	Dry
5.	05	2,650/50	Grass/Turf	Dry
6.	Unknown	Unknown	Unknown	Unknown
7.	Unknown	1,360/Unknown	Grass/Turf	Soft
8.	27	2,400/40	Asphalt	Dry
9.	Unknown	3,000/Unknown	Asphalt	Dry
10.	Unknown	Unknown	Dirt	Dry
11.	12	1,910/100	Grass/Turf	Dry
12.	01	2,250/45	Asphalt	Dry
13.	15	Unknown	Grass/Turf	Dry
14.	19	4,000/75	Asphalt	Dry
15.	25R	8,000/200	Asphalt	Dry
16.	Unknown	Unknown	Grass/Turf	Dry

**Table Eight  
Pilot Information**

Case #	Age	Certificate(s)	Rating(s)	Biennial Flight Review	
				CURRENT	LAST
1. 20	26	Private	SEL	Yes	
2. 09	38	Private	SEL	Yes	
3. 13	41	Commercial	SEL	Yes	
4. 01	33	Private	SEL	Yes	
5. 12	31	Private	SEL	Yes	
6. 14	31	Commercial	SEL	Yes	
7.	32	Private	SEL	Yes	16
8.	35	Private	SMEL	Yes	02
9. 13	49	Private	SEL	Yes	
10. 01	40	Private	SEL	Yes	
11. 10	51	Private	SEL	Yes	
12. 08	45	Private	SEL	Yes	
13. 06	51	Private	SEL	Yes	
14. 23	60	ATP	MEL	Yes	
15. 02	30	Commercial	SMEL	Yes	
16. 04	36	Private	SMEL	Yes	

**Table Nine  
Pilot Flight Time**

Case #	Total	Make/Model	Instrument	Last 24 Hr	Last 30 Days	Last 90 Days
1.	370	310	00	06	27	27
2.	369	369	00	01	11	30
3.	877	460	85	00	Unknown	05
4.	89	32	02	02	Unknown	67
5.	90	02	02	02	Unknown	05
6.	775	228	140	03	Unknown	20
7.	3,554	1,341	42	Unknown	Unknown	Unknown
8.	187	44	02	05	05	76
9.	450	450	07	00	Unknown	30
10.	250	10	00	Unknown	Unknown	Unknown
11.	1,083	493	Unknown	01	Unknown	26
13.	311	311	115	02	Unknown	27
14.	12,000	200	1,026	02	Unknown	120
15.	344	275	45	Unknown	Unknown	10
16.	456	91	02	05	Unknown	124

There were two pilots with less than 100 hours (average 90 hours), eleven pilots with 100 to 1,000 hours (average 445 hours), and one pilot with 12,000 hours. In addition, there were three pilots with no instrument experience, nine pilots with less than 100 hours (average 24 hours) of instrument time, two pilots with 100 to 1,000 hours (average 129 hours), and one pilot with 1,026 hours. The average flight time during the last 24 hours for all of the pilots was three hours.

**Figure One**  
**Classification of Geographic Disorientation by Distance**

Type	Distance (feet)	Distance (meters)
Distant	2,500 or more	800 approx.
Intermediate	20 to 2,500	6 to 800 approx.
Near	Up to 20	Less than 6

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**References**

1. Shipman, R.P. 1988. The Right Time But The Wrong Place. Air Line Pilot. March. Pages 12-15.
2. National Transportation Safety Board 1988. Report of General Aviation Commercial accidents during 1966-1975 related to landing at the wrong airport. Special computer printout.
3. National Transportation Safety Board 1988. Report of General Aviation Non-Commercial accidents during 1983-1985 related to landing at the wrong airport. Special computer printout.

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