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# NATIONAL TRANSPORTATION SAFETY BOARD



# AIRCRAFT INCIDENT REPORT

USAIR FLIGHT 105 BOEING 737-200, N283AU KANSAS CITY INTERNATIONAL AIRPORT, MISSOURI SEPTEMBER 8, 1989



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| 16. Abstract<br>This report explains the premature descent below minimum descent altitude of USAir flight <i>105</i> on<br>approach to Kansas City International Airport, Missouri, on September 8, 1989. The aircraft struck<br>and severed four electronic transmission cables, located about 75 feet above the ground,<br>approximately 7,000 feet east of the runway threshold. The safety issues discussed in the report are<br>identification of potentially confusing features near runways on instrument approach charts; FAA<br>oversight of air traffic control quality assurance; FAA training of and guidance to operations<br>inspectors; application of visual descent points to training in and execution of nonprecision<br>instrument approaches, and incorporation of requirements for visual descent points in FAR Part 135<br>operations; communications of weather information between air traffic control and the National<br>Weather Service; and revision of minimum safe altitude warning inhibit areas. Safety<br>Recommendations addressing these issues were made to the FAA and the National Weather Service. |   |  |                   |  |
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# EXECUTIVE SUMMARY

On September 8, 1989, N283AU, a Boeing 737-200 operated as USAir flight 105 was a regularly scheduled revenue passenger flight conducted under 14 Code of Federal Regulations Part 121 from Pittsburgh, Pennsylvania, to Wichita, Kansas, with an en route stop in Kansas City, Missouri. Fifty-eight passengers, two flight crewmembers and four flight attendants were onboard. A Federal Aviation Administration inspector who was performing an en route inspection occupied the cockpit observer's seat. The flight from Pittsburgh to the Kansas City area was uneventful.

The captain was the pilot flying and the first officer was performing the communications with air traffic control. USAir 105 was cleared to execute the localizer back course approach to runway 27 at 2129:41. At 2134:23, the local controller told USAir 105 "Ican't tell for sure but it appears we have lost the lighting on the south side of the airport. " The flightcrew later described seeing a bright flash about this Subsequent inspection revealed that the airplane struck and severed time. four electronic transmission cables, located about 75 feet above the ground, approximately 7,000 feet east of the runway 27 threshold. The flightcrew executed a missed approach and landed uneventfully in Salina, Kansas. None of the passengers or crew was injured, but the airplane sustained minor damage in the incident.

The National Transportation Safety Board determines that the probable cause of this incident was the flightcrew's failure to adequately prepare for and execute a nonprecision approach and their subsequent premuture descent below minimum descent altitude. Contributing to the cause of the incident was the inadequate and deficient services provided to the flightcrew by air traffic control personnel.

The safety issues raised in this report include:

- 0 Identification of potentially confusing features near runways on instrument approach charts.
- 0 FAA oversight of air traffic control quality assurance.
- 0 FAA training of and guidance to operations' inspectors.
- 0 Application of visual descent points to training in and execution of nonprecision instrument approaches, and incorporation of requirements for visual descent points in FAR Part 135 operations.
- 0 Communication of weather information between air traffic control and the National Weather Service.
- 0 **Revision of minimum safe altitude warning inhibit areas.**

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Recommendations concerning these issues were addressed to the FAA and the National Weather Service.

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# NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C. 20594

# AIRCRAFT INCIDENT REPORT

#### USAIR, FLIGHT 105 BOEING 737-200, N283AU KANSAS CITY INTERNATIONAL AIRPORT, MISSOURI SEPTEMBER 8, 1989

# 1. FACTUAL INFORMATION

# 1.1 History of the **F1** ight

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On September 8, 1989, N283AU, a Boeing 737-200 operated as USAir flight 105 (USAir 105), was a regularly scheduled revenue passenger flight conducted under 14 Code of Federal Regulations (CFR) Part 121 from Pittsburgh, Pennsylvania, to Wichita, Kansas, with an en route stop in Kansas City, Missouri (MCI). Fifty-eight passengers, two flight crewmenbers and four flight attendants were onboard. A Federal Aviation Administration (FAA) inspector, who was performing an en route inspection, occupied the cockpit observer's seat. The flight from Pittsburgh to the MCI area was uneventful. The airplane was dispatched with one component inoperative, the first officer's radio altimeter, under its approved minimum equipment list.

The captain was flying the airplane and the first officer was performing such duties as communicating with air traffic control (ATC). The first officer mude initial contact with MCI east arrival approach control at 2121:20 cdt, when the airplane was about 45 miles northeast of the airport. He indicated that they had received Automatic Terminal Information Service (ATIS) information "Romeo."' The MCI east arrival controller told the flightcrew to plan for a visual approach to runway 19.

#### 'Information Romeo stated:

Kansas City International information romeo. Zero one five zero zulu, two thousand five hundred scattered, measured ceiling seven thousand five hundred overcast; visibility one zero; temperature seven one [F<sup>0</sup>]; wind estimated at one one zero degrees at one one; the altimeter two niner seven four. Remarks, frequent lightning northeast through east, occasional lightning west. Simultaneous I-L-S runway one niner and I-L-S runway niner approaches in use. Notice to airmen, convective SIGMET (significant meteorological information) one Charlie is in effect for Iowa Missouri Nebraska and Kansas. Concerns an area of severe thunderstorms with tops above flight level four five zero. Taxiway alpha one closed. Departing aircraft expect alpha two departure. Taxiway delta five and delta six closed. Taxiway delta centerline displaced fifty feet north of original centerline from four hundred feet west of taxiway delta four to west of taxiway delta six. Advise on initial contact you have romeo. At 2127:34, the east handoff controller told the tower that the National Weather (NWS) was reporting winds that were favoring the use of runway 27. The cab coordinator was informed at 2128:55 that the winds were from the west at 24 knots, gusting to 39 (see appendix 8). He approved operations on runway 27 at 2129:01. At 2128:22 the crew of USAir 105, after asking the east arrival controller "how does it look for us," agreed to accept the localizer back course approach to runway 27.<sup>2</sup> The airplane was at an approximate altitude of 6,500 feet ms1 and about 14 miles from the runway at that time. The east arrival controller cleared the flight for the approach at 2129:41 when the airplane was 5 miles from the Mizzo intersection of the localizer back course approach (see figures 1 and 2). USAir 105 was descending through approximately 5,000 feet ms1 at that time. (See section 1.17.1, Flight Path, and figures 3 and 4.)

During this general timeframe, several aircraft were on approach to MCI's runway 19. The local controller instructed a Midway Airlines flight to go around at 2124:56 after he was unable to determine, because of the heavy rain, whether the previous flight, Braniff 659, had cleared the runway. Shortly thereafter, the Braniff flight crew informed the local controller that they had encountered a "dranntic" wind shift at 200 to 300 feet, which had been out of the west. This pilot report (PIREP) was neither disseminated within the MCI ATC facility nor was it communicated to pilots of other aircraft in the MCI airspace. The local controller then remarked to the Braniff crew that he believed that the rain at that time was "the hardest I've ever seen it rain." At 2126:39, a military C-12 aircraft, call sign PAT 130, executed a go around after its crew lost sight of the runway. Its crew informed the east arrival controller at 2127:38, "that wall of water just covered the airport down there, we, it's not visible any more."

At 2130:55, because of storm activity in the area of the published missed approach course and in response to a request from the crew, the east arrival controller gave USAir 105 al ternate missed approach instructions for the localizer back course approach to runway 27. Ten seconds later, the controller told the flight to contact the tower. At 2131:13, USAir 105 contacted the tower and, in response, the local controller cleared the flight to land and added "the wind is estimated two six zero at two four gusts three niner but [it] does appear that the wind is dying down a little bit."

<sup>&</sup>lt;sup>2</sup>The Airman's Information Manual in effect at the time of the incident defined a localizer as an electronic signal broadcast on one of 40 instrument landing system radio frequency channels which provides the pilot with "[lateral] course guidance to the runway centerline. The approach course of the localizer is called the front course and is used with other functional parts, e.g., glide slope, marker beacons, etc. The course line along the extended centerline of a runway, in the opposite direction to the front course is cat led the back course." The localizer back, course approach to MCI's runway 27 was a nonprecision approach and as such did not provide precise electronic vertical flight path guidance.



Figure 1.--Localizer back course approach to MCI's runway 27. Copyright, Jeppesen Sanderson, Inc. reprinted with permission.

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| JEF                        | pesen  | AL                      | IG 19-88         | (10.9A)                                 | EFF     | lug 25      | -<br>KANS,<br>KA  | AS CIT)<br>NSAS CIT              | RPORT     |
|----------------------------|--|-------------------------|------------------|---|---------|-------------|-------------------|----------------------------------|-----------|
| i GE!<br>CAI<br>For<br>Low | GENERAL<br>CAUTION: Birds in vicinity of airport.<br>For STARs see Kansas City. Mo (Downtown).<br>Low-level wind shear alert system.   |                         |                  |   |         |             |                   |                                  |           |
|                            |  | ADI                     | DITIONAL         | RUNWAY IN                               | FORMA   | TION<br>USA | BLE LENGTH        | s                                |           |
| <b>R</b> W                 |  | . 101                   |                  |   | Thresh  | old I G     | ilide <u>Slap</u> | TAKE-OFF                         | WIDT      |
| -                          | 19 HIRL CL ALSF-   | 11 TD2                  | groove           | d RVR                                   |         |             | <b>4713</b> '     |                                  | 150'      |
| 9                          | HIRL CI MALS   | 8_TD <u>2</u><br>/ASI-1 | groove<br>groove | d RVR                                   |         |             | \$435'            |                                  | 150       |
|                            |  |                         |                  |   |         |             |                   |                                  |           |
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|                            |  |                         |                  |   |         |             |                   |                                  |           |
|                            |  |                         |                  | TAKE-OFF                                |         |             |                   |                                  |           |
|                            |  | Ewys 1                  | , 19             |   |         |             | 2wys              | 9, 27                            |           |
|                            | CL & RCLM<br>any RVR<br>aut, other<br>fue reg.   | Farwa<br>Via Re         | rd<br>H          | <b>STD</b>                              |         | N.<br>V     | rused<br>In Rof   | STD                              |           |
| 6.2<br>No                  | <b>F 3</b> d   | <b>ne</b> 16 -          | . Y.             | eve 50 .                                | 1       |             | 16 - Y            | me 50                            | <b>-1</b> |
| 44                         | 44 and and and a second |                         | m 24 -           | Y <sub>2</sub>                          |         |             | m 24 - Y2         |                                  |           |
|                            |  |                         |                  |   |         |             |                   |                                  |           |
|                            |  |                         | FOR FL           | ING AS ALT                              | ERNATE  |             | 1                 | OC Rwy 1                         |           |
|                            | Procision  |                         |                  | LOC Bury I<br>LOC BC Bury<br>VOR Bury 2 | 77<br>7 |             |                   | DC Ruy 4<br>DB Ruy 1<br>DB Ruy 4 |           |
|                            | 600-2 800-2 NA   |                         |                  |   |         |             |                   |                                  |           |
| ANG                        | IANGES: See other side.  |                         |                  |   |         |             |                   |                                  |           |

Figure 2. -- Approach chart of additional runway information for MCL Copyright, Jeppesen Sanderson, Inc. reprinted with permission.

At 2131:43, the MCI east arrival approach controller transmitted the following message: "All aircraft on this frequency, the visibility at [Kansas City] International Airport is 1/2 mile with rain." The flightcrew of USAir 105 had just changed the communication frequency to that of the MCI local controller and, as a result, did not receive this report. The localizer back course approach called for a least 1 mile visibility before flightcrews could execute this approach.<sup>3</sup> Just after the east arrival controller's report, the crew of Midway flight 225 told the controller that they could not execute the approach with 1/2 mile visibility. Within about 1 minute, the flight crews of two other aircraft also informed the controller that they would be unable to execute the approach because of the visibility.

At 2132:45, the local controller asked the flight crew of USAir 105 to inform him when they saw the runway. He also told the flightcrew that he was increasing the intensity of the runway lights. At that time, USAir 105 was about 3 miles from the runway 27 threshold, at an approximate altitude of 1,900 feet msl.

At 2134:23, the local controller told USAir 105 "I can't tell for sure, but it appears we have lost the lighting on the south side of the airport." The flightcrew later described seeing a bright flash about that time. At 2135:36, the flightcrew of USAir 105 asked the local controller for vectors or headings "out of all this [adverse weather]" and informed that controller that they were executing a missed approach. At 2137:09, after establishing radio contact with the east arrival controller, USAir 105 declared "we lost hydraulics A and B we've got an emergency situation."<sup>4</sup>

After determining the weather at nearby airports, the flightcrew of USAir 105 requested vectors to Salina, Kansas. Although Wichita was the scheduled termination point of the flight, visibility at Wichita was below the minimum distance required for the initiation of an instrument approach. The flight diverted to Salina and landed at 2239 without further incident. None of the passengers or crew was injured.

Subsequent inspection of the area near the airport revealed that 4 of a group of 11 electrical transmission cables, located 7,270 feet east of the runway 27 threshold on a north-south orientation, had been severed by USAir 105. The highest cable, a static line with no current, was located at an approximate altitude of 1,100 feet msl, about 75 feet above the ground. The next lower cable, a transmission line that supplied 161,000 volts, was about 18 feet lower, and the middle and lower transmission lines were lower still by about 4 and 11 feet, respectively. The lines were near an automobile storage facility that was brightly illuminated with mercury vapor

<sup>3</sup> FAR 121.651 (b) states, in part: No pilot may continue an approach past the final approach fix unless the latest weather report for that airport reports the visibility to be equal to or more than the visibility minimums prescribed for that procedure.

<sup>4</sup> Subsequent inspection revealed that hydraulic system A uas undamaged. See section 1.12, Wreckage and Impact Information, for more details. lights (see figure 3). The severed cables transmitted electrical power to the terminal lights at MCI, as well as the taxiway lights on the south side of the airport.

**1.2** Injuries to Persons

There were no injuries to the passengers or crewmenbers.

1.3 Damage to Airplane

The airplane sustained minor damage. USAir reported that the cost of repairing the airplane was \$272, 205.

1.4 **Other Damage** 

Damage on the ground was limited to the four electric utility cables described previously.

**1.5 Personnel Information** 

The captain, age 40, received a type rating in the Boeing 737 on April 1, 1986, and completed his initial operating experience as captain on the airplane on April 10, 1986. At the time of the incident, he had accrued about 14, 300 hours of flight time, of which about 2,000 hours were in the Boeing 737, as captain. (See appendix C).

The first officer, age 38, completed his training on the Boeing 737 on September 17, 1986. At the time of the incident, he had accrued an estimated 7,500 hours of flight time, about 2,300 of which were in the Boeing 737.

From July 1989 to the night of the incident the captain had operated four flights into MCI, including one each on September 1 and 2, 1989. The first officer had not flown into MCIasa USAir flight crewmember and could not remember whether he had done so before joining USAir.

Five air traffic controllers provided or supervised the providing of ATC services to USAir 105 upon its arrival into the MCI airspace. All were full-performnce-level controllers and facility rated at MCI. The east arrival radar controller, age 39, became facility rated at MCI on March 24, 1976. The terminal radar approach control (TRACON) area supervisor, age 52, acting as west arrival radar controller at the time of the incident became facility rated at MCI on December 9, 1982. The local controller, age 46, became facility rated at MCI on October 19, 1973. The cab coordinator and controller-in-charge of the MCI tower, age 31, became facility rated at MCI on August 22, 1989. The flight data/clearance delivery controller, age 31, became facility rated on May 31, 1989.

The FAA inspector who occupied the cockpit observer's seat on USAir 105 had been an inspector with the FAA for about 1 year. Before that time, he had been an airline pilot. At the time of the incident, he was the FAA's aircrew program manager of USAir's Boeing 767 program

# 1.6 Airplane Information

The airplane, registration No. N283AU, was a Boeing 737-200A, equipped with two Pratt & Whitney JT8D-15 engines, each delivering about 15,500 pounds of thrust. The airplane was mnufactured on December 19, 1983, and delivered to USAir on December 22, 1983. USAir operated the airplane continuously since that date. (See appendix D).

# 1.7 Meteorological Information

# 1.7.1 Weather Data

The September 8, 1989, 1900 surface weather map, prepared by the NWS, showed a weak low-pressure system over extreme northern Lake Michigan with a stationary front extending south, then southwest through lower Michigan, Iowa, the extreme southeast corner of Nebraska into central Kansas, turning east through extreme southwestern Kansas. One instability line was oriented northeast-southwest through eastern Kansas and extreme northwestern Missouri, just northwest of Kansas City. Another was oriented east-west from east-central Kansas, through central Missouri, turning northeast through Illinois. In the Kansas City area, light southwesterly winds, broken sky cover, and scattered thunderstorms were present.

On the 2200 surface weather map, the northeast-southwest instability line moved southeast past Kansas City, and the stationary front had begun to approach Kansas City from the northwest. MCI weather conditions showed generally low overcast skies with gusty westerly winds and thunderstorms with rain showers.

The following surface observations were taken at MCI about the time of the incident:

Time--2050; type--record special; clouds--Z,500 feet scattered, ceiling--measured 7,500 overcast; visibility--10 miles; weather--none; temperature--71° F.; dew point--69° F.; wind 110 degrees 11 knots; altimeter--29.74 inches; remarks--thunderstorm ended 2048 moved northeast, frequent lightning in cloud north through east, occasional lightning in cloud west, rain ended 2038.

Time--2127; type--special; ceiling--indefinite 500 feet obscured; visibility--l/Z mile; weather--thunderstormwith heavy rain showers; wind-250 degrees 22 knots gusting to 38 knots; altimeter--29.83 inches; remarks--runway 19 visual range 2,400 feet variable 6,000 feet plus, thunderstorm began 2125 all quadrants moving northeast, occasional lightning in cloud, cloud to cloud and cloud to ground.

Time--2150; type--record special; ceiling--measured 2,500 feet overcast, visibility--l 1/2 miles; weather--thunderstormwith moderate rain showers; temperature--66° F.; dewpoint--65° F.; wind--260 degrees 12 knots gusting to 22 knots; altimeter-- 29.81 inches; remarks--thunderstorm began 2125 north through east moving northeast, occasional lightning in cloud and cloud to cloud, peak wind 270 degrees 38 knots at 2125, pressure rising rapidly, rain began 2124.

The NVS recorded the following winds (wind speed only was recorded) at MCI, using its wind recording device located near departure end of runway 1, for the following approximate time intervals:

Wind

| 2100-2118 | varied between 9 and 14 knots           |
|-----------|---|
| 2118-2123 | decreased to 8 knots                    |
| 2123-2125 | gusted to 38 knots                      |
| 2125-2127 | varied between 22 to 36 knots           |
| 2127-2129 | decreased rapidly to 16 knots           |
| 2129-2139 | decreased slowly to 10 knots            |
| 2139-2140 | gusted to 17 knots, dropped to 12 knots |
| 2140-2145 | gusted to 22 knots, dropped to 14 knots |

At 1836, the NVS measured the winds aloft at the following altitudes at its Topeka, Kansas, station:

| <b>Altitude</b> (msl) | <u>Direction(degrees_true)</u> | <u>Speed (knots)</u> |
|-----------------------|--------------------------------|----------------------|
| 879 (surface)         | 100                            | 08                   |
| 1. 762                | 124                            | 16                   |
| 2. 513                | 159                            | 24                   |
| 3.177                 | 178                            | 38                   |
| 3.926                 | 191                            | 42                   |
| 4,907                 | 202                            | 39                   |
| 6.048                 | 207                            | 38                   |

The MCI transmissometer, located at the approach end of runway 19, recorded the runway visual range (RVR) for runway 19. The following RVRs were interpreted from the transmissometer recordings of the night of the incident.

<u>Ti me</u>

<u>Time</u>

×

RVR

| 2100-2123 | greater than 6,000 feet              |
|-----------|--------------------------------------|
| 2124-2125 | decreased to 2, 300 feet             |
| 2126-2132 | increased to greater than 6,000 feet |
| 2132-2133 | decreased to 5,000 feet              |
| 2133-2134 | increased to greater than 6,000 feet |
| 2134-2200 | greater than 6,000 feet              |
|           | <b>0</b>                             |

The NVS barograph at MCI recorded the following barometric pressures on the day of the incident. (See appendix E). The times are approximate; the pressures are in inches of mercury:

<u>Ti me</u>

**Pressure Chanse** 

| 1300-2110 | <b>28. 78 - 28. 64</b>          |
|-----------|---------------------------------|
| 2110-2120 | <b>28.64 - 28.75</b>            |
| 2120-2130 | <b>28</b> . 75 - <b>28</b> . 70 |
| 2130-2230 | <b>28.</b> 70 - <b>28.</b> 74   |

In a 2125 observation from its weather radar at MCI, the NWS noted that the airport was within an area of 6/10 coverage of thunderstorms with rain showers reaching level 5.<sup>5</sup> The thunderstorm cells were moving from  $250^{\circ}$  at 25 knots. Thunderstorms with level 4 rain showers were in an approximate 22-mile square-sided grid encompassing MCI. The 2130 overlay from the radar showed a north-south oriented line of thunderstorms reaching level 4 about 10 miles west of MCI.

At 1855 on the night of the incident, the NWS'S Severe Storms Forecast Center in Kansas City issued the following convective SIGMETS (significant meteorological information). SIGMET 66C, which was valid through 2055, stated:

> 30 miles west of Kansas City, MD. [so]ated severe thunderstorm, diameter 30 miles moving from 270 degrees 20 knots. Tops to 45,000 feet. Hail to 1 inch. Wind gusts to 50 knots possible.

SIGMET1C was issued at 1955 on the day of the incident and was valid through 2155. It stated:

From 30 miles east of Onnha, NE, to 20 miles north of Kansas City, MD, to 30 miles southeast of Salina, KS, to 90 miles north-northwest of Salina, KS, to 30 miles east of Onnha, NE. Area of severe thunderstorms moving from 270 degrees 25 knots. Tops above 45,000 feet. Hail to 3 inches. Wind gusts to 65 knots possible.

1.7.2 Dissemination of Weather Information

The NWS observer on duty at MCI at the time of the incident told the Safety Board that he typically transmitted weather observations to the MCI control tower on the NOTAM (notice to airmen) and NADDS (data distribution system). The NADDS was a computerized data dissemination system that the FAA used at MCI to communicate flight safety and administrative data. According to the NWS weather observer, the NADDS was out of service when the 2127 observation was taken. As a result, he

<sup>&</sup>lt;sup>5</sup> NWS assigns 1 of 6 intensity levels to thunderstorms based on their precipitation rates: level 1 is light, 2 is moderate, 3 is heavy, 4 is very heavy, 5 is intense, and 6 is extreme.

estimated that he gave the observation data to the control tower at 2128 using the unrecorded telephone line in the MCItower.<sup>6</sup>

MCI ATC personnel told the Safety Board that the NADDS was in service and that they had received the 2127 observation data through the NADDS but they could not recall the time. The NADDS was unrecorded and no other mechanism was present at MCI to record either the transmission or the receipt of weather information exchanged between the NWS and ATC facilities at MCI.

#### 1.8 Aids to Navigation

The lights associated with MCI's runway 27 were operating normally at the time of the incident. The localizer and distance measuring equipment (DME) were operating at the time of the incident. After the incident, the runway 27 visual approach slope indicator (VASI) and the MCItaxiway lights were out of service.

After the incident, the FAA conducted a flight inspection of the runway 27 localizer. It was found to be operating within normal limits.

#### 1.9 **Communications**

There were no difficulties reported in communications within the MCI ATC facility and between the MCI ATC facility and aircraft on the night of the incident.

#### 1.10 Aerodrome Information

Kansas City International Airport, certificated under 14 CFR Part 139, is 15 miles northwest of the city at coordinates 39° 07' N and 94° 45' W. The airport elevation is 1,026 feet msl. It has two mnjor runways that do not intersect, arranged in an "L" shape. Runway 1-19, the principal instrument runway with Category II and III approval, is 10,801 feet long and 150 feet wide. Runway 9-27 is 9,500 feet long and, 150 feet wide.

At the time of the incident, runway 27 was equipped with runway end identifier lights (REIL), high intensity runway lights (HIRL) with centerline lights (CL), and a 2-bar VASI on the left side of the runway. The VASI provided a 3<sup>o</sup> glide path with a threshold crossing height of 58 feet above ground level (agl).

Two nonprecision instrument approaches were available to runway 27: a localizer back course and a very high frequency omni directional range (VOR). The localizer back course approach incorporated step-down levels at

<sup>&</sup>lt;sup>6</sup> All communications between aircraft and air traffic control, and most communications among air traffic controllers through electronic transmission methods were recorded. ATC transmissions and recorded conversations that occurred around the time of the incident were transcribed (see appendix B).

various points demarcated by DME distances and a visual descent point (VDP) (see section 1.17.5).

The MCI TRACON provided ATC services in the airspace that extended about 30 miles around the airport, including an approximate 15 mile extension to the south. That airspace ranged from the surface to 15,000 feet msl.

# 1.11 Flight Recorders

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The airplane was equipped with a cockpit voice recorder (CVR) that recorded cockpit area sounds on a continuous 30-minute tape. However, because USAir 105 continued to fly more than 30 minutes after executing the missed approach at MCI, no CVR information pertinent to the incident was available.

The airplane was equipped with a Sundstrand Data Control digital flight data recorder (DFDR) that recorded the following data in digital format, on a continuous 25-hour tape: altitude, airspeed, heading, vertical acceleration, and microphone keying. The recorder was read out at the Safety Board's laboratory in Washington, DC.

The DFDR showed that at 2133:25 USAir 105 had reached its lowest altitude of 1,076 feet msl and its lowest airspeed of 131 knots, while maintaining a heading of about  $283^{\circ}$ . Within 1 minute, USAir 105 had climbed to about 3,200 feet msl and had reached an airspeed of about 160 knots during. the initial portions of the missed approach. (See appendix F).

1.12 Weckage and Impact Information

The main and nose gear doors were torn off. The left main gear shinmy danpener was missing. An approximate 12-inch cut was found in the vertical stabilizer, extending from the leading edge to the forward spar. Hydraulic system B sustained a breach to a hydraulic line in the nose gear area. The right side fuselage, just in front of and slightly above the right wing, sustained a 12- to 16-inch gouge. The underside of the right engine cowling was creased.

1.13 Medical and **Pathological Information** 

**There were no** injuries to passengers, crewmembers, or persons on the ground.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The incident was fully survivable.

### 1.16 **Tests and Research**

#### 1.16.1 Meteorological Tests

At the time of the incident, the FAA was conducting an evaluation at MCI of a Terminal Doppler Weather Radar (TDWR), a sophisticated radar capable of detecting variations in wind direction and speed measured radially from the antenna, located about 8 miles southwest of MCI. The TDWR could also measure the intensity of precipitation. The experiment was conducted jointly at MCI by the NWS Severe Storms Laboratory, the University of North Dakota, and the National Center for Atmospheric Research. The TDWR was not operating between 2132 and 2138. In addition to the TDWR, throughout the night of the incident the FAA was operating an S-band doppler weather radar and a surface mesonet.

Data from the FAA's weather radar facility near MCI were recorded around the time of the incident and, with TDWR data, subjected to the following interpretations regarding MCI weather about the time of the incident. At 2127:25, the leading edge of an easterly noving gust front was 2 miles east of the approach end of runway 27. The highest winds were at 39 knots between the approach end of runway 27 and the leading edge of the gust front. Level 2 thunderstorms were present with small embedded areas of level 5 thunderstorms. The heaviest precipitation was found in a band about 5 1/2 miles long extending north from the departure end of runway 27.

The highest wind speed, 40 knots, was measured at 2128, about 1/2 mile east of the approach end of runway 27. The wind speed decreased to 29 knots at the departure end of the runway.

At 2131:20, the leading edge of the gust front was slightly more than 4 miles east of the approach end of runway 27. Wind speeds of 39 knots were observed there. Between the leading edge and 1 1/2 miles east, wind speeds of 31 knots or more were observed. Between the approach end of runway 27 and 11/2 miles east, wind speeds as high as 23 knots were observed. At that time, winds up to 16 knots were observed over runway 27.

According to mesonet data, at 2133, the winds about 1 mile east of the approach end of runway 27 were from the west at 20 knots; over the center and the departure end of the runway, the winds were from the west at 10 to 15 knots and 10 knots, respectively. Precipitation was falling at a rate of 3 1/2 inches per hour in a northeast-southwest-oriented area over the western part of the airport. It was falling at a rate of 1.2 inches per hour over the approach end of runway 27.

#### 1.16.2 Overflight of Approach

On May 7, 1990, an NTSB investigator flew over the localizer back course runway 27 approach in a Bell 206 helicopter. The purpose of the flight was to photograph and document the lights along the approach path. Night, visual meteorological conditions prevailed throughout that flight. A photograph (figure 5) shows a line of about seven bright mercury vapor lights, slightly to the right, or north, of a centerline extended from runway 27. The power line was identified by the investigator as just east of the line of lights. The investigator stated that he had no difficulty distinguishing between the lights near the power lines and the lights associated with the runway.

1.17 **Additional** Information

1.17.1 Flight Path

Data from the ATC surveillance radar at MCI were used to determine the flight path and flight profile of USAir 105 (figures 3 and 4). The Safety Board compared these data to the airplane's DFDR data to confirm the flight path during the final minutes of USAir 105's approach to MCI.

At 2129:41, when the MCI east arrival approach controller cleared USAir 105 to execute the localizer back course approach to runway 27, the flight was 5 miles from Mizzo and descending through 5,200 feet msl. Twenty-two seconds later, the controller told the crew to turn left to a heading of 240<sup>0</sup> to intercept the localizer. The airplane leveled off for about 25 seconds at an approximate altitude of 2,400 feet msl. USAir 105 was abeam of Mizzo about 2130:53 when it was descending through about 3,500 feet msl at an airspeed of 156 KIAS.

USAir 105 reached 1,400 feet, the minimum descent altitude (MDA), about 2132:57. At that time, its descent rate slowed, and the airplane remained around the MDA for approximately 2 seconds. The airplane crossed the localizer around 2132:20 and flew on or intercepted the localizer about 2132:50, when it was about 2 1/2 miles from the runway threshold and about 3 1/2 miles inside Mizzo, at an approximate altitude of 1,600 feet msl. Figure 3 illustrates positions on the flight path that would have resulted in full localizer needle deflection on the appropriate flightcrew instruments, indicating substantial deviation from the localizer flight path. Full deflection would have occurred before 2132:10 and between about 2132:30 and 2132:40. From about 2132:50, when the airplane was established on the localizer, to the initiation of the missed approach the airplane's airspeed decreased steadily from about 150 KIAS to about 130 knots.

The airplane maintained an approximate 270<sup>°</sup> heading until 2133:09. It then began a turn to the north at an approximate rate of 1/2<sup>°</sup> per second for about 4 seconds. The rate of turn then increased to about 1- to 2-degrees per second until the wire strike.

1.17.2 ATC Procedures and Requirements

According to paragraph 2-2, handbook 7110.65E, the FAA's ATC procedures handbook in effect at the time of the incident, controllers are to prioritize their duties according to the importance of those duties at the time. Regardless, the first ATC priority was to separate aircraft and issue safety alerts as required. The handbook stated: Good judgment shall be used in prioritizing all other provisions of this handbook based on the requirements of the situation at hand. Because there are many variables involved, it is virtually impossible to develop a standard list of duty priorities that would apply uniformly to every conceivable situation. . . . when more than one action is required, the controller shall exercise his best judgment based on the facts and circumstances known to him That action which is most critical from a safety standpoint is performed first.

Paragraph 2-102 required controllers to solicit PIREPs on strong frontal activity, squall lines, thunderstorms, windshear and other relevant "conditions pertinent to flight safety." They were to give the information to appropriate ATC facilities.

Paragraph 2-105 required controllers to perform visibility observations when the prevailing visibility at the tower was less than 4 miles and to give this visibility information to other controllers. In addition, controllers were required to "forward current weather changes to the appropriate control facility when the official weather changes to a condition which is below the 1,000-foot ceiling or below the highest circling minimum, whichever is greater, or less than 3 miles visibility."

Paragraph 2-106 required controllers to disseminate to pilots or other ATC facilities general information about the prevailing weather.

Paragraphs 5-120 and 5-121 required radar controllers, when the visibility was less than 3 miles, to vector aircraft to at least 2 miles outside the approach gate,<sup>7</sup> with headings that will result in intercept angles no greater than 30<sup>0</sup>.

Paragraph 271 from the FAA's Facility Operation and Administration handbook 7210.31, required Facility Air Traffic managers to establish "a means by which the receipt of weather observations are immediately known to facility personnel responsible for dissemination [of that information]." The paragraph required the managers to establish procedures "for the prompt collection and dissemination of SIGMET, Center Weather Advisory (CWA), and PIREP information."

Paragraph 1222 of the handbook specified that, "during periods when windshear is likely to occur or has been reported; e.g., frontal activity, thunderstorms, or pilot reports, inform users by broadcasting on the ATIS that the component [low-level windshear alert system (LLWAS)] is out of service."

<sup>&</sup>lt;sup>7</sup> The approach gate is a point that is one milebefore the final approach fix, Mizzo on the runuay 27 back course localizer approach at MCI.



Figure 3. -- Overhead view of flight path.

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Figure 4. -- Profile view of flight path.



Figure 5.-- Overhead view of lights near threshold of runway 27.

# 1.17.3 Air Traffic Control Actions

At 2126:29, the local controller broadcast to aircraft on his frequency the RVR<sup>8</sup> as 2,800 at midfield and 1,800 at the runway rollout area. The transcript of ATC communications indicates that the following portion of this transmission was received at the east arrival controller's position "for runway one nine touchdown two thousand eight hundred and midfield two thousand."

At 2126:53, the east arrival controller asked the local controller, "What's going on, nobody's going to land?" The local controller responded, "No I (unintelligible) can't even see the edge of the tower [because of the] heavy rain." At 2127:28, the east arrival controller advised an aircraft, in response to a statement on the proximity of the adverse weather to MCI: "Affirmative I think it's right over the airport (unintelligible) had two missed approaches in the last 3 minutes."

Between 2125 and 2127, MCI NVS personnel, having become aware that adverse weather had just approached the airport, called the MCI ATC tower on an unrecorded telephone line to inquire about the current visibility. In response, the cab coordinator and the clearance delivery controller jointly determined that the prevailing visibility was 1/2 mile in rain. This information was disseminated within the MCI ATC facility in response to a request from the west handoff controller, at 2131:26, for the tower visibility.

At 2127:33, the east handoff controller informed the local controller that the winds at MCI favored the use of runway 27 and asked him to "have C - C [the cab coordinator] call us so we can coordinate (right away);" The cab coordinator gave his approval to the east handoff controller for operations at MCI's runway 27 at 2129:01. As noted, at least 1 mile visibility was required to execute the localizer back course approach to that runway.

The MCI TRACON, as in all 63 FAA automated radar terminal system (ARTS) 3A radar facilities, was equipped with minimum safe altitude warning (MSAW) software to alert an air traffic controller to an aircraft that has prematurely descended close to ground level. The MSAW alert did not activate during the incident involving USAir 105, despite the fact that the airplane was in the MSAW general terrain warning area, because the wire strike occurred within the inhibit area designed to minimize the number of false MSAW alerts to controllers.

#### 1.17.4 Air Traffic Controller Interviews

Shortly after the incident, Safety Board investigators interviewed the air traffic controllers responsible for ATC handling of USAir 105, the flightcrew, and the FAA inspector who conducted the en route inspection on

<sup>&</sup>lt;sup>8</sup> The equipment for determining the RVR at MCI was on runway 19 and not on runuay 27.

the flight. About 10 weeks after the incident, the Safety Board interviewed those individuals and the MCI ATC facility chief. A verbatim transcript of those interviews was made.

The MCI controllers uniformly told the Safety Board that the workload at the time of the incident was "light."

<u>The East Arrival Controller</u>. -- The east arrival controller said that she stopped issuing clearances for visual approaches to MCI's runway 19 because "visuals were not working." She changed the clearance of a Northwest Airlines aircraft from a visual to the ILS approach to runway 19 because "airplanes were coming back to me." She said that she did not receive any pilot reports. After she noticed that flights were executing missed approaches and she received information that the winds favored that runway, she changed the approaches to the localizer back course runway 27 approach.

As she was getting ready to vector or direct a Midway Airlines aircraft to turn to runway 27, about 2130, she noticed that the NADDS indicated that the visibility had deteriorated to 1/2 mile. The tower never called her to advise that the visibility had deteriorated to 1/2 mile.

She did not give other controllers, and she did not think that she had relayed to other aircraft, information on the 2127:38 statement by a flight crewmember of PAT 130, the military C-12, that their airplane had encountered a "wall of water" and that the airport was "not visible any more." Although she would "normally" disseminate such information, she could . not remember why she did not do so on the night of the incident.

She was aware that the local controller had told her that he could not see the edge of the tower. She interpreted this statement to mean, "There is rain. It was probably hard rain on one side of the tower or something." Such information would not have prompted her to inquire about the visibility because, as she explained, "Normally people would tell you. We have a half a mile, we have zero visibility, we have whatever." There was no reason to inquire about the visibility because, "my aircraft are seeing the airport. I mean, why would I think there would be bad visibility?" She did not advise the local controller that USAir 105 had not been informed of the prevailing 1/2 mile visibility because "He's already gone. I've got to get my aircraft--this information to my aircraft now."

She stated that under instrument conditions an aircraft on the runway 27 localizer back course approach would need to be established 1 mile outside the final approach fix (Mizzo in this approach). With regard to the radar track of USAir 105 (figure 3), she said, "I thought he was vectored correctly, he was a little off, so I gave him a heading to join." She stated that she believed the flight appeared to intercept the localizer, as required, outside of Mizzo.

<u>The Local Controller.</u> -- The local controller said that after one flight had executed a missed approach he asked the cab coordinator to obtain the current wind observation from the NVS. He told the east arrival controller that he could not see the edge of the tower because of the heavy rain striking the windows of the cab. Although he transmitted the runway 19 RVR information, he could not recall if he told the cab coordinator or flight data/clearance delivery controller that a new visibility observation was necessary. "I was concerned" he stated:

> "with the airplanes at that time. In other words, I have airplanes in the air and on the ground, and my primary concern was those airplanes. I was not concerned with whether I had a half mile or three-sixteenths or nine-twenty-eighths of a mile visibility. That's for the coordinator in the tower to do."

The local controller did not issue weather and visibility information to USAir 105, but he believed the flightcrew would have heard the weather and PIREPs that had been reported by other aircraft on the frequency. He knew that the visibility was 1/2 mile when USAir 105 executed the approach to runway 27 because the cab coordinator had informed him of the visibility. He also knew that he was required to transmit this information, or other data indicating significant changes in weather, but did not know why he did not do so. Further, he was aware of the assignment of responsibility for disseminating weather information to flightcrews. He stated:

> if it was disseminated before he made the approach, then it should have been given by approach control before he cleared the approach and changed to the tower. If it was given after that, then I should have given it to him when I had it.

<u>The Controller-In-Charge/Cab Coordinator.--The controller of the</u> tower at the time of the incident had assigned himself to the position of cab coordinator before the incident. He said that when the front reached the airport, the NVS called the cab on an unrecorded line to determine the visibility. He explained that it took about 3 1/2 minutes after determining the reduced visibility to disseminate the information to the west handoff controller because:

> I answered the phone a lot aside from coordinating on the missed approaches with [the] Midway [Airlines flight] and them, and I don't remember when I gave the visibility, but I must have answered it 10, 15 times. Everybody calling whether or not the airplanes were at the end of the taxiway, whether or not they got off or the company operations. I assisted and I don't recall exactly when it happened, but I helped everybody out that needed it if they fell behind, and I assisted everybody out.

He said he knew that he was required to disseminate weather information as soon as significant changes took place. He ordinarily accomplished this by advising personnel in the tower and calling the TRACON area manager or supervisor.

The controller added that in the year that he had been in the MCI area, the weather on the night of the incident, was the "worst storm that I ever worked at Kansas City," because of the wind and the heavy rain.

<u>The Clearance Delivery Controller</u>...The clearance delivery controller said that ordinarily, when she noticed new weather information on the NADDS, she would record a new ATIS message within 20 seconds. On thenight of the incident, she transmitted on the ATIS a PIREP from another aircraft concerning severe turbulence.

She acknowledged that it was her responsibility to transmit on the ATIS that the LLWAS was out of service at MCI on the day of the incident. She acknowledged that she failed to relay this information because she "forgot."

<u>The TRACON Area Supervisor</u>.--Before the incident, the TRACON area supervisor was performing the duties of area manager because no area manager was on duty. In addition, he had assigned himself to the position of west arrival controller. He cancelled the "flex" shifts and retained two controllers to work overtime in order to accommodate flights that were expected to be delayed by the weather.

He noted that a line of adverse weather Was approaching the airport from the west. He did not solicit PIREPs from pilots on this weather because "nobody was out there." He was not aware that missed approaches were being executed as a result of the reduced visibility.

The TRACON supervisor believed that the intercept angle of USAir 105 with the localizer looked good initially. That is, the flight would intercept the localizer 1 mile outside Mizzo, as required. However, when the east arrival controller issued the 240<sup>°</sup> heading to the flight, the intercept angle appeared to be "awfully tight." He said that, nevertheless, even if a flight had received a vector that would have put the aircraft inside Mizzo, a pilot would inform the controller of an unacceptable situation and would request another approach. However, he acknowledged that such a situation would not relieve the supervisor from correcting inappropriate controller actions.

He removed himself from the west arrival position after USAir 105 had executed the missed approach, because "things were happening [that were] out of the ordinary."

In commenting on possible improvements to procedures at MCI based on his review of the events of September 8, 1989, the supervisor said he did not know if he would modify procedures to improve the dissemination of weather information, both within the MCI facility and from the facility to aircraft in the airspace. "Unless somebody shows me the inadequacies" [in MCI ATC weather dissemination] he added, "I don't know of the changes" to make in light of the information obtained from the incident.

<u>The MCI ATC Facility Chief.</u> -- The chief of the MCI facility acknowledged that the flightcrew of USAir 105 had not been informed that the prevailing MCI visibility had deteriorated to less than 1/2 mile. However, he added that "in my review of it, it was pretty clear that the crew knew it was less than, well less than 10 miles, and probably well less than what it should have been for the approach." He did not believe that a 3-minute interval from the observation of the 1/2 mile visibility to the dissemination of that information was "unreasonable." In describing the responsibilities of controllers to disseminate weather, among their other duties and responsibilities, he said:

> Our first and foremost [responsibility] is to separate airplanes. I think weather [dissemination] falls about No. 6. And the reason that falls there is I think I've been told in testimony in court that the pilot is in the best seat in the house to make the decision on what the weather is to make the approach, regardless of what we tell him, because the information we give him is normally old anyhow.

1.17.5 Nonprecision Approaches, Approach Charts, and Visual Descent Point

FAR 91.116 (c) lists the criteria that must be met before a pilot is permitted to descend below the MDA. They include requirements that the prevailing visibility be "not less than the visibility prescribed in the standard instrument approach procedure being used" and that visual reference be established with at least one of the following types of runway markings, runway lights or approach light systems: runway threshold, threshold markings, threshold lights, REIL, VASI, touchdown zone or touchdown zone markings, touchdown zone lights, runway or runway markings or runway lights.

At the time of the incident, FAR 91.116 (c)(4) was in effect. In addition to pilot confirmation of lights or markings associated with the runway, this regulation, with some exceptions, prohibited descent below an MDA until an aircraft had reached the visual descent point or (VDP). It stated that descent below MDA is prohibited unless:

> When the aircraft is on a straight-in nonprecision approach procedure which incorporates a visual descent point, the aircraft has reached the visual descent point, except where the aircraft is not equipped for or capable of establishing that point or a descent to the runway cannot be made using normal procedures or rates of descent if descent is delayed until reaching that point.

FAR 121.651, which specified the requirements for takeoff and landing minimums in air transport operations, used. the identical language as FAR 91.116 (c)(3) and 91.116 (c)(4) with reference to visual contact with lights or markings for descent below MDA and for adherence to VDP.

The Airman's Information Manual (AIM) contained the following with regard to VDPs:

Visual Descent Points are incorporated in selected nonprecision approach procedures. The VDP is a defined point on the final approach course of a nonprecision straight-in approach procedure from which normal descent from the MDA to the runway touchdown point may be commenced, provided visual reference required by FAR 91.116 (c)(3) is established. The VDP will normally be identified by DME on VOR and LOC (localizer)procedures. The VDP is identified on the profile view of the approach chart by the symbol: V (emphasis in original).

VDPs are intended to provide additional guidance where they are implemented. No special technique is required to fly a procedure with a VDP. The pilot should not descend below the MDA prior to reaching the VDP and acquiring the necessary visual reference in accordance with FAR 91.116 (c)(3)(4).

The captain and first officer of USAir 105, as well as the FAA inspector who was performing an en route inspection of the flight, were unfamiliar with the requirement governing VDPs and descent below MDA. The captain and first officer could not remember performing approaches that incorporated VDPs in airplane simulators.

On August 18, 1989, the Federal Register<sup>9</sup> published Part II of the FAA's final rule regarding revisions of its FAR Part 91 general operating and flight rules. The final rule included the following FAA statements pertaining to VDPs:

One commenter urges the FAA to reinsert the current rule regarding visual descent points (VDPs). [The FAA stated that] VDPs are not an integral part of the approach procedure. An aircraft that is not equipped to identify a VDP has the same approach minima as a similar aircraft that is equipped to identify the VDP.

**Mandatory use of VDPs is considered inappropriate for a number of** reasons:

- (1) VDPs that use DME fixes may, because of displacement factors and/or fix errors, result in descent angles that are either too shallow or too steep for the approach.
- (2) A mandatory VDP rule discourages the purchase and use of the very equipment necessary to identify the VDP. This is so because compliance can only be required of those aircraft that are equipped to identify the VDP.

For these reasons, the final rule, like the NPRM [Notice of Proposed Rulennking], does not include a mandatory VDP requirement.

The FAA informed the Safety Board that although it planned to delete the VDP from FAR Part 91 operating rules, there was no plan to change

<sup>9</sup> <u>Federal Resister,</u> Vol. 54, No. 159, August 18, 1989, page 34284.

the pertinent part of FAR Part 121. In addition, the FAA stated<sup>10</sup> that "The VDP is a point established on the final approach course which is intended to aid the pilot in determining when to begin a descent from the MDA to touchdown provided all other conditions in FAR Section 91.116 (c) are met."

In a meeting on May 10, 1990, with a representative of the FAA, the Safety Board was informed that the VDP was designed to provide additional guidance to pilots to enhance stabilized descents during the execution of nonprecision approaches. The VDP is the point on a nonprecision approach that provides a 3-degree descent angle from the MDA to the runway touchdown zone. The VDP was made a mandatory part of the FARs in the early 1980s.

USAir supplied each captain and first officer with current Jeppesen-Sanderson instrument approach charts for airports that the company served and for other airports near those in the USAir route system Approach charts to certain runways displayed warnings about possible confusion of lights near runways with lights associated with those runways. For example, charts for the ILS Runway 18L approach to Tampa, Florida's, Tampa International Airport contained the following warning on its profile view: "Caution: In minimum visibility conditions, reflections of bright lights on ground 1.4 NM north of rwy 18 threshold may be confused with airport lights." Similar warnings were contained in the approach charts to such air carrier airports as: Flint, Michigan; Ft. Meyers, Florida; Ithaca, New York; Nashville, Tennessee; and Philadelphia, Pennsylvania. All of them were served by USAir. No warning was printed on the approach chart for the localizer back course approach to runway 27 at MCI.

#### 1.17.6 USAir Procedures and Requirements

USAir's Flight Operations Manual specified the company's pilot operating procedures. Approaches were to be executed in accordance with "Company policy and procedures, operations specifications, Federal Aviation Regulations, and the appropriate approach plates, which shall be checked by each flight crewmember before commencing approach." In addition, the Manual required flight crewmembers to review:

> field elevation, minimum descent altitude or decision height, headings, frequencies, missed approach procedures, etc. Normally the pilot flying briefs the other flight crewmember on these pertinent items and on any special requirements and/or conditions. The other(s) should add or amend any significant information item(s) that may have been omitted or are erroneous.

Approach briefings were to include information from an applicable USAir Airport Advisory for the destination airport, pertinent climate information, final approach airspeed, and descent rate.

<sup>&</sup>lt;sup>10</sup> Memo dated June 1, 1990, from the Manager, Air Transportation Division, AFS-200, to the Manager, Recommendation/Quality Assurance Division, AAI-200.

The manual referred to the VASI as "designed to provide, by visual reference, the same information that the glideslope unit of an ILS provides electronically." It explained the descent angle needed to remain on the glideslope, the manner in which the VASI would appear to flightcrews, standard installation of the VASI and operation of the system

The manual required the nonflying pilot, the first officer in this incident, to note instruments that are flagged and, during instrument conditions, to monitor the airplane's altitude, airspeed, and sink rate. In addition, the nonflying pilot was required to call out "100 feet above minimums' and "at minimums" at the appropriate altitudes. The manual directed the non-flying pilot to:

Observe outside conditions to the degree possible throughout the approach and, no later than 100 feet above the minimum altitude, shall be alert to spot and call approach, strobe, or other lights in sight, "Runway in sight," "No contact," or other pertinent information.

The mnual paraphrased FARs 91.116 and 121.651 in listing appropriate runway lights and markings that pilots must visually confirm to permit descent below MDA. The mnual used the identical language as the FARs in its section on VDPs.

When descending below MDA, it stated that:

Thereafter, any deviations of altitude, airspeed, heading, and/or rate of descent from normal should be called out. Such monitoring should continue to touchdown or through a missed approach. Pilots conducting instrument approaches utilize visual cues as they become available during the approach. At DH or MDA, the pilot may be satisfied that the total pattern of visual cues provide sufficient guidance to continue the approach and landing, and if not, a missed approach is executed. If the approach is continued, it is based on a "see to land" concept, and it is imperative that the required visual reference be continuously maintained. If visual cues are lost after DH or MDA, the pilot must execute the appropriate missed approach procedure.

The manual did not direct pilots to automatically go around during nonprecision approaches if the flight navigation displays showed full localizer deflection during the approach.

USAir's Boeing 737-200 Pilot's Handbook contained a chapter on training. It defined a stabilized approach as "stabilized airspeed, stabilized sink rate, and a constant profile." No reference was made regarding requirements for go-arounds if a pilot encountered localizer deflection inside the final approach fix on a nonprecision approach. Such guidance was given to pilots flying a precision approach.' USAir's Director of Flight Training and Standards stated that a pilot failing to execute an immediate go-around when encountering full scale localizer deflection inside the final approach fix on a nonprecision approach would be rated unsatisfactory on a proficiency check.

# 1.17.7 Pilot Interviews

<u>The First Officer</u>.--The first officer stated that the flight was uneventful until it arrived in the MCI area. The first officer heard a flight crewmember of the Midway Airlines flight inform ATC that they were executing a missed approach and he heard a crewmember of PAT 130 report that they had encountered a wall of water.

He said that after USAir 105 received ATIS information informing them to expect a visual approach to runway 19, he got out the "entire stack" of approach charts to MCI, reviewed the airport layout, then pulled out the ILS runway 19 chart. He briefed the captain on the approach, but this briefing did not include the airport or runway lighting configurations. He set the navigation radio frequencies to those of that approach. After the flight was given a heading to intercept the localizer for the runway 27 localizer back course approach, he removed the runway 27 approach chart from the "stack." He tuned and identified the radio frequencies appropriate for that approach. He briefed the captain on the second approach. However, he was unable to recall if the briefing included information on the runway lighting configuration. Neither he nor the captain realized that the vectors from MCIATC would take them to the localizer course well inside of Mizzo.

He said that neither he nor the captain expected the weather to adversely affect their execution of the approach to runway 27 because the weather forecast for MCI had called for a frontal system to move into the area from the northwest, and they were northeast of the airport heading southwest. He did not doubt the accuracy of the ATIS report of 10 miles visibility because he could see the lights of the city while they were in the airspace. Mbreover, the airplane's radar, which showed a curved red and magenta line about 5 miles northwest of the airport, "indicated that the storm cells "would cross across the approach [end] of [runway] 19."

He believed that the flights that were executing missed approaches around that time were doing so because of the weather on the approach to runway 19. However, since USAir 105 was to go to runway 27 he believed that the weather would be different than that encountered on approach to runway 19. In his aviation career he had seen variations in the weather among runways within large fields, such as Chicago O'Hare and New York Kennedy.

The first officer added that he and the captain did not discuss the weather before they began to execute the approach. Further, they had no reason to question the report in the MCIATIS information Romeo report of 10 miles visibility at MCI since they could see the lights of Kansas City and could maintain ground contact throughout the approach. He added that

<sup>&</sup>lt;sup>11</sup> An airplane's color weather radar portrays the intensity of precipitation through color. Green indicates light precipitation, yet low indicates moderate precipitation, and red or magenta indicates intense precipitation.
flightcrews must rely on the weather information that ATC gives them, particularly when the weather is "less than desirable."

He estimated that he "picked up the runway [27] environment" when the airplane was at 1,700 feet msl. After leveling off at the MDA of 1,400 feet, "all of a sudden we had this torrential downpour" which he described as "the heaviest rain I've ever seen or been [in] in my life." Nevertheless, he did not lose sight of the runway lights. He believed that they had encountered the rain between an estimated 1.8 and 1.3 DME on the approach path.

When he first noted the lights, he called out "runway lights in sight" and the captain responded, "Igot'em" He described the lights as "full bright, very bright and there were two long lines." He had no doubt at any point during the approach to runway 27 that the lights were associated with the runway. At 500 feet agl he made his last scan of the instruments, noting "air speed, descent [rate] [making] sure we had no flags [and] everything is stabilized." He said that he did not see the VASI.

Later in the interview he said that:

we never saw the airport. When we were turned in on the localizer, we saw city lights on our descent to MDA we entered a little cloud bank, a layer of clouds. When we broke out we saw the runway lights. I am assuming since there were kind of yellowish, dim lights, as I said, off the left that might have been terminal lights or something like that.

In his initial interview, the first officer stated that on approach to runway 27 he called out, "Igot the rabbit," a reference to an approach light system that was not present at runway 27. During the second interview, he clarified this statement, saying that he had meant to say runway lights but had said approach lights or rabbit by mistake. Further, while he did not say whether he saw the REIL flashing, he said that he "saw something flashing" and that the flashing lights were white.

He described the events just preceding the wire strike:

The wipers were called for. I turned them on. And as I said, I sensed the aircraft falling at an abnormal rate, descending at an abnormal rate, at which time I looked down, I had the visual cue of the lights being not where they should be. So at that point I immediately called for max power, were my exact words, and I yelled it twice. And then I said get out of here, at which time, as he was bringing, it's so instantaneous an error, [the captain] George firewalled the throttles, and at that time the aircraft made contact with something. I sensed the aircraft almost being suspended for a brief instant there was a slight hesitation then there was a brilliant flash. And this all happened in a microsecond. There was a brilliant flash and the aircraft then, whenever George took the yoke and brought it back into a climb attitude and the aircraft started to go around, at which time my hand came immediately off of the wiper switch and I grabbed the flap handle and I went to flaps 15 and he called for the gear, with my other hand I reached over and I put the gear up with my right hand. And the aircraft, we turned left on the missed approach.

The first officer stated that he had not flown back course approaches "on a regular basis" but had occasionally executed them while flying throughout the company system However, he had not often encountered a VDP and had received little training and no simulator exposure to a VDP before the incident.

<u>The Captain</u>.--The captain generally agreed with the first officer's account of the incident. He had heard pilots indicating that they were executing missed approaches, including the reference to "the wall of water," but he did not interpret these statements as evidence of a "visibility problem" at runway 27 since those aircraft had been on approach to runway 19. Having been to MCI previously, the captain was well aware of how "spread out" the airport was. This belief was reinforced "from looking at the radar the way the weather was and [because] the tower didn't report anything changing at the airport."

He said that because there was no ADF (automntic direction finder) on the localizer back course approach, he could not have recognized that the intercept heading the east arrival controller gave USAir 105 would take the flight inside Mizzo, the final approach fix. He did not recall the DME reading when the flight intercepted the localizer.

The captain stated that he was looking "back and forth" at the instruments and outside the cockpit throughout the approach. He estimated that when they broke out about 200 to 300 feet above minimums they were approximately 3 miles from the runway and "looking at it." He then saw two strobe lights that were white and very bright, lights that he continued to see throughout the execution of the approach. He believed that the first officer had seen them first. After they had encountered the rain, he could also see the runway lights.

Since there were few lights on the west side of MCI, it was difficult to assess accurately the prevailing visibility. Because he was looking at the runway and the "runway strobe lights (REIL)," there was no reason to assume that the visibility information given on the ATIS was incorrect. The captain stated that if he had been told that the visibility was 1/2 mile, he would have discontinued the approach.

When they broke out of the overcast:

we were looking at the strobe lights. When I started down, we ran into that wall of water or whatever it was, and I checked the [descent rate], stopped the descent there and when I called for the wipers, the reason I called for them was to make a decision. But that decision was already made by something else which I haven't been able to explain. When my eyes came back down we were already too low. We were actually seeing clear, I think, but everything had changed. I was getting ready to make a decision [to abandon the approach] at that time but I never got to make it.

After they encountered the rain, he looked up to see if the wiper switch had been placed correctly. When he looked outside again, "everything had changed.' Then he thought:

something's not right. I was still looking outside, until when [the first officer] Mike said go around, which was just a . split instant later. I brought the power up. It was just a split second after that when we heard the bang.

He did not see the VASI during the execution of the approach. He said that he believed that the VASI was "not working" at the time of the incident.

The captain could not remember receiving any training on the VDP, and he said that he had not flown back course approaches very often in his airline career. He did not note the presence of the VDP before executing the approach. He explained:

> I would gladly have complied with the VDP. But I have read an approach plate the same way for 20 years. Now on the Jeppesens, when you get down to the final approach fix and altitude providing there's no other step down, you go from final approach or step down and then you look down to minimums. Now I know there's only about that much separating VDP from that other number, but you didn't know how to speed read and you skipped words. Now I suspect that is what happened because I've been in there twice before I think and I had never, I mean, their problem too is that not all nonprecision approaches have VDP.

1.17.8 FAA En Route Inspections

At the time of the incident, the FAA provided the following guidance to their inspectors who observe a safety hazard or a potential violation of FARs, while performing an en route inspection, in FAA Handbook 8430.6C, Paragraph 987 (i):

> During en route inspections, the inspector must be alert to point out any apparent hazard to flight or potential violations and inform the crew as to the possible consequences; e.g., a climb through an assigned altitude.

## 1.17.9 FAA Inspector Interview

The FAA inspector who occupied the cockpit observer's seat on USAir 105 was en route to MCI to conduct a flight check for a USAir Boeing 767 captain candidate.

After the incident, he reported, both in his statement and in the interviews, that the takeoff, climb, and en route portion of the flight was normal (see appendix G). He wrote:

As we approached 3000' the localizer was almost pegged to the left of the captain's HSI [horizontal situation indicator]. The captain mode a small left turn and commanded "checklist" About this time we entered heavy rain that increased in intensity thruout (sic) the approach. At this time I observed the Captains (sic) altimeter to be reading 2500' and that he was correcting a slight overshoot of the localizer, of approximately 1/2 dot, and was tracking the localized (sic) descending at between 800 and 1500 feet per minute. The Captain leveled the aircraft at 1400' and approximately 5 seconds later, the F/O [first officer] responded "runway in sight." Thru out (sic) the entire approach, I was able to see ground lights out both side windows and portions of both windscreens. Due to the position of the jump seat on the B-737 and the heavy rain, and the fact that the windshield wipers do not cover the center portion of the windscreen,  ${\rm I}$ could not see anything directly in front of the aircraft. During this entire flight, I at no time, ever had visual contact with the MCI airport or the runway environment.

He said that after the flight was given headings to the runway 27 localizer back course approach, the captain asked the first officer to obtain a different missed approach procedure from the published one. At that point,

> The co-pilot initiated a different missed approach I assume because they were both looking in the area, both of them had. their approach plates out on their flight kits. They both still had the [runway] 19 ILS on their control columns and they stayed on their control columns throughout the entire flight. In fact, when we got to Salina they were still on there. And the next morning I did observe that both of their approach plates for runway 27 were open on their flight kits. The co-pilot started reading the approach to the captain at some point just prior to Mizzo.

He was not required to possess, and he did not have accessible and open, approach charts for the MCI approaches. He was not aware at that time that the runway 27 back course localizer approach incorporated a VDP. He did not remember whether the flightcrew, in their approach briefing or thereafter, had mentioned the VDP.

The inspector said that the captain "wired" the localizer by the time the airplane reached 2,500 feet msl and had excellent control of the airspeed, mnintaining bug<sup>12</sup> plus 5 knots. He stated that 'he felt he [the captain] mnde a fairly stabilized approach. In other words, I never felt we were unstabilized during the approach.'

He said that the first officer was looking out the forward windscreen and the captain was scanning his instruments during the approach. The first officer reported, 'I've got the runway,' then the captain looked up and said "I got it.' At that point, he stated:

> I didn't observe either one of them go back in the cockpit until the impact and they both went back in the cockpit then. I know at impact they were both out of the cockpit and after impact they both came back into the cockpit.

He believed that they were about 150 to 200 feet above the runway when the "bang" occurred.

FAA policy and procedures required that the inspector complete a form indicating the quality of the performance of the flightcrew on the flight that had been inspected. The inspector indicated that the performance of the crew was unacceptable<sup>13</sup> because "on approach to MCI, aircraft struck power lines approximately 6,000 feet from runway threshold. See report to MTSB."

The inspector did not indicate to the crew during the flight, and his report did not address the crew's nonadherence to the east arrival controller's clearance to "mintain three thousand [feet msl] until established on the localizer."

In response to a request from the Safety Board, the Boeing Company supplied data (see appendix H) that indicated that an individual sitting in a "normal position" on the Boeing 737 cockpit observer's seat could see about  $10^{\circ}$  down the center of the nose of the airplane. An individual sitting in the "alert position" leaning forward could see about  $18^{\circ}$  down the center of nose of the airplane.

## 1.17.10 FAA Oversight of USAir

From September 18 to October 6, 1989, the FAA conducted "special surveillance" of USAir proficiency checks and training, cockpit en route inspections, flightcrew and flight attendant mnnuals, recurrent crew training, and flight dispatch procedures.

 $^{13}\,$  Four categories were available: unacceptable, potential, information and exceeds.

<sup>&</sup>lt;sup>12</sup> Reference speed used on an airplane's final approach path. It is based primarily on an airplane's weight, configuration, as well as environmental and other factors.

Two incidents involving USAir flights prompted a series of FAA reviews beginning about September 8, 1989, and ending with publication of the report: <u>USAir, Inc. Aircrew Desianated Examiner/Flight Trainino Proaram</u> <u>Assessment</u> in October. The findings were critical of USAir's cockpit resource training program, company policy on flightcrew approach briefings, lack of crew coordination between pilots and flight attendants, stereotyped flight training and checking, monitoring of adverse training trends, deficient international dispatcher training, and several flight attendant training and equipment matters.

USAir officials disagreed with the report by saying that the programs and procedures under criticism were approved by the FAA and, in most cases, exceeded basic FAA requirements. The author of the report testified at the Safety Board's public hearing that: "We recommended some technique changes. They are changes that could take place in a relatively short period time with[in] the company. They have the quality people and equipment to accomplish a job. It is a matter of changing techniques in a few areas [and they are doing that] at a rapid pace at this moment."

#### 2. ANALYSIS

#### 2.1 General

The crewmenbers of USAir 105 were certificated in accordance with applicable FARs. The MCI air traffic controllers were certificated to perform their duties in accordance with applicable requirements and FARs. The FAA inspector was certificated to perform his duties in accordance with applicable FARs. No preexisting defects were found in the airplane's structure, systems, or powerplants that could have contributed to the incident. The inoperative first officer's radio altimeter had no effect on the conduct of the flight. Although a hydraulic system was breached after USAir 105 struck the electrical transmission wires near MCI, the subsequent difficulty with the hydraulic system did not compromise the ability of the flightcrew to fly the airplane, as evidenced by USAir 105's uneventful landing in Salina, Kansas.

USAir 105 was a routine flight until its arrival into the MCI airspace. From then until the missed approach, both the flightcrew and the air traffic controllers faced a dynamic situation influenced by the adverse weather.

The Safety Board examined the factors that my have affected the performance of the flightcrew of USAir 105 and the performance of the MCI controllers. In addition, the Safety Board reviewed the performance of the FAA inspector who occupied the cockpit observer's seat to determine the actions that he could have taken to prevent the incident. Additionally, in light of the flightcrew's unfamiliarity with the VDP, the Safety Board examined FAA regulations, advisory material and policy on VDPs. The Safety Board also examined the minimum safe altitude warning (MSAV) system at MCI and the application of video camera recording technology to flight decks.

#### 2.2 Weather

The Safety Board's examination of the weather at MCI reveals that at 2131, a line of thunderstorms passed over the airport. The leading edge of the gust front from the thunderstorm was 4.2 miles east of the approach end of runway 27. USAir 105 most likely encountered the gust front about 5.5 miles east of the runway, as well as heavy rain about a mile later. The airplane remained in the rain until the flightcrew executed the missed approach and departed to the west. A narrow band of low-surface visibility of 1/2 mile or less, associated with the storm cell, also covered the final approach course when USAir 105 was on the approach.

The barograph data reveal a sharp rise in pressure at MCI of of mercury about 2122. From then to 2133, the pressure fell 0.10 inch of mercury about 2122. There were no recorded localized pressure changes that would have 0.05 inch. adversely affected the aerodynamic performance or instrumentation of USAir 105 while it was on final approach to runway 27 at MCI. Moreover, the effects of ambient pressure changes on barometric instruments would have been manifested by a difference between the transponder encoded altitude recorded by the ATC radar at MCI when corrected to msl altitude by applying the reported barometric altimeter setting and the airplane's actual height The fact that the reported altitude corresponded with the above the ground. approximate altitude of the wires that the airplane struck indicates that the Thi s lightcrew was not misled by possible erroneous altitude indications. conclusion was also supported by the altitude recorded on the airplane's flight data recorder which would have corresponded to that indicated on the cockpit altimeters.

As the airplane descended through 2,500 feet msl, the airspeed increased by about 30 knots, from about 140 knots to about 170 knots, and the airplane leveled off. These changes my have been associated with passage through the leading edge of a gust front. About 20 seconds later, the Thereafter, the airspeed remained stabilized about descent was resumed. 150 knots and the descent remained fairly constant through MDA until the wire A slight decrease in airspeed beginning about 10 seconds before the strike. wire strike was most likely caused by thrust and configuration changes. Consequently, the Safety Board found no evidence that the airplane was affected by windshear at the time of the incident. Therefore, the Safety Therefore, the Safety Board concludes that, despite the fact that the flightcrew should not have initiated the approach because of the prevailing visibility, weather factors did not affect the ability of the flightcrew to avoid the wires that USAir 105 struck.

## 2.3 Flightcrew

The evidence indicates that flightcrew actions were the primary factors affecting the flight path of USAir 105. For example, the airplane's heading change to the north about 30 seconds before the wire strike suggests that the crew turned the airplane in response to the first officer's call that he had identified the runway lights. The nature of this change in the flight path, as well as the time and altitude at which the change occurred, gives credence to the crew's explanation of their actions and is supported by the statements of the FAA inspector that both crewmembers looked outside the cockpit after the first officer's call.

The Safety Board believes that the turn preceding the wire strike followed several errors by the flightcrew of USAir 105 in their execution of the localizer back course approach to runway 27 at MCI. They:

> continued an instrument approach even after it became apparent that, because of the radar vectors provided by ATC, they would not intercept the localizer until well within the final approach fix,

> descended below 3,000 feet well before the airplane was established on the back course localizer, contrary to the approach clearance they had received,

> were unaware of their distance from the runway when they improperly descended below MDA before reaching the VDP,

failed to determine the visual aids, lights, and markings that were associated with the runway,

were unfamiliar with the regulation governing visual descent points (VDPs) and the application of VDPs to nonprecision approaches, and

failed to discontinue the approach despite the horizontal situation indicator (HSI) indicating full-scale localizer deflection, while at low altitude, at night, in instrument meteorological conditions, over 2 miles inside the final approach fix.

The evidence indicates that the flightcrew failed to review adequately the approach charts necessary for the execution of the back course localizer approach to runway 27. The FAA inspector commented that both the captain and first officer mnintained the runway 19 approach chart on their respective control columns throughout the approach to runway 27 and through the approach and landing at Salina. Further, the evidence suggests that both the captain and first officer were unaware that runway 27 was equipped with a VASI, contrary to the captain's statement that he had assumed that the VASI was not operating. According to the first officer, he did not brief the captain on the visual aids, lights, and markings associated with MCI's runway 19 when they were preparing for the approach to that runway; he could not recall if he briefed the captain on those features associated with runway 27.

About 45 miles northeast of MCI, the flightcrew began to prepare for the execution of the ILS approach to MCI's runway 19. USAir 105 was about 15 miles from the airport, at an approximate altitude of 7,000 feet, when the active runway was changed and the flighcrew was given vectors for the localizer back course approach to runway 27. Because the flight would typically intercept the localizer about 2 to 3 minutes later, the flightcrew had only limited time available to accomplish the following: retune and identify navigation frequencies, review headings, altitudes and related navigational information, examine the missed approach procedures, compare the published missed approach procedures with the airplane's airborne weather radar information on the adverse weather, and ask for and receive alternative missed approach instructions. The flightcrew performed these activities near a busy airport while they were monitoring and, when necessary, responding to ATC communications, as well as monitoring flight parameters, controlling the airplane, and noting the location of the adverse weather.

Neither the flightcrew nor the FAA inspector said that the flightcrew had appeared rushed when they changed to runway 27. However, the evidence indicates that in preparing for the runway 27 approach, the crew overlooked the fact that the localizer back course approach incorporated a VDP and that the runway was equipped with a VASI. Moreover, after USAir 105 reached the MDA, the captain, who should have been mnintaining the instrument scan, failed to note the airplane's distance to the runway after the first officer stated he had seen the runway lights. This distance was critical to the proper execution of the approach. According to the radar data, the descent from MDA began about 2 miles from the end of the runway, rather than from the 0.8 DME position from which it should have been initiated.

The Safety Board believes that the crew should not have initiated the localizer back course approach to runway 27 before they had reviewed adequately the approach charts. The proper procedures in the execution of the approach would have resulted in the flightcrew leveling the airplane at the MDA and continuing at that altitude, 1,400 feet, until the VDP was reached and one of several lights or markings associated with the runway was identified, or the VASI was recognized and the vertical flight path intercepted. This crew did not level the airplane at the MDA for more than 2 seconds, was not aware that a VDP was a required element of the approach, and did not recognize the presence of the VASI.

Further, the flightcrew should have recognized that because a localizer back course approach provides limited flightpath guidance in comparison with the precision instrument approaches that air carrier pilots typically execute, it was imperative that they review the approach charts to obtain as much information about the approach as possible, such as runway lighting and markings associated with the runway. By contrast, precision approaches contain precise vertical and lateral electronic flightpath guidance and approach light systems for visual identification of the runway and runway lights.' In addition, identification of MCI's runway 27 was complicated by the lack of approach lights, the dark terrain, as well as the conpeting visual cues of airport lights, highway lights, and other lights associated with the runway environment. As a result, the approach in this incident called for particular crew vigilance, vigilance that the crew of USAir 105 did not employ.

There were aids available to the flightcrew, such as a VASI, REIL, and runway edge lights, which, while not as helpful or 'precise as the guidance typically associated with precision approaches, offered assistance in executing the localizer back course approach. Of these aids, the VASI was probably most critical to executing the approach because it provided visual vertical guidance. Used properly, this guidance, while not as precise as the vertical guidance of an instrument landing system (ILS) approach, would have enabled the flightcrew to descend from a point at the MDA to the runway touchdown zone. The role of the VASI in the proper execution of nonprecision approaches is underscored by the fact that the majority of domestic airports certificated for air carrier operations, with runways that allow nonprecision instrument approaches, incorporate VASIs at those runways.<sup>14</sup> Nevertheless, the flight crewmembers did not question ATC about the status of the VASI.

Moreover, the flightcrew of USAir 105 apparently did not recognize that the airplane would not be established on the localizer until well along the localizer path, inside the final approach fix. By descending below 3,000 feet before being established on the localizer, the flightcrew did not adhere to an air traffic control clearance.

According to the FAA inspector, after the first officer, who had been scanning outside the cockpit, declared that he could see the runway, both flight crewmenbers maintained a scan outside the cockpit until impact with the wires. The Safety Board believes that both flight crewmenbers focused primarily on what they believed to be lights associated with the unway; the captain stated that he believed that he was looking at the strobes associated with the REIL and the first officer thought that he was looking at the runway edge lights.

The difference between what the crewmembers were actually looking at and the REIL and runway lights was substantial. The lights that they were most likely observing were mercury vapor lights, which mmintain an orangebeige hue, associated with a large automobile storage facility. The REIL consists of two strobe lights that flash together regularly at either side of the runway threshold. The runway edge lights are a string of lights that line both sides of the runway. Given the dissimilarity in the lights, the Safety Board examined factors that could explain the gross misidentification of the flightcrew.

Stimuli that the sense organs receive from visual, auditory, and other sources become perceptions following neural processing. Gregory<sup>15</sup> describes how the eye, or more accurately, the retina, provides the brain with images that are "read" or processed. Certain images, which are more difficult for the brain to process than others, result in errors in the neural processing known as visual illusions. Illusions, according to Gregory, could occur in any of the sense modalities.

<sup>15</sup> Gregory, R.L. <u>Concepts and Mechanisms of Perception</u>. London, Duckworth, 1974.

<sup>&</sup>lt;sup>14</sup> Data supplied by the FAA's National Flight Data Center for airports with FAR Part 139 authority, as of June 22, 1990.

Aviation creates unique perceptual demands because many of the cues typically relied on in day-to-day perceptual activities are lacking. For example, pilots must learn to rely on certain visual cues and ignore others, such as kinesthetic or body orientation cues, to avoid illusions that could lead to potentially catastrophic misinterpretations of an aircraft's orientation in space.

Leibowitz<sup>16</sup> suggests that two visual processes, one used for object recognition and the other for visual guidance, my partially explain the phenomenon of visual illusions among pilots. Recognition vision, he wrote, "depends critically on the amount of light present as well as [the presence] of a sharply focused immge." If one of these conditions is not satisfied, "we have difficulty reading or recognizing objects." Moreover, he indicated that recognizing objects when transitioning from one set of cues to another may "require an extended period of time." As a result, pilots mking the transition from monitoring instruments to identifying objects outside an airplane my be susceptible to illusions during the time it takes to complete the transition.

The application of theories and evidence on human visual perception to the investigation of aviation accidents is limited. Haber, in a discussion of an accident involving an air force fighter,<sup>17</sup> wrote that several factors together increase the probability that a pilot will experience an illusion, an illusion that could lead to an accident. These include target fixation, which limits a pilot's ability to perceive other, perhaps relevant, cues. Haber added:

> humms are not completely at the mercy of an uninformative visual world when flying over unfamiliar [terrain]. We make assumptions about the terrain or the objects and then use those assumptions to determine [the] sizes of [various] distances. Pilots can thus test their patterns of assumptions, especially if they can get fairly close to the objects observed. Even so, the entire process is one of assumptions supported only by consistency. The effects of intense or heavy task loadings, fatigue, stress, anxiety, bad weather, or mechanical malfunctions merely add more potentially deadly factors to the equation.

The Safety Board believes that the flightcrew of USAir 105 misidentified lights on the ground for those associated with the runway while executing the approach to MCI's runway 27. Several factors my have caused the misidentification. The darkness reduced the visual recognition ability

<sup>&</sup>lt;sup>16</sup> Leibowitz, H.W. "Some Basic Mechanisms in Spatial Orientation" Paper presented at an Air Force conference on aviation safety, Bolling Air Force Base, December, 1987.

<sup>&</sup>lt;sup>17</sup> Haber, R. H. "Why Lou-Flying Fighter Planes Crash: Perceptual and Attentional Factors in Collisions with the Ground." H<u>uman Factors</u>, 1987, <u>29</u>, 519-532.

and the visual acuity of the crew. Further, it was raining at the time which distorted the view through the windscreen. In addition, although the actual time that elapsed is undetermined, the first officer was transitioning from monitoring instruments inside the cockpit to scanning the outside environment. As Leibowitz suggested, the time needed to effect the transition could have been insufficient for the first officer to fully identify the lights he was observing.

Furthermore, the stress levels of the crew were probably elevated. Both crewmembers had been attempting to find the runway after altering quickly their preparations for the approach that they would be executing and because they had just flown through a storm cell. The first officer's declaration that he had the runway in sight, consistent with Haber's analysis, provided the captain with an expectation and a suggestion of how the lights would appear, that is, they would be associated with a runway. These circumstances could have influenced the crewmembers to misidentify the lights they were observing for lights associated with the runway. Since the first officer did not actually identify the lights he was observing, each crewmember in effect perceived the lights differently, as different elements of the same runway lighting configuration.

The Safety Board believes that the flightcrew failed to use resources, such as the VASI and the VDP, and prematurely descended below MDA without positively identifying their position in relation to the runway. The flightcrew then misidentified lights, located more than 1 mile from the runway threshold, as being associated with runway 27. This sequence of events led to the flightcrew's premature descent below MDA leading to the incident. Because the responsibility for the conduct of the flight belonged to the flightcrew, and because the crew erred in their continuation of the approach until the flight struck electrical transmission wires, the Safety Board believes that the actions of the flightcrew of USAir 105 caused the incident.

The FAA has apparently recognized that misidentifications can occur near airports because on some approach charts it has alerted pilots to mintain vigilance to avoid confusing these lights with those associated with runways. This incident illustrates the need for placing such a warning on the approach charts for MCI's runway 27. However, the Safety Board is concerned that approach charts to other runways with potentially confusing features my not display cautionary warnings. Therefore, the Safety Board believes that the FAA should solicit input from pilots to identify potentially confusing lights or other features near runways associated with instrument approach charts that do not display cautionary warnings on those features and to modify the charts of runways identified by pilots to incorporate the needed warnings.

## 2.4 **Controllers**

The Safety Board believes that on the night of the incident the MCI controllers did not provide adequate air traffic control services in general and to USAir 105 in particular. Moreover, after the incident, many of these controllers did not appear to recognize the potential effect of their performance, which could have lead to a catastrophic accident. These performance deficiencies included the failure to:

perform a timely weather observation following deterioration in the prevailing visibility to below 4 miles,

disseminate visibility information in a timely manner within the facility after the weather observation had been performed,

solicit PIREPs from flightcrews who were making reports on the MCI weather,

disseminate PIREPs to MCI controllers and flightcrews who had no means of hearing the initial pilot reports,

provide the flightcrew of USAir 105 with correct information on the prevailing visibility,

vector USAir 105 outside the final approach fix,

inform flightcrews over the ATIS that the LLWAS was out of service,

assign priorities to ATC tasks accord ng to their importance and criticality to flight safety, and

assign 'personnel to properly supervise portions of the facility while the supervisors of record were performing routine controller duties.

An ATC action that directly related to this incident involved the lack of timely dissemination of weather information, both from the MCI ATC facility to the flights in the MCI airspace and within the ATC facility itself. The slow dissemination occurred during a time of rapid weather deterioration, when timely dissemination was most needed.

'The controller-in-charge, who was also serving as the tower cab coordinator, did not recognize the need to take new visibility measurements after the visibility had deteriorated as a result of the heavy rain, despite the requirement that visibility measurements be taken when the prevailing visibility dropped below 4 miles. Instead, the evidence indicates that it was the specific request of the NVS, several minutes after the visibility had decreased, that precipitated the new visibility observation.

Further, after tower personnel had taken the new visibility measurements, which resulted in a determination that the visibility was 1/2 mile, the controller-in-charge did not disseminate the information to either flightcrews or controllers within the MCITRACON. Again, only a specific request for the information, from the west handoff controller, prompted the controller-in-charge to disseminate the information, approximately 3 1/2 minutes after the measurements had been taken. Yet, in this interval, the controller-in-charge was aware that USAir 105 had been cleared for the localizer back course approach, despite the fact that the approach required at least 1 mile visibility. At that time, USAir 105 was about 20 miles from runway 27, sufficient distance from MCI to provide the flight crewmembers adequate time to consider and prepare for alternative actions.

Further, the controller-in-charge demonstrated poor judgment during a dynamic situation by continually responding to relatively trivial requests over the unrecorded telephone line, such as informing airlines on the location of their airplanes, when more pressing and critical needs, directly affecting flight safety, had not been addressed. The Safety Board believes that given the weather and the air traffic at MCI at that time, the controller-in-charge should have disregarded the telephone requests and quickly disseminated critical weather information to those inside and outside the MCI ATC facility who needed that information.

The actions of the east arrival controller directly affected USAir 105. For example, despite requirements that flights on the localizer back course approach to runway 27 be vectored to outside the final approach fix, she vectored the flight well inside Mizzo, the final approach fix. Such vectors could have contributed to an unstabilized approach because the flight was required to mnintain 3,000 feet msl until intercepting the localizer. USAir 105 did not join the localizer until it was about 21/2 miles from the runway threshold. Had the crew adhered to the east arrival controller's clearance, they would have had to descend about 2,600 feet in those 21/2 miles, rather than in the 6-mile-distance from Mizzo to the threshold, mnking it difficult for the flightcrew in efforts to execute a stabilized descent.

In addition, although controllers and pilots mude several explicit statements about the weather, such as the 2127:38 report of the PAT 130 flightcrew "that wall of water just covered the airport down there...it's not visible anymore," the east arrival controller failed to solicit PIREPs from this flightcrew or request amplifying information about the weather from controllers who were commenting or reporting on weather conditions. Further, the east arrival controller stated that after she had handed off USAir 105 to the local controller the flight was, in effect, no longer her responsibility. However, she was aware that the flightcrew had not been informed of the prevailing visibility, which was below that required for initiation of the approach.

These oversights by the east arrival controller went unnoticed because the TRACON supervisor assigned himself to the west arrival controller position while he was also acting as supervisor. This limited his ability to monitor the performance of the east arrival controller. Because the severe weather was centered west of MCI, the air traffic there was greatly reduced, as was the need for a controller dedicated to the west radar position. As a supervisor, he should have recognized the need to give his full attention to the supervision of the TRACON controllers at a time when weather factors were rapidly changing and greatly influencing the nature of operations at MCI. The ground controller heard the 2125:05 report on the wind shift and on the intensity of the rain by the flightcrew of Braniff 659. He told the flightcrew that he agreed with their assessment of the weather, but he failed to disseminate their report to others in the MCI facility.

Between 2125 and 2127, the controller-in-charge informed the local controller that the official tower visibility was 1/2 mile. During this interval, at 2126:29, the local controller transmitted in the blind the RVR for runway 19, which ranged from 1,800 feet to 2,800 feet, according to the location on the runway. However, he also did not inform the flightcrew of USAir 105 that the MCI visibility was below the minimum required to permit execution of the approach.

Finally, the clearance delivery/flight data controller did not include on the ATIS information that the LLWAS was out of service. Although this information would not, in all probability, have altered the chain of events that led to the incident, the absence of such information provided incorrect information to the flightcrew. Since there was an LLWAS at MCI, the flightcrew had every reason to believe that ATC would be transmitting LLWAS information on variations in wind speed and/or direction around the airfield. The lack of such information, in the presence of severe weather near the field, may have led the flightcrew to believe that the weather would be less severe than it was. However, the crew was aware that the wind speed was 24 knots gusting to 39 knots and was therefore probably alert to the possibility of turbulence.

The Safety Board is concerned that some of the MCI controllers did not appear to recognize deficiencies in their performance on the night of the incident and the effect of these deficiencies on the performance of the flightcrew of USAir 105. For example, the east arrival controller did not acknowledge, even after being shown a plot of the radar track, that USAir 105 joined the localizer well inside the final approach fix. Moreover, the statement of the chief of the MCI facility that "weather [dissemination] Moreover, the falls about No. 6" in ATC priorities contradicts FAA requirements. The FAA guidance clearly states that "it is virtually impossible to develop a standard list of duty priorities" and that priorities must be determined by the prevailing circumstances. The Safety Board believes that on the night of the incident weather dissemination to flightcrews about to execute the localizer back course approach deserved a high priority since that information would have prevented the execution of that approach. In addition, the chief did not recognize the role of ATC in informing pilots about the conditions they can expect. Contrary to what the chief stated, the fact remains that tower controllers and not pilots are in the best position to observe and disseminate information on prevailing conditions at the field, particularly in dynamic weather situations.

Although the flightcrew of USAir was ultimately responsible for the conduct of the flight and must assume primary responsibility for the cause of the incident, the Safety Board believes that the MCI air traffic controllers placed the flightcrew in a situation that jeopardized their ability to conduct the flight safely. Consequently, the Safety Board believes that they contributed to the cause of the incident. In April 1990, the Safety Board asked the FAA to describe its response to the ATC performance deficiencies at MCI that were uncovered in the investigation of this incident. The Safety Board later reiterated its request to the FAA. On July 12, 1990, the FAA responded that it made no changes to procedures at its MCI ATC facility and did not take disciplinary action against or decertify any controller involved in the incident at MCI. However, MCI controllers were counseled and given refresher training "regarding watch coverage, position responsibilities, weather information, ATIS procedures, airport conditions, runway selection, holding procedures, vectoring, radar arrival information and the handling of emergencies." Given the lack of information on taking disciplinary action of any kind against some of the MCI controllers, the Safety Board hopes that the FAA's actions at its MCI ATC facility will correct the deficiencies noted there.

## 2.5 Oversight of Air Traffic Controller Performance

The Safety Board's investigations of previous accidents and incidents involving ATC deficiencies, as well as its investigations of ATC operational errors, have been critical of the FAA's safety oversight and quality assurance of the ATC system For example, following its investigation of a series of operational errors at Chicago's O'Hare International Airport, the Safety Board issued the following recommendation to the FAA:

## <u>A- 88- 90</u>

Establish an independent national division that would be responsible for the quality assurance of the air traffic control system and that would report directly to the Administrator of the Federal Aviation Administration.

On November 4, 1988, the FAA Administrator responded to this recommendation by saying, in part:

The FAA has established the Office of Air Traffic Evaluations and Analysis under the Associate Administrator for Air Traffic to perform the overall quality assurance function of 'the air traffic control system This office is, by design, separate from other elements of the air traffic organization to ensure the creation of an independent body to ensure an unbiased evaluation and quality assurance function.

The Safety Board's investigation of a subsequent operational error that occurred on October 12, 1988, involving the President's airplane, further illustrated the reduced effectiveness of the FAA's national quality assurance program In its letter to the FAA, <sup>18</sup> the Safety Board reiterated its belief that the national quality assurance of the ATC system "would be better discharged by a unit that had no allegiance to the air traffic service and reported its findings, corrective actions, and followup reports directly

<sup>&</sup>lt;sup>18</sup> Safety Recommendation A-88-157, dated November 15, 1988.

to the FAA Administrator." In addition, the Safety Board noted in the letter that the Office referred to by the Administrator in his response of November 4, 1988, had actually been created 2 years previously and placed under the authority of the Associate Administrator for Air Traffic, the person responsible for the operation and oversight of the ATC system As a result, the Safety Board concluded that because of this organizational structure, the ATC quality assurance office was, "in effect, evaluating itself."

On December 8, 1988, the Secretary of Transportation changed Order 1100.2C of the Department of Transportation and, in a memorandum to the FAA Administrator and the Acting Chairman of the Safety Board, explained that he had moved the air traffic quality assurance function from the FAA's Associate Administrator for Air Traffic to the newly created Office of Quality Assurance under the Associate Administrator for Aviation Safety. In his letter to the Acting Chairman, the Secretary went on to say, in part, "We are confident that you [will] find that these positive actions taken by the Department comply with your Recommendations and will consequently be able to place Recommendations A-88-90 and A-88-157 in the Closed-Acceptable Action category."

Following the change of administration in early 1989, the newly appointed Secretary of Transportation informed senior FAA officials that the quality assurance program would be reinstituted within the Air Traffic Service. Concurrently, the FAA established the Office of Safety Quality Assurance under the Administrator for Aviation Safety which was designed to provide safety oversight to quality assurance endeavors in six major operational programs within the FAA to include the Air Traffic Service. This office would report directly to the FAA Administrator. FAA senior staff then provided briefings to members of the Safety Board to explain how they envisioned the incorporation of the organizational change.

On March 7, 1989, Safety Board staff met with the FAA's Associate Administrator for Aviation Safety. He informed the staff that these actions were being taken in response to Safety Recommendation A-88-90. The Associate Administrator said that the Office of Safety Quality Assurance would enhance the quality assurance to and safety oversight of the ATC system While the Safety Board was encouraged by the organizational change, it noted that the FAA had staffed this function with only two specialists. The Safety Board concluded that this new office can monitor effectively the ATC system and ensure that deficiencies are addressed and corrected, but only if the office is given a staff adequate to exercise its responsibility. The Safety Board closed recommendation A-88-90 and classified it "Superseded" by recommendation A-89-41.

Thereafter, the Safety Board conducted a special investigation of the FAA's Coast TRACON following an ATC operational error that led to a loss of separation between two air transport aircraft and addressed the issue of substandard quality assurance of the ATC system.<sup>19</sup> On May 23, 1989, the Safety Board issued the following safety recommendation to the FAA:

## <u>A-89-41</u>

Implement and provide adequate staff and funding for the Federal Aviation Administration's Office of Safety Quality Assurance, which is located organizationally under the Associate Administrator for Aviation Safety, to monitor the air traffic control system and to ensure that operational and managerial shortcomings are identified and corrected.

On August 17, 1989, the FAA Administrator informed the Safety Board, in response to recommendation A-89-41 that the Office of Safety Quality Assurance would provide quality assurance and safety evaluation of activities to include the Air Traffic Service. He added that this office would "participate in program evaluations [and] independently analyze evaluation reports, conduct its own evaluation of the technical and mnnagerial aspects of those program areas, develop recommendations for correcting deficiencies and actively track the implementation of the recommendations."

The Safety Board responded to the FAA Admi nistrator on January 22, 1990, and noted that this office would be staffed by 19 persons, only 2 of whom would be dedicated to ATC issues. The Safety Board concluded that because of the smll number of persons tasked with ATC quality assurance and the magnitude of the ATC system, the FAA's Office would not be capable of providing the necessary oversight of the ATC system and classified the recommendation as, "Open--Unacceptable Action."

On April 12, 1990, the FAA Administrator informed the Safety Board

that:

the FAA's intention in establishing the Office of Safety Quality Assurance was not to exercise "total oversight" in a mmner that would routinely involve its staff in the day-today events occurring in the system, but to monitor and assess programs on a broad national scale. The daily developments of the air traffic system are examined by the Air Traffic Quality Assurance Program which the Office of Safety Quality Assurance monitors closely in its oversight function. The principal role of the Office of Aviation Safety is to monitor the system and to ensure that the Office of the Associate Administrator for Air Traffic has an effective quality assurance organization in place and functioning properly.

The Safety Board continues to lack confidence in the FAA's commitment to provide effective quality assurance and safety oversight of the ATC system The evidence indicates that the FAA failed to take the necessary

<sup>&</sup>lt;sup>19</sup> Safety Recommendation A-89-33 through -43, dated May 23, 1989.

actions to address and correct the numerous operational, administrative and mnnagerial deficiencies identified in the investigation of this incident. The fact remnins that the FAA's Office of Safety Quality Assurance is understaffed and without an approved charter outlining its responsibilities.

The findings of this and previous investigations underscore the need for the FAA to enhance the depth, frequency, and quality of its vigilance over the ATC system needed to address and prevent a recurrence of the type of ATC errors that were committed in this incident. Therefore, the Safety Board believes that the FAA should modify the functional statement of its Office of Safety Quality Assurance and provide sufficient resources to it to make it capable of providing total quality assurance and safety oversight of the ATC system Thus, the Safety Board now classifies Safety Recommendation A-89-41 as "Closed-Unacceptable Action, Superceded" by Safety Recommendation A-90-125.

#### **2.6 FAA** Inspector

The Safety Board believes that the FAA policy regarding inspectors who witness unsafe practices or violations of FARs while performing en route inspections is appropriate. The policy suggests that, when necessary, inspectors tactfully and constructively direct the attention of flightcrews, during a flight, to unsafe practices, with little disruption to the routine of flight and with the authority of the pilot-in-command intact.

The evidence suggests that the FAA inspector performing the en route inspection on USAir 105 did not follow that guidance. During the flight, the crew did not adhere to an air traffic control clearance at least Yet he did not mention this occurrence in his statement and did not once. cite it in his report on the flightcrew's performance. Further, he claimed that he was unable to see through the airplane's windscreen. However, Boeing data indicate that if he had leaned forward, he could have seen almost 20<sup>8</sup> down the nose of the airplane. Even before the execution of the approach, it should have been obvious to him that the crew did not adequately prepare for executing the localizer back course approach. The Safety Board concludes that the FAA inspector did not inform the crewmenbers of the errors they were committing in their planning and execution of the localizer back course approach.

Although he did not violate FAA requirements in doing so, the inspector could not have examined MCI instrument approach charts during the en route inspection because they were inaccessible. Consequently, his inspection would have been deficient, regardless of the outcome of the flight, since he would have been unable to monitor adequately the flightcrew's execution of the instrument approach. The Safety Board believes that if the FAA inspector had informed the flightcrew of their inadequate preparation for the approach, of their nonadherence to the ATC clearance, or of the full-scale localizer deflection inside the final approach fix, they might have abandoned the approach and the incident would not have occurred. Therefore, the Safety Board concludes that this inspector did not fulfill his responsibilities while performing an en route inspection of USAir 105. The Safety Board believes that the performance of the FAA inspector in this incident calls into question the quality of en route inspections. The fact that en route inspections are conducted by inspectors without referral to instrument approach charts indicates that, at a minimum the most critical aspects of flight are unexamined during such inspections. Further, the fact that the inspector on USAir 105 failed to address a premature descent that was contrary to an ATC clearance raises questions about the FAA's training of and guidance to its inspectors.

The criticality of proper en route inspections to flight safety cannot be overstated. The FAA en route inspection represents a final check that flight crews are adhering to company procedures and FAA regulations. If these inspections are substandard, critical aspects of flight safety my be in jeopardy. Consequently, the Safety Board believes that the FAA should require that inspectors have current instrument approach charts accessible during the conduct of en route inspections. In addition, the Safety Board believes that in view of the evidence on the quality of the performance of the inspector on USAir 105, the FAA should review its training, policies and procedures regarding en route flight inspections and revise them to increase the likelihood that inspectors will monitor crew performance and, as necessary, inform the crew of unsafe actions or violations of FARs.

## 2.7 Visual Descent Point

Neither the flight crewmember nor the FAA inspector on USAir 105 fully recognized the purpose and role of the VDP in executing a nonprecision approach. USAir referred to the VDP several times in its Flight Operations Manual. As a result, the flightcrew was required to be familiar with the pertinent regulation. An FAA inspector whose role requires that he or she observe flightcrew compliance with FAA regulations should also be expected to be knowledgeable on VDPs.

The Safety Board believes that with the recent revisions to the pertinent rules, the FAA's stance on VDPs is contradictory. By dropping the requirement for VDPs from FAR Part 91, general operating and flight rules, and not from FAR Part 121, air carrier operating and flight rules, the FAA 18, in effect indicating that VDPs are critical to the safety of air carriers but ndt to regional airline flights operated under FAR Part 135 and to general aviation flights operated under FAR Part 91. Further, the Safety Board is concerned with the FAA's statement that VDPs that use DME fixes, which are the overwhelming majority of VDPs, may result in excessively steep or shallow descent angles due to "displacement factors and/or fix errors." Since DME is accurate and reliable enough to be used for other approach navigation purposes, including step-down points on nonprecision approaches, it would be sufficiently reliable and precise to use to establish VDPs. Given the reliability of current avionics, the Safety Board does not believe that there will be sufficient unreliability or inaccuracy in equipment to pose a danger to aircraft relying on DMEs in the execution of instrument approaches. Further, the Safety Board believes that the passengers on flights operated under FAR Part 135 should receive the 'same safety benefits that VDPs provide as passengers on flights operated under FAR Part 121.

Therefore, the Safety Board believes that the FAA should instate VDPs in FAR Part 135, Air Taxi Operators and Commercial Operators.

The VDP is a fix on nonprecision instrument approaches that applies only to DME-equipped aircraft. As such, it plays an inportant role in reducing the likelihood of premuture descents in nonprecision approaches. The fact that the flightcrew of USAir 105 descended well before the VDP and that these crewmembers could not recall receiving simulator training employing VDPs indicates that pilot training in the execution of nonprecision approaches should be improved. Therefore, the Safety Board believes that the FAA should issue an Air Carriers Operations Bulletin directing principal operations inspectors to urge air carriers to assure that flightcrews are cognizant of the purpose of VDPs and to include approaches with VDPs in their simulator training.

## 2.8 Recording and Disseminating of Weather Information

In this incident, conversations between NVS personnel and FAA ATC personnel in MCI took place over an unrecorded telephone line. Subsequently, the exact nature of the transmission of the weather information, such as the time of transmission and whether the information was properly sent and received, were in dispute.

Following the incident, the NVS and the MCI ATC facility enhanced their procedures for acknowledging the transmission and receipt of weather information at MCI. However, the procedures do not contain a formal acknowledgement of the transmission of weather information, despite the fact that both FAA and NVS procedures encourage such requirements.

The Safety Board believes that the acknowledgement of the transmission of weather information is critical to assuring that such data is With acknowledgment of receipt of a message, the received and acted upon. sender is informed that the information has been received, there is a record of receipt for future reference, and there is some assurance that the message will be acted upon. Therefore, the Safety Board believes that the FAA should require acknowledgement of the transmission and receipt of all weather messages exchanged between an FAA ATC facility and the NWS at airports where weather information is regularly exchanged between the two entities, to include the time of receipt and the identity of the person receiving the information. Further, the exchange of such weather messages should occur over recorded telephone lines or recorded electronic transmission means, and the recordings should be retained for a reasonable amount of time.

#### 2.9 Minimum Safe Altitude Warning (MSAW)

Although the MCI ATC radar facility was equipped with MSAW software, the MSAW alert failed to activate during the premuture descent of USAir 105. Had it alerted the controller, he or she could have informed its flightcrew of their unsafe altitude, and the incident could have been avoided. Because USAir 105's premuture descent, which took place more than a mile from the runway threshold, was inside the inhibit area designed to minimize the number of false alerts of low aircraft that are mnintaining a proper descent, the MSAW alert did not activate. This incident indicates the need to revise the parameters controlling the size of the MSAW inhibit areas. Therefore, the Safety Board urges the FAA to provide site adaptation guidance to encourage modification of MSAW parameters, as appropriate, to increase the MSAW protection areas and to minimize the extent of inhibit areas.

## 2.10 Cockpit Recording

Because USAir 105 flew for more than 1 hour after the incident, no CVR record of conversations that occurred during the incident was retained. Such a record might have assisted investigators to recognize the actions of the crewmembers and the FAA inspector in this incident. In previous aircraft accident investigations, both in this country and overseas, the limitations of CVRs have, on occasion, presented difficulties to investigators. This accident demonstrates the value of longer playing CVRs, which can record cockpit sounds for as long as 2 hours, to accident and incident investigations.

In addition, given current technology, many of the limitations of CVRs now in use could be overcome through the use of long-playing' video recordings. Cockpit video cameras recording 2 hours or more might have assisted investigators in this incident, especially in examining the crew interactions. For example, the nature of the crew briefing and approach chart review that occurred in preparation for the localizer back course approach could have been recorded by long duration cockpit video recorders.

Although worthwhile information has been recovered from CVRs and sophisticated DFDRs, in several investigations the use of video technology might have complemented data supplied by those recorders and provided valuable additional information to accident investigators. For example, in the October 1987 accident involving a Piedmont Airlines Boeing 737, the airplane was destroyed and two passengers were injured after the airplane overran the runway upon landing at Charlotte, North Carolina. The Safety Board determined, through aerodynamic analyses of the airplane's performance, that the spoilers were armed before landing. The Safety Board concluded that the airplane's excessive speed and the captain's unstabilized approach caused A cockpit video recorder could have facilitated the the accident. determination of the arming of the spoilers, a determination that was anbiguous on the CVR. In the September 1986 accident involving a Midwest Express DC-g-10 in Milwaukee, Wisconsin, the airplane was destroyed and all 31 persons onboard were killed following a catastrophic engine failure shortly after takeoff. The Safety Board concluded, after analyses of airplane performance data, that the flightcrew's improper use of flight controls led to an accelerated stall and the loss of airplane control, which caused the accident. However, the determination of the crew's rudder input, a critical element of the flightcrew's flight control application, which was not recorded on the CVR, might have been determined by cockpit video recorder, as well as an expanded parameter DFDR. In the August 1988 accident involving a Delta Airlines Boeing 727 at Dallas-Ft. Worth International Airport, Texas, the airplane was destroyed and 14 passengers and crew were

killed. The Safety Board concluded that the captain and first officer's failure to set the flaps on takeoff, and with the failure of the takeoff warning system on the airplane, caused the accident. The determination of crew actions regarding flap extension before the takeoff could have been determined considerably earlier in the investigation with a video recording of the crew's actions, as well as by an expanded parameter DFDR.

Given the many transport aircraft in service today using only 5-parameter digital flight recorders\*\* and the numerous pilot actions that occur without verbal or nonverbal communications, the amount of information that could be provided by a cockpit video recorder is considerable. The value of determining such information is especially great given the criticality of human factors issues of crew performance in understanding the cause of accidents. Although DFDRs and CVRs provide much valuable information, they cannot fully document the range of flightcrew actions and communications. Further, as the introduction of aircraft with electronic "glass" cockpit instrumentation to line service continues, the value of cockpit video recordings will increase as an aid to investigators attempting to determine the status of the cockpit instrumentation presented to the flightcrew.

On March 30, 1990, before the conclusion of its investigation of the January 1989 accident involving a British Midland Airways Boeing 737-400, near East Midlands Airport, the British Air Accidents Investigation Branch (AAIB) issued a recommendation to the Civil Aviation Authority calling for research into the application of closed-circuit television technology on The recommendation sought to improve "methods of providing flight aircraft. deck crews of public transport aircraft with visual information on the status of their aircraft by means of television monitoring. " The recommendation also addressed the issue of such video recordings monitoring "flight deck presentations. " The Safety Board agrees with the intent of the AAIB recommendation and believes that application of current technology of long duration video in the cockpits of air transport aircraft could prove to be a valuable addition to aircraft accident investigations. As a result, the Safety Board will monitor and evaluate progress in the application of video technology to the cockpits of air transport aircraft.

2.11 USAir Training and Procedures

The Safety Board's examination of USAir's training and procedures indicated that the company had complied with relevant FARs. Nevertheless, the company lacked guidance to pilots on the need to maintain precise course guidance while executing nonprecision approaches. Had the flightcrew been given this guidance, perhaps they would have recognized the need to abandon

<sup>20</sup> On May 26, 1994, all airplanes operating under 14 CFR Part 121 will be required to record at least 11 parameters on the **onboard** digital flight data recorders rather than 5 parameters. The following parameters, at a minimum, will be recorded: time, altitude, airspeed, vertical acceleration, microphone keying, pitch, roll, longitudinal acceleration, control column or pitch control surface position, and engine thrust of each engine.

the approach before they joined the localizer so close to the runway and the incident could have been avoided. The company provided adequate guidance to pilots executing precision approaches and directed them to mnintain precise guidance on the localizer/glide slope and to execute an immediate missed approach if they encounter localizer or glide slope deviation outside of specified safety limits.

Since the time of this incident, as well as an accident involving a USAir Boeing 737-400 that occurred in New York's LaGuardia Airport on September 20, 1989,<sup>21</sup> USAir has modified its procedures and flightcrew training program It has increased the training time in nonprecision approaches, in general, and the use of VDPs, in particular. The use of VDPs was also incorporated during training in flight simulators. USAir standardized the checklists of the various aircraft types in its fleet and increased internal oversight of its FAA-designated check airman program

The Safety Board believes that this incident illustrates the need for USAir to revise further its operating procedures and training curriculum to emphasize the importance of mnintaining precise course control in the execution of nonprecision approaches. Further, the Safety Board believes that other carriers may also lack such guidance to their pilots. Therefore, the Safety Board believes that the FAA should direct its principal operations inspectors to determine whether airlines they surveil require pilots to execute a missed approach when they encounter full-scale localizer deflection inside the final approach fix on a nonprecision approach and to require airlines that do not employ such procedures or provide such guidance to do so.

#### 3. CONCLUSIONS

- 3.1 Findings
  - 1. The crew members of USAir 105 were qualified in accordance with applicable FARs.
  - 2. The MCI air traffic controllers were qualified to perform their duties in accordance with applicable rules and FARs.
  - 3. No preexisting defects were found in the airplane's structure, systems, or powerplants that could have contributed to the incident.
  - 4. Weather factors were not causal to the incident.
  - 5. The flight crewmembers did not adequately review the approach charts in advance of their execution of the localizer back course approach to runway 27.

<sup>&</sup>lt;sup>21</sup>Aircraft Accident Report--"USAir, Inc. Boeing 737-400, LaGuardia Airport, Flushing, New York, September 20, 1989"(NTSB/AAR--90/03)

- 6. The flight crewmembers were unaware of the availability of several elements helpful in the execution of the localizer back course approach.
- 7. The flightcrew's failure to abandon the approach, following their inadequate preparation for the execution of that approach, caused the incident.
- 8. The first officer's misidentification of lights he believed to be associated with runway 27 influenced the captain's subsequent misidentification of lights.
- 9. The flightcrew and the FAA inspector were unaware of the application of the regulation governing VDPs.
- 10. There was no information on the pertinent approach chart regarding the existence of potentially confusing lights along the approach path to runway 27, although such information was present on approach charts for runways at other airport.
- 11. The MCI air traffic controllers failed to provide accurate weather information to the flight crew of USAir 105, failed to vector the airplane to join the localizer outside the final approach fix and committed other errors in handling the flight, which contributed to the incident.
- 12. The FAA inspector conducting an en route inspection of USAir 105 did not inform the crewmenbers of the errors they were committing in their planning and execution of the localizer back course approach.
- 13. USAir did not require its pilots to execute, and the flightcrew of USAir 105 did not execute, a missed approach when they encountered full-scale localizer deflection inside the final approach fix on a nonprecision approach.

## 3.2 Probable Cause

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The National Transportation Safety Board determines that the probable cause of this incident was the flightcrew's failure to adequately prepare for and execute a nonprecision approach and their subsequent premuture descent below minimum descent altitude. Contributing to the cause of the incident was the inadequate and deficient services provided to the flightcrew by air traffic control personnel.

## 4. RECOMMENDATIONS

As a result of its investigation, the Safety Board recommends that the Federal Aviation Administration:

Solicit reports from pilots about potentially confusing lights or other features near runways associated with instrument approach charts that do not display cautionary warnings on those features and require that the approach charts be revised to incorporate the needed warnings. (Class II, Priority Action) (A-90-124)

Modify the functional statement of the Federal Aviation Administration Office of Safety Quality Assurance and provide sufficient resources to it to make it capable of providing effective quality assurance and safety oversight of the air traffic control system (Class II, Priority Action) (A-90-125)

Require that inspectors have current instrument approach charts accessible to them during the conduct of en route inspections. (Class II, Priority Action) (A-90-126)

Review the training, policies and procedures regarding en route flight inspections and revise them to increase the likelihood that FAA inspectors will monitor adequately crew performance and inform the crew, as necessary, when violations of Federal Aviation Regulations or unsafe practices have occurred. (Class II, Priority Action) (A-90-127)

Incorporate requirements for Visual Descent Points in Federal Aviation Regulations (FAR) Part 135, Air Taxi Operators and Commercial Operators, similar to FAR Part 121.651(c)(4). (Class II, Priority Action) (A-90-128)

Issue an Air Carriers Operations Bulletin directing principal operations' inspectors to urge air carriers to ensure that flightcrews are cognizant of the purpose of Visual Descent Points and to include approaches with Visual Descent Points in their simulator training. (Class II, Priority Action) (A-90-129)

Provide site adaptation guidance to encourage modification of Minimum Safe Altitude Warning parameters, as appropriate, to minimize the extent of inhibit areas. (Class II, Priority Action) (A-90-130)

Direct principal operations inspectors to verify that the airlines they surveil have clearly established stabilized approach and missed approach procedures for nonprecision approaches, such as full-scale deflection of the localizer needle when the airplane is inside the final approach fix. (Class II, Priority Action) (A-90-131) As a result of its investigation, the Safety Board recommends that the Federal Aviation Administration and the National Weather Service:

Require the acknowledgement of the transmission and receipt of all weather messages exchanged between an FAA air traffic control facility and the National Weather Service at airports where weather information is regularly exchanged between the two entities, to include the time of receipt and the identity of the person receiving the information. Further, the exchange of such weather messages should occur over recorded telephone lines or recorded electronic transmission means, with the recordings retained for a reasonable amount of time. (Class II, Priority Action) (A-90-132)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ James L. Kolstad Chairman

/s/ <u>Susan Coughlin</u> Vice Chairman

/s/John <u>K. Lauber</u> Member

/s/ Jim Burnett Member

/s/ C<u>hristopher A. Hart</u> Member

**September** 11, 1990

## 5. APPENDIXES

# APPENDIX A

## INVESTIGATION AND HEARING

## 1. Investigation

The National Transportation Safety Board was notified of the incident about 2300 eastern daylight time on September 8, 1989. An investigator from its Kansas City Regional Office was dispatched immediately. An investigative team was dispatched from its Washington headquarters to the scene the following morning. Investigative groups were established for: operations, air traffic control, meteorology, and digital flight data recorder. Specialists in human performance and air traffic control radar were assigned to the investigation thereafter. Parties to the investigation were: the Federal Aviation Administration, USAir, Inc., and the Airline Pilots Association.

#### 2. **Public Hearing**

There was no public hearing. Recorded interviews of the flightcrew of USAir 105, the FAA inspector who occupied the cockpit observer's seat on the flight, and the MCI air traffic controllers who worked with the flight and who supervised the MCI facility were held on November 28 and 30, 1989.

## APPENDIX B

# AIRTRAFFICCONTROL **TRANSCRIPT**

<u>INFORMATION:</u> Tower Coordinator transcription November 15, 1989 concerning the incident involving USA105, Boeing 737, on September 9, 1989 at 0235 UTC

Air Traffic Manager Kansas City International Tower

This transcription covers the time period from 0206 UTC on September 9, 1989, to 0300 UTC on September 9, 1989.

| Agencies Making Transmissions                         | Abbreviation  |
|---|---------------|
| Kansas City International Tower<br>Tower Coordinator  | сс            |
| Kansas City International Tower<br>Local Control      | LC            |
| Kansas City Internationai Tower<br>East Radar         | ER            |
| Kansas City Internationai Tower<br>East Handoff       | EHO           |
| Kansas City International Tower<br>West Radar         | WR            |
| Kansas City International Tower<br>West Handoff       | WHO           |
| Kansas City Center Traffic<br>Management Unit         | TMU           |
| Kansas City Downtown Airport<br>Traffic Control Tower | МКС           |
| Unknown   | UNK           |
| US Air 105  | USA105        |
| Braniff 569   | <b>BNF569</b> |
| Braniff 507   | BNF507        |
| Braniff 635   | BNF635        |

- 0206:00 LC Braniff five ninety seven you're number two after the ah one in position Braniff ah five sixty nine fly runway heading runway one nine cleared for takeoff
- 0206:05 BNF569 Braniff five sixty nine cleared to roll
- 0206:23 **TMU** T-M-U

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- 0206:25 CC Yeah this is International with this ah twenty miles (and PAOLA)\* can we come off that a little bit its killin us out there I got about ah almost two hundred miles of airspace sittin out at the runway
- 0206:34 TMU Okay let me ah Braniff five twenty ones my pathfinder as soon as I see what this rascal does I should be able to release you off of ah some of it I hope
- 0206:43 CC Yeah get me off of it cuz it it is killin us
- 0206:45 TMU If the supervisor will (unintelligible) if the supervisors will let me and I will get back with you
- 0206:49 CC At least five miles even that much will help
- 0206:51 TMU Bye
- 0206:52 cc Bye

APPENDIX B

(0207)

- 0207:09 UNK (Unintelligible)
- 0207:12 LC Calling tower say again you were cut out er you were cutting out
- 0207:23 LC Braniff five sixty nine contact departure good evening
- 0207:25 BNF569 Braniff five sixty nine going to departure
- 0207:30 BNF507 Tower Braniff five zero seven could you give us our sequence please (unintelligible) were down here at (one nine) \*
- 0207:35 LC Braniff five zero seven yes sir you're number three
- 0207:39 BNF507 Okay thank you
- (0208)
- 0208:02 UNK (Unintelligible) (continental one eighty eights)\* (unintelligible)
- (0209)
- 0209:01 LC Braniff five ninety seven at Alpha two taxi into position and hold
- 0209:04 BNF597 Position and hold Braniff five ninety seven

- 0209:10 BNF635 Braniff six thirty five next
- 0209:11 LC Braniff six thirty five thats correct
- 0209:14 LC Braniff six thirty five when safety permits you can taxi into position and hold behind the company
- 0209:19 BNF635 (Okay)\* position and hold behind the company when possible six thirty five
- 0209:27 LC Braniff six fifty five turn left at one of the intersections ground point eight off the runway sir
- 0209:33 UNK (Unintelligible)
- 0209:47 LC Braniff five ninety seven fly runway heading runway one nine cleared for takeoff
- 0209:50 BNF597 Runway heading one nine cleared to go Braniff five ninety seven
- (0210)

- 0210:59 LC Braniff five ninety seven contact departure good evening
- (0211)
- 0211:01 BNF597 Departure good evening sir Braniff five ninety seven
- 0211:28 LC Braniff six thirty five fly runway heading runway one nine cleared for takeoff

| APPENDIX B |         |   |
|------------|---------|---|
| 0211:32    | BNF635  | (Six)* thirty five cleared to go  |
| 0211:38    | LC      | Braniff five zero seven taxi into<br>position and hold runway one nine at<br>Alpha two      |
| 0211:41    | BNF507  | Okay position and hold Braniff five<br>zero seven Alpha two                                 |
| 0211:49    | LC      | Air Midwest fifteen fifty nine youll be<br>next behing the ah Braniff seven twenty<br>seven |
| 0211:52    | AMW1559 | Fifteen fifty nine thank you  |
| (0212)     |         |   |
| 0212:35    | LC      | Braniff six thirty five contact<br>departure good evening                                   |
| 0212:38    | BNF635  | (Six) <b>* thirty</b> five good day   |
| (0213)     |         |   |
| 0213:08    | BNF694  | And Braniff six ninety fours ready on<br>ah runway ah one nine correction niner             |
| 0213:13    | LC      | Braniff six ninety four runway niner<br>fly runway heading cleared for takeoff              |
| 0213:18    | BNF694  | Runway heading ah cleared to go Braniff<br>six ninety four                                  |
| 0213:44    | UNK     | (Unintelligible)  |

|         |         | APPENDIX B   |
|---------|---------|--|
| 0213:48 | LC      | Braniff five zero seven fly runway<br>heading runway one nine cleared for<br>takeoff                               |
| 0213:53 | BNF507  | Braniff five zero seven rolling<br>(unintelligible)  |
| 0213:56 | LC      | Air Midwest fifteen fifty nine taxi<br>into poisition and hold runway one nine<br>behind the ah seven twenty seven |
| (0214)  |         |  |
| 0214:13 | LC      | Air midwest fifteen fifty nine did you<br>copy position and hold   |
| 0214:22 | LC      | Air Midwest fifteen fifty nine<br>appro-er-tower   |
| 0214:25 | UNK     | You been caiiin <b>sixteen</b> nineteen er   |
| 0214:30 | AMW1559 | Fifteen fifty nine go ahead  |
| 0214:31 | LC      | Yes sir taxi into position and hold<br>runway one nine   |
| 0214:33 | AMW1559 | (Okay)* position and hold one nine   |
| 0214:46 | LC      | (Go ahead) * override  |
| 0214:48 | ER      | Runway nine no further north than<br>runway heading please   |
| 0214:49 | LC      | You got it T-K   |
| 0214:50 | ER      | K-Y  |

| APPENDIX B |         |  |
|------------|---------|--|
| 0214:52    | LC      | Air Midwest fifteen fifty nine fly<br>runway heading runway one nine cleared<br>for takeoff  |
| 0214:56    | AMW1559 | (Fifteen fifty nine)* cleared for takeoff  |
| 0214:59    | LC      | Braniff five zero seven contact<br>departure good evening  |
| (0215)     |         |  |
| 0215:05    | cc      | West handoff 10-C-c  |
| 0215:07    | WHO     | West handoff   |
| 0215:08    | CC      | Ah this is ah C-C we got Air Midwest ah<br>sixteen nineteen off runway niner like<br>to take him out about two or three<br>miles straight east and then straight<br>south on a one ninety heading you guys<br>take him towards Topeka reference<br>traffic be depart off of nineteen |
| 0215:21    | WHO     | Approved P-N   |
| 0215:22    | CC      | Thanks B-G   |
| 0215:23    | CC      | Would you tell east for me   |
| 0215:24    | WHO     | Yeah I will  |
| 0215:25    | LC      | If are you the next one out  |
- 0215:26 BNF201 Affirmative sir
- 0215:27 LC Alright if Braniff two fifteen you behind your company
- 0215:37 BNF563 Tower this is Braniff five sixty three
- 0215:41 LC Alright the number one ah Braniff out there is two zero one is that correct
- 0215:44 BNF201 Affirm
- 0215:45 LC Ah Braniff two zero one taxi into position and hold one niner
- 0215:48 BNF201 Okay position and hold on runway one nine for Braniff two zero one
- 0215:51 LC Braniff six ninety four contact departure good evening
- 0215:54 BNF694 Good day
- (0216)

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0216:07 LC Air Midwest sixteen nineteen taxi into position and hold runway niner

| APPENDIX B |         |  |
|------------|---------|--|
| 0216:09    | AMW1619 | Sixteen nineteen position and hold   |
| 0216:27    | LC      | Air Midwest sixteen nineteen <b>ammend</b><br>your altitude maintain four thousand   |
| 0216:31    | AMW1619 | Okay four thousand sixteen nineteen  |
| 0216:41    | LC      | Air Midwest sixteen nineteen fly runway<br>heading runway niner cleared for<br>takeoff   |
| 0216:44    | AMW1619 | Runway heading runway nine cleared to<br>go sixteen nineteen   |
| 0216:47    | LC      | Local  |
| 0216:48    | ЕНО     | Hows it look for visuals from the northeast (does it look)* okay   |
| 0216:49    | BNF201  | Tower Braniff two zero one we've just<br>been advised we have a passenger in<br>handicapped passenger in the lavatory<br>there if you need for us to clear the<br>runway we will |
| 0216:56    | LC      | Who's that is that <b>for</b> ah Braniff two<br>zero one   |
| 0216:58    | BNF201  | Yes sir  |

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- 0217:00 EHO (Unintelligible) C-C
- 0217:01 CC C-C

- 0217:02 EHO Hows it look to the northeast for visuals (unintelligible) \*
- 0217:05 CC Well I see your ah six forty nine out there fifteen northeast
- 0217:07 EHO Okay thats what we want to know were going to try to shove him in before that stuff comes over
- 0217: 10 CC Alright B-G
- 0217:12 LC Air Midwest fifteen fifty nine contact departure good day
- 0217:16 AMW1559 Fifteen fifty nine to departure good day
- 0217:29 BNF2019 And Interantional tower Braniff two zero one we are ready now runway one nine
- 0217:35 LC Braniff two zero one roger continue to hold right there just a moment ma'am

| APPENDIX B |         |  |
|------------|---------|--|
| 0217:38    | BNF201  | Thank you sir two zero one   |
| 0217:46    | LC      | Air Midwest sixteen forty three taxi<br>into position and hold runway niner  |
| 0217:49    | AMW1643 | Position and hold sixteen forty three  |
| 0217:53    | LC      | Air Midwest sixteen nineteen ah turn<br>right heading one <i>niner zero</i>  |
| 0217:58    | AMW1619 | Right to one ninety sixteen nineteen   |
| 0218:00    | LC      | Air Midwest sixteen nineteen <b>ammend</b><br>your altitude maintain four thousand<br>and contact departure good evening |
| 0218:05    | AMW1619 | Four thousand over to departure good evening   |
| 0218:28    | LC      | Air Midwest sixteen forty three runway<br>niner fly runway heading cleared for<br>takeoff                                |
| 0218:33    | AMW1643 | Runway heading <b>cleared</b> to go Air<br>Midwest sixteen forty three   |
| 0218:44    | LC      | Braniff two zero one fly runway heading runway one nine cleared for takeoff  |

|         |         | APPENDIX B   |
|---------|---------|--|
| 0218:47 | BNF201  | Runway heading and cleared to go on<br>runway one nine for Braniff two zero<br>one   |
| (0219)  |         |  |
| 0219:20 | AAL454  | Tower American four fifty four is with<br>you for one niner  |
| 0219:23 | LC      | American four fifty four International<br>tower runway one nine cleared to land<br>wind estimated one zero zero at ah ten<br>knots |
| 0219:28 | AAL454  | Cleared to land on ah one nine American<br>four fifty four   |
| 0219:33 | LC      | Air Midwest sixteen forty three contact<br>departure good evening  |
| 0219:36 | AMW1643 | (Sixteen forty three)* good night  |
| (0220)  |         |  |
| 0220:05 | LC      | Braniff two zero one contact departure<br>good evening   |
| 0220:08 | BNF201  | Two zero one good night sir  |
| 0220:46 | BNF649  | Tower Braniff six forty nine with you  |

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for one nine

- 0220:48 LC Braniff six forty nine International tower number two 0220:51 BNF649 How far are we behind American
- BNF045 HOW Lat are we benind American
- 0220:53 LC Just exactly three miles
- 0220:55 WHO C-C west handoff
- 0220:57 cc c-c
- 0220:57 WHO Is your BRITE working
- 0220:58 cc Yeah
- 0220:58 WHO Alright thanks P-N
- 0220:59 cc (B-G)\*
- (0221)
- 0221:53 ER Descend and maintain three thousand reduce speed to two

| 0221:58 | ЕНО    | East handoff   |
|---------|--------|--|
| (0222)  |        |  |
| 0222:00 | сс     | (This is)* C-C we need a splot a slot<br>behind ah Midway two twenty five for a<br>couple departures   |
| 0222:05 | ЕНО    | D-W  |
| 0222:05 | сс     | B-G  |
| 0222:21 | LC     | Braniff six forty nine runway one nine cleared to land   |
| 0222:23 | BNF649 | (Braniff)* six forty nine cleared to<br>land   |
| 0222:36 | LC     | American four fifty four turn left that<br>next high speed <b>ground point</b> eight off<br>the runway |
| 0222:40 | AAL454 | (Four fifty four)*   |
| (0223)  |        |  |
| 0223:44 | LC     | International are out of service<br>however beginning to hear the wind and                             |

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| APPENDIX B |        |  |
|------------|--------|--|
|            |        | it looks like the front is approaching from the west I have no idea what it is   |
| 0223:59    | MID225 | (Tower)* Midway two twenty five about<br>five out landing clearance  |
| (0224)     |        |  |
| 0224:03    | LC     | Midway two twenty five runway one nine<br>you're cleared to land I say again I<br>have no wind instruments they are out<br>of service it does appear that the wind<br>is ah to be honest from the flags in<br>front of the tower theyre coming<br>straight from the west theyre standing<br>straight out |
| 0224:15    | MID225 | Two twenty five thank you  |
| 0224:16    | LC     | (Alright)* Braniff six forty nine turn<br>left that next high speed intersection<br>ground point eight off the runway  |
| 0224:22    | BNF649 | (Six)* forty nine  |
| 0224:25    | PAT130 | Tower PAT one three zero were about ah<br>five miles out for one nine  |
| 0224:30    | LC     | PAT one three zero International tower<br>continue for runway one nine youre<br>following a Midway D-C nine<br>(unintelligible) a mile final Braniff<br>six forty nine I need you to tell me<br>when you are clear of the runway   |

- 0224:43 LC Braniff six forty nine are you clear of the runway
- 0224:48 LC Braniff six forty nine are you clear of the runway
- 0224:54 BNF215 (Were get) \* Were getting strong winds on the approach end of the runway
- 0224:56 LC Midway two twenty five go around Midway two twenty five go around

(0225)

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- 0225:02 MID225 Two twenty five is gone
- 0225:08 BNF215 (This is)\* Braniff two fifteen at the end of the runway were getting strong winds down here
- 0225:12 EHO Handoff east
- 0225:15 CC This is C-C Braniff Midway two twenty five went around he'll be on about a one seventy heading three thousand coming to ya
- 0225:21 EHO Okay ah put him on a heading to miss the box D-W

| APPENDIX | В |
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- 0225:25 PAT130 (Unintelligible) were gonna have to go Downtown also
- 0225:27 LC Alright Midway one thirty
- 0225:30 EHO Can you turn him
- 0225:31 cc One seventy and three thousand give him to east
- 0225:32 EHO Ah can you turn further left to miss the box to ninety
- 0225:35 MID225 Twenty five one seven zero
- 0225:37 LC One seven zero climb and maintain three thousand for PAT one thirty
- 0225:42 PAT130 Three thousand for PAT one ah three zero
- 0225:46 MID225 Midway two twenty five you have instructions for us
- 0225:48 LC Midway two twenty five yes sir Im sorry I had to send you around but I couldn't see whether the other aircraft was clear of the runway and I couldn't get an acknowledgement climb and maintain

three thousand and you can turn left heading zero

0226:00 EHO Handoff Midway two twenty five will be a zero nine zero heading three thousand coming 0226:01 CC to you 0226:03 EHO D-W 0226:04 CC B-G Midway ah two twenty five contact de departure on one two six point six 0226:13  $\mathbf{LC}$ (Twenty)\* six six Midway two twenty 0226:24 MID225 five good day Good evening 0226:26 LCThe R-V-R for runway one nine touchdown 0226:29  $\mathbf{LC}$ two thousand eight hundred midfield two thousand eight hundred **rollout** one thousand eight hundred 0226:39  $\mathbf{LC}$ PAT one three **zero** maintain three thousand fly heading one seven zero contact approach control on one two six point six good evening

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| Appendix B |        |   |
|------------|--------|---|
| 0226:46    | PAT130 | Twenty six point six  |
| 0226:49    | ЕНО    | (Unintelligible) handoff  |
| 0226:50    | cc     | PAT one thirtys on a one seventy three<br>thousand coming at cha B-G  |
| 0226:53    | EHO    | PAT one thirty okay at three were going to climb Midway to four D-W   |
| 0226:57    | сс     | Nah I think I think PAT wants to go to<br>Downtown too  |
| 0227:00    | EHO    | Alright   |
| 0227:01    | сс     | B-G   |
| 0227:01    | ЕНО    | D-W   |
| 0227:10    | BNF695 | Kansas City Tower Braniff six ninety<br>five just outside of PENZZ inbound <b>for</b><br>I-L-S one nine   |
| 0227:17    | LC     | Braniff six ah ninety five<br>International Tower theres heavy rains<br>at the airport the wind is estimated<br>two seven zero degrees two zero gust to<br>three eight do you still want to<br>continue with the approach |

- 0227:27 BNF695 Thats negative lets go somewhere else and wait
- 0227:28 UNK (Unintelligible)

- 0227:29 LC Standby right there sir and ah
- 0227:33 LC Go ahead override is this ah
- 0227:34 EHO Yeah the winds are from the weather service are from the west we need to go to two seven have C-C call us so we can coordinate (right away) \*
- 0227:39 LC I don't care I Braniff ah six fifty nine
- 0227:46 LC Don't hang up on me Braniff six fifty nine wants to go around three thousand where do you want him
- 0227:51 EHO Braniff six fifty nine just leave him runway heading at three
- 0227:54 LC Alright
- 0227:55 EHO D-W
- 0227:55 LC From there

| APPENDIX B |        |  |
|------------|--------|--|
| 0227:57    | EHO    | Ah wheres he at right at south end of<br>one nine  |
| 0227:58    | LC     | No hes at PENZZ right now hon  |
| 0228:00    | ЕНО    | Oh okay okay yeah ah right now leave<br>him straight at three thousand Ill get<br>back with ya   |
| 0228:05    | LC     | Alright hundred seventy heading hows that  |
| 0228:06    | ЕНО    | Sounds good D-W  |
| 0228:10    | LC     | And the wind reported from the weather<br>bureau again is estimated as two six<br>zero degrees two four knots gust three<br>niner  |
| 0228:16    | BNF695 | Ah Braniff six ninety five we'd like to<br>go ahead and execute a missed approach<br>ah like new, instructions we'll go out<br>and wait til it passes over the field                           |
| 0228:23    | LC     | Six ninety five yes sir turn left<br>heading one seven zero climb and<br>maintain three thousand and maintain<br>three thousand <b>and</b> change back to<br>approach on one two six point six |

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- 0228:30 BNF695 Twenty six point six hundred seventy on the heading maintain three thousand Braniff six ninety five talk to ya later
- 0228:35 LC Bye bye
- 0228:46 EHO North of ya for the I-L-S one nine D-W East standby please Braniff six ninety fives on a one seventy ah East handoff go ahead
- 0228:55 cc This is C-C did you want to try to go two seven the winds
- 0228:58 EHO Yeah
- 0228:59 CC From the weather bureau is two sixty twenty four gust thirty nine
- (0229)

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- 0229: 01 EHO Yeah we want to go to two seven
- 0229:01 cc Two sevens approved
- 0229:02 EHO U-S Air one oh five is being vectored for it Braniff six ninety five you still talking to him

| 0229:05  | CC     | Ah should be over to ya two sevens<br>approved B-G   |
|----------|--------|--|
| 0229:07  | ЕНО    | Okay everybodys going to two seven D-W   |
| 0229:16  | LC     | Braniff two fifteen tower  |
| 0229:18  | BNF215 | Two fifteen  |
| 0229:20  | LC     | You want to take off in this ah weather<br>here or do you want to ah wait for a<br>minute                              |
| 0229:24  | BNF215 | Standby just one second let me get ah  |
| 0229:27  | LC     | (Alright)*   |
| 0229:29  | ГС     | The wind from the weather bureau is two<br>six zero at two four gusts <b>three</b> niner                               |
| 0229:32  | BNF215 | Ah two fifteen thats a negative on this runway here  |
| 0229:35  | LC     | <b>Alright</b> well just hold right there sir<br>we'll see what happens here in about<br>the next two or three minutes |
| 0229: 39 | BNF215 | Two fifteen copy   |

|         |     | APPENDIX B  |
|---------|-----|---|
| (0230)  |     |   |
| (0231)  |     |   |
| 0231:05 | сс  | (Unintelligible) (move over to this thing here)*  |
| 0231:07 | ЕНО | C-C east  |
| 0231:08 | сс  | Go ahead  |
| 0231:09 | ЕНО | U-S Air one oh five wanted alternate<br>missed approach instructions south turn<br>turn him south to ah three if he needs<br>it |
| 0231:14 | сс  | Okay one seventy (and three)*   |
| 0231:15 | ЕНО | And that will be true for all arrivals<br>the next four arrivals (unintelligible)   |
| 0231:17 | сс  | Okay  |
| 0231:18 | EHO | D-W   |
| 0231:19 | LC  | One zero five International tower<br>runway two seven cleared to land   |

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whatever  $\ensuremath{\text{if}}$  youve got anybody to land they better get down

0234:52 EHO Handoff Tell Denny we lost all the lights 0234:53 CC Runway lights EHO 0234:55 All the lights south of the airport 0234:57 CC hello All the lights south of the 0234:58 EHO The runway lights are on 0234:58 BNF215 (0235) Alright the runway lights are on but 0235:01 LCthe Okay ah all we have is the runway lights **taxiway** lights and all that stuffs gone (**alright**)\* bye **bye** 0235:04 CC EHO D-W0235:09 Yeah tell 0235:10 CC

0235:15 EHO East handoff

- 0235:16 cc Did you hear what I said to that other guy
- 0235:18 EHO I think I did
- 0235:19 cc Okay all we have is all we have is runway lights we do not have any
- 0235:22 EHO Approach lights
- 0235:23 CC Ah well we dont know if we have those or not but we dont have any taxiway lights any ah nonmovement are lights
- 0235:28 EHO D-W
- 0235:28 CC B-G
- 0235:36 USA105 Can you give us a vector U-S Air one oh five out of all this
- 0235:39 LC U-S Air one zero five yes sir change back to approach on one two six point six

| APPENDIX B<br>0235:43 | USA105 | Twenty six <b>six</b>  |
|-----------------------|--------|--|
| 0235:54               | LC     | Braniff two fifteen the weather bureau<br>reports the wind as two two zero at one<br>four  |
| (0236)                |        |  |
| 0236:02               | BNF215 | Two fifteen the wind sounds good to us<br>but weve got a ah Continental and weve<br>got one of our seven twos ahead of us                          |
| 0236:07               | LC     | Alright who's number one at the approach end of ah one nine  |
| 0236:10               | BNF563 | Braniff five sixty three and we'll take<br>it  |
| 0236:12               | LC     | Im sorry I thought you were number two<br>Braniff five sixty three fly runway<br>heading runway one nine cleared for<br>takeoff                    |
| 0236:33               | WHO    | (Thats ah) * West handoff  |
| 0236:35               | cc     | This is C-C ah we've got a couple <b>of</b><br>departures comin at ya the (weather<br>reported)* estimated the wind at two<br>two zero at one four |
| 0236:41               | WHO    | Two twenty at fourteen <b>alright</b>  |

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- 0236:43 CC (B-G)\*
- 0236:49 LC Continental one eighty youre next behind the ah Braniff seven twenty seven is that correct
- 0236:59 LC Braniff five sixty three did you copy fly runway heading runway one nine cleared for takeoff sir
- (0237)

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- 0237:03 BNF563 Affirmative
- 0237:04 LC Okay I cant see is the reason 'I ask
- 0237:07 BNF563 Yeah oh okay were on our way
- 0237:09 LC Alright
- 0237:10 BNF563 I'll let you know about the highspeeds here in a second on the lighting
- 0237:12 LC Yeah I don't I don't think theyre ah working I can't see any on the south of the airport
- 0237:17 LC Oop now theyre starting to come back

| APPENDIX B |    |   |
|------------|----|---|
| 0237:25    | ГС | Continental one eighty eight ah tower   |
| 0237:38    | ΓC | Continental one eighty eight tower  |
| 0237:58    | LC | Continental one eighty eight ah tower   |
| (0238)     |    |   |
| 0238:01    | WR | C-C West  |
| 0238:02    | сс | See if Continentals on yours  |
| 0238:03    | CC | C-C   |
| 0238:04    | WR | Hey protect U-S Air one oh five he's<br>lost his hydraulics he's got an<br>emergency whatever you do with your<br>departures just keep em away from him |
| 0238:09    | CC | Okay we'll do that  |
| 0238:10    | WR | P-N   |
| 0238:22    | ГС | Braniff five sixty three runway heading contact departure good evening  |

|         |        | APPENDIX B  |
|---------|--------|---|
| 0238:26 | BNF563 | Okay we're airborne changing over good<br>night   |
| 0238:27 | LC     | Good night now  |
| 0238:29 | LC     | Continental one eighty eight<br>tower   |
| 0238:41 | LC     | And Continental one eighty eight<br>International tower   |
| 0238:45 | BNF215 | Continentals answering you this is<br>Braniff ah two one five we're able to<br>get around him if he doesnt want to go   |
| 0238:49 | LC     | He is answering me  |
| 0238:51 | BNF215 | Affirmative   |
| 0238:52 | LC     | Alright Im not hearing a thing ah<br>Continental one eighty eight Braniff<br>two ah one five ah would you relay back<br>to me Continental one eighty eight fly<br>runway heading runway one nine cleared<br>for takeoff |
| (0239)  |        |   |
| 0239:09 | BNF215 | I think he just went over to ground now<br>ah this is Braniff two'one five again<br>and I ah believe he wants to wait   |

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| Α | PF | PEI | ١D | IX | В |
|---|----|-----|----|----|---|
|   |    |     |    |    |   |

| 0239:13  | LC     | Alright  |
|----------|--------|--|
| 0239:18  | LC     | Braniff just said he thought he went<br>back to you go ahead override                            |
| 0239:20  | ЕНО    | (Need a strip on)* Braniff five sixty<br>three   |
| 0239:22  | LC     | Who  |
| 0239:23  | ЕНО    | Disregard we got it on the west $D - W$  |
| 0239:24  | COA188 | <b>Continental</b> one eighty eight you hear<br>this receiver or transmitter                     |
| 0239:28  | ГС     | I can hear you now Continental one<br>eighty eight da you ready to ah go sir                     |
| 0239:31  | COA188 | We want to wait a little bit we're<br>right in the middle of a thunderstorm<br>the way we see it |
| 0239:37  | LC     | <b>Alright</b> ah can I get aircraft around<br><b>you</b>  |
| 0239: 43 | COA188 | We can move here in a minute if you<br>want us to start our engines now                          |

- 0239:46 LC Braniff two fifteen you ah do you wish to takeoff sir
- 0239:49 BNF215 Yeah say the winds please
- 0239:50 LC The wind is estimated two two zero at one four knots and the flags ah in front of the tower look like they thats the way they are about from the south southwest there and theyre not standing straight out yet
- (0240)
- 0240:02 BNF215 We'll take it Braniff two one five
- 0240:04 LC Alright Braniff two fifteen when you can ah fly runway heading runway one nine cleared for takeoff
- 0240:12 BNF215 Runway heading two fifteen here we go
- 0240:48 N13P Tower this is ah one three pop with you at ah two seven we're going to hold here for a little while kind of see what happens with the (unintelligible) out here
- 0240:54 LC One three papa okay sir just pull over to the ah northwest side there so I can get aircraft around you

| APPENDIX B |      |   |
|------------|------|---|
| 0240:59    | N13P | That'll be fine and ah are you <b>lookin</b><br>at any kind of radar up there see what<br>it looks like eastbound   |
| (0241)     |      |   |
| 0241:03    | LC   | Well eastbound doesnt look bad we've ah<br>lost our weather radar and ah our wind<br>instruments are out also   |
| 0241:11    | N13P | Okay ah we'll see if we can get Flight<br>Service here and ( <b>try</b> to )* talk to<br>them <b>then</b>   |
| 0241:16    | LC   | The ah from what I see on the ah just<br>the regular radar there line that came<br>through here is about ten miles east<br>and ah from that position it goes kinda<br>south southwest about two thirty<br>heading |
| 0241:28    | NI3P | How far south does it go can you tell   |
| 0241:30    | LC   | Goes off my scope here in the tower but<br>Im only watching twenty miles  |
| 0241:34    | N13P | Okay thanks   |
| 0241:34    | LC   | (Roger)*  |

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| <b>APPENDIX</b> | B |
|-----------------|---|
|                 |   |

- 0241:36 LC Braniff two fifteen you're in position fly runway heading runway one nine cleared for takeoff
- 0241:40 BNF215 Braniff two one five rolling
- 0241:50 LC Alright anybody else at the ah approach end of ah one nine that wants to take off
- 0242:00 MCA1049 Heartland ten forty nine will be ready ah we can take Alpha two when we (get to that one)\*
- 0242:04 LC Alright Heartland ten forty nime ah
- 0242:06 cc Five seven
- 0242:08 WR C-C West
- 0242:09 CC C-C

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- 0242:10 WR Braniff five sixty three at eight thousand got severe turbulence fifteen south of the airport
- 0242:14 CC Fifteen south of the aiport severe turbulence B-G

0242:16 WR (At eight)\*

| APPENDIX B |         |   |
|------------|---------|---|
| 0242:25    | MCA1035 | (Unintelligible) Heartland ten thirty<br>five (unintelligible) at two seven   |
| 0242:29    | LC      | Heartland ten thirty five roger taxi up<br>but hold short of runway two seven   |
| 0242:35    | MCA1035 | And ah ten thirty five I think we'll ah<br>remain (in the block)* here (for<br>awhile)*   |
| 0242:39    | LC      | Alright just pull over to the northwest<br>side there and hold and ah Braniff two<br>fifteen a company jet fifteen south<br>leaving eight thousand reported severe<br>turbulence contact departure now good<br>evening                                      |
| 0242:51    | BNF215  | Braniff two <b>one</b> five good day  |
| (0243)     |         |   |
| 0243:23    | UNK 1   | Yower do you have any other reports from the two airplanes that took off  |
| 0243:26    | LC      | No sir ah I <b>havent</b> had any really<br>reports at all except for that one<br>Braniff he got about fifteen south a<br>seven twenty seven leaving eight<br>thousand he reported severe turbulence<br>outside of that I haven't had any<br>reports at all |

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(0244)

- 0244:03 LC Continental one eighty eight do you want to ah well lets disregard it Midway ah one thirty do you want to try it or do you want to take off er ah just hold right there
- 0244:12 MID130 We'd like to hold here for a while
- 0244:14 LC Alright
- 0244:15 LC And Heartland ten forty nine can ah is there any way you can make a one eighty or anything to get out there
- 0244:21 MCA1049 Ah is there anybody behind us
- 0244:23 LC Well I think there is (I think there's)\* a Delta and aye ah American MD eighty
- 0244:28 MCA1049 Okay we'll just we'll just hold up here with the rest of them then for ah ten forty nine
- 0244:32 LC Alright

(0245)

APPENDIX B (0246)

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| 0246:08 | сс  | East handoff C-C          |
|---------|-----|---------------------------|
| 0246:12 | EHO | Five hundred broken       |
| 0246:14 | сс  | Say what                  |
| 0246:14 | EHO | Ah huh go ahead           |
| 0246:15 | сс  | Ah do we                  |
| 0246:15 | EHO | Bob standby               |
| 0246:17 | EHO | Thats four and rain (oh)* |
| 0246:22 | сс  | West handoff              |
| 0246:30 | сс  | (Who)*                    |
| 0246:31 | WR  | C-C West                  |
| 0246:32 | сс  | с - с                     |

| 0246:32 | WR     | Braniff two fifteen says he wouldn't<br>recommend any more departures off one<br>nine for the next few minutes because<br>of ah turbulence   |
|---------|--------|--|
| 0246:37 | сс     | <b>Okay and</b> did we ever tell you that the lights are back  |
| 0246:40 | WR     | Ah I don't know but I'll tell em   |
| 0246:41 | сс     | Okay thanks  |
| 0246:42 | WR     | (P-N) *  |
| (0247)  |        |  |
| 0247:08 | BNF658 | Tower Braniff six fifty eight  |
| 0247:11 | LC     | Calling tower say again  |
| 0247:13 | BNF658 | (Yeah)* Braniff six fifty eight ah<br>sitting at the gate ah did anybody ah<br>departing ah (look wha what's)* going<br>on with the weather  |
| 0247:19 | LC     | Nobody's ah elected to take off right<br>now ah Braniff six fifty eight ah looks<br>like were just on the ah just about in<br>the middle of this thunderstorm here<br>looks like the winds died down a little<br>bit but ah no one's <b>elected</b> to go right<br>now |

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## APPENDIX B

Okay just wondering what was happening we don't ah we can't ah look at the 0247:31 BNF658 radar sittin here at the gate ah so we just wanted to find out 0247:37 LCOkay we just had ah had two two of your company go and ah just about fifteen southeast just got another report theres severe turbulence between right around eight thousand feet and he does not recommend ah people going that way 0247:51 BNF658 Is there another way of going 0247:53 LCNot really gonna have to fly into it or try and fly out of it to the east or southeast and that's where the ah severe turbulence was 0248:00 BNF658 (Well then were not going)\* 0248:01  $\mathbf{LC}$ (Alright) \* (0249)0249:36 EHO East handoff 0249:37 This is C-C again whats happening with U-S Air one oh five  $% \left( {{{\mathbf{U}}_{\mathrm{s}}}^{\mathrm{T}}} \right)$ CC

APPENDIX B

| 0249: 39 | EHO  | He has ah hydraulic problems we <b>havent</b><br>ascertained if hes ah emergency or not<br>at any rate hes diverting into Wichita  |
|----------|------|--|
| 0249:43  | CC   | Oh hes going to Wichita  |
| 0249:44  | EHO  | Thats correct  |
| 0249:45  | C C  | Oh good  |
| 0249:46  | EHO  | D-W  |
| 0249:46  | C C  | Вуе  |
| (0250)   |      |  |
| (0251)   |      |  |
| 0251:49  | N13P | Tower ah one three pap were gonna turn<br>into the wind here if theres nobody<br>real close to us <b>kinda</b> keep us from<br>bumping around too much   |
| 0251:56  | LC   | <b>Alright</b> theres I've got a Heartland out<br>there but I dont believe he's that<br>close Heartland ah (unintelligible)<br>close to that King Air there can he<br>turn around (into the wind)* |

(0252)

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- 0252:04 MCA1035 Ah it'll give us a second and ah we we'll make the turn here
- 0252:11 LC Alright
- 0252:11 UNK (Forward)\*
- 0252:13 MC Ah looks like hes got enough room
- 0252:31 WR C-C West

0252:33 cc (Unintelligible) C-C

- 0252:34 WR Did anybody tell you U-S Air went to Wichita
- 0252:35 cc Yeah
- 0252:35 WR Thank you P-N
- 0252:36 cc Thanks

(0253)

| (0254)  |         |   |
|---------|---------|---|
| 0254:59 | MCA1035 | Tower ten thirty five   |
| (0255)  |         |   |
| 0255:01 | LC      | Yes sir go ahead  |
| 0255:02 | MCA1035 | This King Air in front of me is he going (southeastbound)*  |
| 0255:05 | LC      | Yes hes ah heading towards Columbia<br>same place you are   |
| 0255:11 | MCA1035 | (Oh Okay)*  |
| 0255:37 | BNF351  | Tower this is Braniff three fifty one   |
| 0255:39 | LC      | Three fifty one yes sir go ahead  |
| 0255:41 | BNF351  | Yeah were number three out here in line<br>and were gonna have to go back to the<br>gate ah for gas I don't know if theres<br>anyway you could work that out where we<br>could get around these two guys in<br>front of us or not |

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| APPENDIX B |        |   |
|------------|--------|---|
| 0255:51    | LC     | Okay is there <b>anyway</b> that <b>ah what</b> are<br>you on are you on Alpha <b>taxiway</b>   |
| 0255:57    | BNF351 | Thats affirm  |
| 0255:58    | LC     | Alright ah how are they sittin ahead of<br>you can you go straight up Alpha and<br>make a right turn at the next<br>intersection or beyond that come back<br>down Bravo |
| (0256)     |        |   |
| 0256:07    | BNF351 | (Well)* we're up here about ah were<br>just south of Alpha two now and the two<br>airplanes that are in front of us are<br>right at Alpha two                           |
| 0256:15    | LC     | Okay but you can't get by them going<br>north on Alpha  |
| 0256:20    | BNF351 | Nah no theres they're still northbound<br>on Alpha  |
| 0256:24    | LC     | Oh they are both still northbound on<br>Alpha   |
| 0256:27    | BNF351 | (Thats affirm)*   |
| 0256:36    | LC     | <b>Alright</b> ah Continental one eighty eight ah tower are you on Alpha two  |

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|         |        | APPENDIX B   |
|---------|--------|--|
| 0256:45 | COA188 | Continental one eighty eight<br>affirmative  |
| 0256:47 | LC     | Okay Midway one thirty are you on Alpha<br>two or are you on Alpha sir   |
| (0257)  |        |  |
| 0257:05 | LC     | Midway one thirty tower  |
| 0257:24 | COA188 | Tower Continental one eighty eight ah<br>Midways trying to talk to ya you<br>hearing him at ail  |
| 0257:27 | LC     | No sir Im not ah Continental one eighty<br>eight ah is Midway facing north on<br>Alpha taxiway   |
| 0257:35 | COA188 | I may have misled you were on Alpha<br>facing north we're we're right at the<br>intersection of Alpha two I I'm<br>guessing hes behind us I don't see any<br>other airplanes |
| 0257:42 | LC     | Okay Co-ah-Continental one eighty eight<br>you are still on alpha then facing<br>north   |
| 0257:47 | COA188 | Affirmative  |

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## APPENDIX B

| Appendix B |        |  |
|------------|--------|--|
| 0257:50    | LC     | Alright ah Continental one eighty eight<br>you can go ah pull north past Alpha two<br>and then I'm gonna bring Midway up<br>behind you (and then)* Ill just take<br>you two around the loop after I can get<br>Braniff ah turned ah back south on<br>Bravo |
| (0258)     |        |  |
| 0258:05    | COA188 | <b>Ckay</b> give us a second to start engines  |
| 0258:07    | LC     | Alright and when you get it started ah<br>Continental one eighty eight cross<br>Alpha two and go up to the next<br>intersection that'll be to the right<br>that'll be Bravo two make a right turn<br>and hold right there                                  |
| 0258:18    | COA188 | One eighty eight   |
| 0258:20    | LC     | And Midway one thirty Im not receiving<br>you sir but you can follow that<br>Continental jet ah north on Alpha and<br>then I can get that Braniffaround<br>behind you  |
| (0259)     |        |  |
| 0259: 04   | ЕНО    | C - C  |
| 0259:06    | UNK    | (Thats ah)*  |

| APPENDIX I |
|------------|
|------------|

- 0259:16 LC Braniff ah three fifty one tower
- 0259:18 EHO Local

- 0259:20 LC (What)\*
- 0259"21 EHO See if (unintelligible) you get a chance look over tell us what the winds are showing up there
- 0259: 30 LC The winds
- 0259:31 ER Go ahead overricie
- 0259:32 LC The winds show nine nine one at nine nine gusts to nine nine
- 0259:36 ER Yeah I know that
- 0259:37 LC Okay thats all I got honey
- 0259:40 EHO Call the weather bureau please do you have time looks like you do
- 0259:46 UNK I got one two three
- 0259:47 LC Braniff three fifty one tower

| APPENDIX B |        |   |
|------------|--------|---|
| 0259:50    | BNF351 | Three fifty one go ahead  |
| 0259:51    | LC     | Yes sir soon as Continental and Midway<br>move north of that <b>taxiway</b> to your<br>right thats Bravo four make a right<br>turn on that and come |
| (0300)     |        |   |

END OF TRANSCRIPT

\*This portion of the recording is not entirely clear but this represents the best **interpretations** possibnie under ehe circumstances

**APPENDIX B** 

| Braniff 597      | BNF597  |
|------------------|---------|
| Air Midwest 1559 | AMW1559 |
| Braniff 694      | BNF694  |
| Braniff 201      | BNF201  |
| Braniff 563      | BNF563  |
| Air Midwest 1619 | AMW1619 |
| Air Midwest 1643 | AMW1643 |
| American 454     | AAL454  |
| Braniff 649      | BNF649  |
| Midway 225       | MID225  |
| PAT 130          | PAT130  |
| Braniff 215      | BNF215  |
| Braniff 695      | BNF695  |
| Continental 188  | COA188  |
| King Air N13P    | N13P    |
| Heartland 1049   | MCA1049 |
| Heartland 1035   | MCA1035 |
| Midway 130       | MID130  |
| Braniff 658      | BNF658  |
| Braniff 351      | BNF351  |

I HEREBY CERTIFY that the following is a true transcription of the recorded **conversations** pertaining to the subject aircraft incident.

William T Ko4 WILLIAM T. ROLF Plans and Procedures Specialist

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## APPENDIX B

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<u>INFORMATION</u>: Transcription concerning the September 11, 1989 accident involving **USA105,** Boeing 737, on Dale: September 9, 1989 at 0235 UTC

Air Traffic Manager Kansas City International Tower

This transcription covers the time period from 0216 UTC on September 9, 1989, to 0258 UTC on September 9, 1989.

| <u>Agencies Makinq Transmissions</u>             | <u>Abbreviation</u> |
|--|---------------------|
| Kansas City International Tower<br>East Arrival  | EA                  |
| Kansas City International Tower<br>Local Control | LC                  |
| US Air 105                                       | USA105              |
| Braniff 649                                      | BNF649              |
| Braniff 694                                      | BNF694              |
| Braniff 695                                      | BNF695              |
| Braniff 563                                      | BNF563              |
| Midway 225                                       | MID225              |
| American 454                                     | <b>AAL4</b> 54      |
| Northwest 1187                                   | NWA1187             |
| Air Midwest 1643                                 | AMW1643             |
| PAT 130  | PAT130              |
| D-H-L 408  | DHL408              |
| Commander N477CA                                 | N477CA              |

Unknown

I HEREBY CERTIFY that the following is a true transcription of the recorded conversations pertaining to the subject accident.

William T Koff WILLIAM T. KOLF Plans and Procedures Specialist

(Title)

| APPENDIX B |        |   |
|------------|--------|---|
| 0216:00    | EA     | Descend and maintain three thousand   |
| 0216:05    | BNF649 | Six forty nine down to three  |
| 0216:09    | BNF694 | Departure Braniff six ninety four<br>passing three thousand for six er<br>correction ten      |
| 0216: 14   | EA     | Braniff six ninety four departure radar<br>contact maintain six thousand on your<br>climb out |
| 0216:21    | BNF694 | Okay maintain six Braniff ɛıx ninety<br>four  |
| 0216:32    | EA     | Midway two twenty five fly heading two<br>six zero  |
| 0216:37    | MID225 | Two sixty degree Heading for Midway two twenty five   |
| 0216:47    | AAL454 | Any chance for lower for American four fifty four   |
| 0216:50    | EA     | American four <b>fif</b> ty four descend and maintain five thousand                           |
| 0216:54    | AAL454 | Down to five thousand American four<br>fifty four   |

|         |             | Appendix B  |
|---------|-------------|---|
| 0216:57 | EA          | Braniff six ninety four turn right<br>heading one one zerc climb and maintain<br>one five thousand        |
| (0217)  |             |   |
| 0217:01 | BNF694      | One one zero up to one five thousand<br>six ninety four   |
| 0217:16 | EA          | American four <b>fifty</b> four the airport<br>nine o'clock four miles do you <b>have i</b> t<br>in sight |
| 0217:20 | AAL454      | Got it in sight American four fifty<br>four   |
| 0217:22 | EA          | American four fifty four roger  |
| 0217:24 | EA          | Braniff six forty nine turn right<br>heading of three three zero youre<br>number two for the airport      |
| 0217:30 | BNF649      | Ah six forty nine right turn to three<br>two zero you say   |
| 0217:34 | EA          | Heading three three <b>zero</b> for <b>Braniff</b><br>six forty nine                                      |
| 0217:36 | B N F 6 4 9 | Okay were not going to be <b>able to</b> do<br>that for very long   |
| 0217:38 | EA          | Its only gonna be a couple miles  |

| <b>APPENDIX B</b><br>0217:41 | EA      | American four fifty four descend and maintain four thousand       |
|------------------------------|---------|---|
| 0217:44                      | AAL454  | Down to four thousand American four<br>fifty four                 |
| 0217:46                      | EA      | Midway two twentv <b>five</b> descend and maintain three thousand |
| 0217:49                      | MID225  | Three thousand Midway <b>twc</b> twenty five                      |
| 0217:53                      | EA      | Braniff six ninety four turn back left<br>heading zero nine zerc  |
| 3217:55                      | BNE694  | Zero nine zero Braniff six ninety four                            |
| (0218)                       |         |   |
| 0218:05                      | EA      | American four fifty four turn left<br>heading of two three zero   |
| 0218:08                      | AAL454  | Left two three zero American four fifty<br>four                   |
| 0218: 19                     | EA      | American four fifty four turn left<br>heading of two two zero     |
| 0218:21                      | NWA1187 | Ten thousand we got the information                               |
| 0218:24                      | AAL454  | Blocked   |

|         |         | APPENDIX B  |
|---------|---------|---|
| 0218:25 | EA      | American four fifty four turn left<br>heading two two zero  |
| 0218:27 | AAL454  | Two zero American four fifty four   |
| 0218:29 | EA      | <b>American four fift</b> y four descend and maintain two thousand six hundred  |
| 0218:33 | AAL454  | Twc thousand Six hundred American four<br>fifty four  |
| 0218:35 | EA      | Northwest eleven eighty seven roger<br>plan a visual approach runway one niner  |
| 0218:39 | NWA1187 | Visual to one nine roger  |
| 0218:45 | EA      | <b>Braniff</b> six forty nine turn left<br>heading two seven zero thats your<br>traffic off to your left at your nine<br>o'clock and two miles west bound |
| 0218:51 | BNF649  | Six forty nine left to two seventy we<br>have him   |
| 0218:54 | EA      | Braniff six forty nine cleared visual<br>approach runway one niner follow that<br>aircraft  |
| 0218:57 | BNF649  | Were how far behind him   |

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| APPENDIX B |        |   |
|------------|--------|---|
| 0218:59    | EA     | Well youre three mil <b>es</b>  |
| (0219)     |        |   |
| 0219:02    | EA     | Midway two twenty five turn right<br>heading of three one zero                        |
| 0219:04    | MID225 | Three ten h <b>eading</b> Midway two two five   |
| 0219:09    | EP     | Braniff Six ninety five dercena and maintain four thousand                            |
| 0219:11    | BNF695 | Down to four thousand Braniff six<br>ninety five                                      |
| C219: 13   | EA     | American four fifty four contact<br>International tower one two eight point<br>two    |
| 0219: 16   | AAL454 | (Four fifty)* four good day   |
| 0219:30    | EA     | Braniff six ninety four contact Kansas<br>City Center one one niner point six<br>five |
| 0219:33    | BNF695 | <b>One</b> nine six five good night   |
| 0219:34    | EA     | (good night)*   |

| 0219:42 | EA      | Midway two twenty five turn right<br>heading of three four zero you'll be<br>following a Braniff seven twenty seven<br>he's at your twelve o'clock and four<br>miles southwest bound descending out of<br>three thousand |
|---------|---------|--|
| 0219:49 | MID225  | Three four zero we got the Braniff   |
| 0219:51 | EA      | Midway two twenty five roger cleared<br>visual approach runway one nine to<br>follow Braniff   |
| 0219:55 | KID225  | (cleared)* the <b>approach</b> runway one nine<br>follow Braniff two twenty five   |
| 0219:58 | AMW1643 | Departure Air Midwest sixteen forty<br>threes through twenty four hundred for<br>six thousand  |
| (0220)  |         |  |
| 0220:01 | EA      | Air Midwest sixteen forty three<br>departure radar contact maintain six<br>thousand  |
| 0220:04 | AMW1643 | Six thousand sixteen forty three   |
| 0220:10 | EA      | PAT one thirty fly heading of three<br>four zero   |
| 0220:12 | PAT130  | Three four zero (thats' what were<br>doing)*   |

## APPENDIX B

| APPENDIX B | E A     |  |
|------------|---------|--|
| 0220: 16   | LA      | heading of two five zero descend and<br>maintain seven thousand                  |
| 0220:21    | NWA1187 | Heading two five zero and down to seven thousand Northwest eleven eighty seven   |
| 0220:36    | EA      | Braniff six forty nine contact<br>International Tower one two eight point<br>two |
| 0220:39    | BNF649  | Twenty eight two six forty nine  |
| 0220:50    | PAT130  | PAT one three zeros'got the airfield<br>in sight                                 |
| 0220:52    | EA      | PAT one thirty roger   |
| 0220:59    | EA      | Braniff <b>Six ninety five</b> turn right<br>heading of three zero zero          |
| (0221)     |         |  |
| 0221:03    | BNF695  | Right turn heading three zero zero<br>Braniff six ninety five                    |
| 0221:05    | EA      | PAT one thirty descend and maintain three thousand                               |

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|         |         | Appendix B  |
|---------|---------|---|
| 0221:07 | PAT130  | Cne thirty out of seven for three<br>thousand   |
| 0221:09 | EA      | Air Midwest sixteen forty three climb<br>and maintain one five thousand turn<br>right heading of one five zero  |
| 0221:16 | AMW1643 | Up to one five thousand heading one<br>five zero Air Midwest sixteen forty<br>three   |
| 0221:20 | USA1C5  | Hey Approach US Air one zero five with<br>vou ten thousand romeo  |
| 0221:23 | EA      | US Air one zero five roger plan a<br>visual approach runway one niner   |
| 0221:26 | USA105  | Visual to one nine US Air one on five   |
| 0221:31 | EA      | PAT one thirty there's three aircraft<br>on final you'll be number four you're<br>following the one at your eleven<br>o'clock five miles turning southbound |
| 0221:40 | PAT130  | (Okay)*   |
| 0221:52 | EA      | Braniff six ninety five descend and<br>maintain three thousand <b>reduce</b> speed to<br>two one zero   |
| 0221:56 | BNF695  | Back to two ten down to three thousand feet Braniff six ninety five   |

APPENDIX B

(0222)

| 0222 : 02 | EA     | Midway two twenty five contact<br>International one two eight point two |
|-----------|--------|---|
| 0222:05   | KID225 | Twenty eight two two twenty five good<br><b>da</b> y                    |
| 0222:07   | EA     | Good day  |
| 0222: 17  | EA     | PAT one thirty fly <b>heading</b> of three six<br>zero                  |
| 0222: 19  | PAT130 | Three <b>Slx</b> zero for one thirty                                    |
| 0222:45   | EA     | Braniff six ninety frve turn right<br>heading of three six zero         |
| 0222:48   | BNF695 | Right turn three six zero <b>Braniff</b> six<br>ninety five             |
| 0222:53   | EA     | PAT one thirty turn left heading two<br>seven zerc                      |
| 0222:56   | PAT130 | Two seventy one three zero  |
| 0223 : 00 | EA     | Northwest eleven eighty-seven descend<br>and maintain five thousand     |

| 0223:03 | NWA1187 | Descend to five thousand Northwest<br>eleven eighty seven   |
|---------|---------|---|
| 0223:16 | EA      | PAT one thirty cleared visual approach<br>runway one niner  |
| 0223:19 | PAT130  | One three zero visual to ore niner<br>thank you   |
| 0223:22 | EA      | Braniff six ninety five that's your<br>traffic ten o'clock three miles turning<br>west bound forty five hundred<br>descending           |
| 0223:27 | BNF695  | Braniff six ninety five we believe<br>we've got him out there   |
| 0223:30 | EA      | Braniff six ninety five roger it's a<br>military C twelve you're cleared visual<br>approach runway one niner to follow<br>that aircraft |
| 0223:35 | BNF695  | Six ninety five roger cleared for visual were turning our base now  |
| 0223:38 | EA      | Roger   |
| 0223:52 | ΕΑ      | US Air one zero five fly heading of two<br>six zero descend and maintain seven<br>thousand  |
| 0223:55 | USA105  | Two sixty on the ah heading down to seven thousand US <b>Air</b> one oh five  |

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(0224)

| 0224 :01 | EA      | PAT one thirty contact International<br>lower one two eight point two   |
|----------|---------|---|
| 0224:04  | PAT130  | Twenty eight two  |
| 0224:05  | PAT130  | Twenty eight two thank you for your<br>help ma'am   |
| 0224:22  | EA      | Northwest eleven eighty Sever turn<br>right heading two seven zero  |
| 0224:26  | NWA1187 | Two seven zero Northwest eleven eighty<br>seven roger   |
| (0225)   |         |   |
| 0225:01  | EA      | Air Midwest sixteen forty three contact<br>Kansas City Center one one niner poxnt<br>six five   |
| 0225:06  | AMW1643 | Nineteen sixty five Air Midwest sixteen<br>forty three  |
| 0225:22  | EA      | Braniff six ninety five your about<br>sixty knots faster than that traffic<br>ahead of you I think the Tower slowed<br>him to get some departures out |

|           |         | APPENDIX B   |
|-----------|---------|--|
| 0225:28   | BNF695  | Okay were gonna slow it back to our<br>final approach speed Braniff six ninety<br>five                               |
| 0225:31   | EA      | Roger Northwest eleven eighty seven<br>turn right heading of three three zero<br>descend and maintain three thousand |
| 0225:38   | Unknown | Who's that for   |
| 0225:40   | EA      | Northwest eleven eight seven fly<br>heading of three three zero descend and<br>maintain three thousand               |
| 0225:44   | NWA1187 | Three three zero and down to three<br>thousand roger Northwest eleven <b>e</b> ighty<br>seven                        |
| 0225:48   | USA105  | US Air one zero five we need to ah come<br>about ah five degrees left  |
| 0225:52 , | EA      | US Air one ah five five degrees left<br>approved   |
| 0225:54   | USA105  | (Thank you)*   |
| (0226)    |         |  |
| 0226 : 02 | EA      | Braniff six ninety five contact<br>International Tower one two eight point<br>two                                    |

| APPENDIX B |        |   |
|------------|--------|---|
| 0226:06    | BNF695 | Twenty erght point two <b>Braniff sıx</b><br>ninety five good evening                           |
| 0226:08    | EA     | Good day  |
| 0226:20    | USA105 | US air one oh five we need another five<br>degrees left   |
| 0226:22    | EA     | US Air one oh five another five left<br>approved  |
| 0226:25    | USA105 | (Thank you)*  |
| 0226:29    | LC     | (RVR)* for runway one nine touchdown<br>two thousand eight hundred and midfield<br>two thousand |
| 0226:34    | MID225 | Twenty five for three thousand ah<br>turning east   |
| 0226:37    | EA     | Midway two twenty <b>five departure</b> radar<br>contact climb and maintain four<br>thousand    |
| 0226:41    | MID225 | (Unintelligible) to four thousand<br>Midway two twenty five                                     |
| 0226:44    | LC     | Six point six good evening  |
| 0226:47    | PAT130 | Twenty six point six roger good <b>day</b>  |

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- 0226:48 LC Roger (unintelligible) override 0226:50 EΑ Where's PAT going Where's PAT going a hundred seventy 0226:51 LC heading three thousand 0226:53 EA What what's going on nobody's going to land No I (unintelligible) can't even **see** the edge of the tower heavy rain 0226:55 LC Okaý 0227:00 EΑ 0227:03 ΕA Northwest eleven eighty seven turn right heading ah three six zero plan the ILS approach runway one niner I'm sorry you'll have to say again for 0227:11 NWA1187 eleven eighty seven 0227:14 EA Northwest eleven eighty seven fly
- heading of three six zero maintain three thousand vectors ILS runway one niner

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0227:22 NWA1187 All right heading three-six zero and maintain three thousand for the ILS to one niner that weathers nearing the field now isn't it

| APPENDIX B |         |   |
|------------|---------|---|
| 0227:28    | EA      | Affirmative I think it's fight over the airport (unintelligible) had two missed approaches in the last three minutes  |
| 0227:35    | NWA1187 | Roger   |
| 0227:38    | PAT130  | Kansas City one three zero we're on a<br>missed from ah International here there<br>that wall of water just ah covered the<br>airport down there we it's ah not<br>visible any more |
| 0227:46    | EA      | PAT one thirty roger how about the ILS<br>one nine at Downtown get you in real<br>quick before that er ah weather gets<br>here  |
| 0227:51    | PAT130  | Yes ma'am thats what we'd love  |
| 0227:52    | EA      | PAT ah one thirty descend and maintain<br>two thousand six hundred fly heading of<br>zero niner zero vectors ILS runway one<br>nine downtown  |
| 0227:58    | PAT130  | (Unintelligible) down to ah two two<br>thousand six hundred   |
| (0228)     |         |   |
| 0228 : 03  | EA      | Northwest eleven eighty seven turn left<br>heading two seven zero   |

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| 0228:05  | NWA1187 | Northwest eleven eighty seven  |
|----------|---------|--|
| 0228:07  | EA      | Northwest eleven eighty seven turn left<br>heading two seven zero                      |
| 0228: 11 | NWA1187 | Left to two seven zero Northwest eleven<br>eighty seven                                |
| 0228:16  | USA105  | Approach US Air one zero five  |
| 0228:17  | EA      | US Air one oh <b>fi∨e</b> approach   |
| C228: 19 | USA105  | Yeah how does it look for us   |
| 0228:20  | EA      | US Air one oh f ive how about runway twc<br>seven for you                              |
| 0228:22  | USA105  | That's what we were going to suggest   |
| C228:24  | EA      | US Air one oh five descend and maintain<br>three thousand fly heading two four<br>zero |
| 0228:26  | USA105  | Two four zero down to three thousand US<br>Air one oh five                             |
| 0228:30  | EA      | Midway two twenty five turn right<br>heading one one zero                              |

| APPENDIX B<br>0228:32 | MID225  | One one zero two twenty flve What do<br>you suggest  |
|-----------------------|---------|--|
| 0228 ; 38             | EA      | US Air one oh five reduce speed tc one niner zero  |
| 0228:41               | USA105  | One nine zero on the speed   |
| 0228:43               | NWA1187 | Northwest eleven eighty seven needs to<br>get back we need a heading one eight<br>zero                       |
| 0228:47               | EA      | Northwest eleven eighty seven roger<br>understand you need to get back turn<br>left heading of one four zero |
| 0228:52               | NWA1187 | One four zero Northwest eleven <b>eight</b> y<br>seven   |
| 0228:55               | EA      | PAT one thirty this will be a turn on<br>one mile from KENZY turn right heading<br>of one one zero           |
| 0228:59               | PAT130  | To one one zero  |
| (0229)                |         |  |
| 0229:01               | BNF695  | Approach Braniff six ninety fives back<br>with you a go around heading one seven<br>zero three thousand feet |

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| 0229:05 | EA     | Braniff six ninety five turn left<br>heading zero niner zero maintain three<br>thousand                              |
|---------|--------|--|
| 0229:09 | BNF695 | Zero nine zero <b>maintain</b> three thousand<br>six ninety <b>five</b>  |
| 0229:11 | EA     | PAT one thirty turn right heading one eight zero   |
| 0229:13 | PAT130 | Right to one eight zero one thirty   |
| 0229:15 | EA     | US Air one oh five turn right heading<br>of two six zero   |
| 0229:17 | USA105 | Two <b>six</b> zero US Air one zero five   |
| 0229:22 | EA     | Midway two twenty five descend and<br>maintain three thousand turn left<br>heading three zero zero                   |
| 0229:26 | MID225 | Three thousand left three zero zero<br>whan can we expect  |
| 0229:28 | EA     | <b>PAT</b> one thirty turn right heading of<br>two zero zero   |
| 0229:30 | PAT130 | Two zero zero for one thirty   |
| 0229:32 | EA     | <b>Everbody</b> expect runway two seven<br>International wind ah two six zero at<br>two <b>four</b> gusts three nine |

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| APPENDIX B      |        |   |
|-----------------|--------|---|
| 0229:41         | EA     | US Air one zero five you're five miles<br>from ah MIZZO maintain three thousand<br>until established on the backcourse<br>cleared <b>localizer</b> backcourse runway two<br>seven |
| 0229:49         | USA105 | Localizer backcourse US Air ah one zero<br>five   |
| 0229:51         | EA     | Midway two twenty five turn left<br>headIng two niner zero  |
| 0229:53         | MID225 | Two ninety heading Midway two twenty five   |
| 0229:54         | EA     | PAT one thirty the airport twelve<br>o'clock five miles   |
| (0230)          |        |   |
| 0230:01         | PAT130 | One thirty (thirty's lookin)*   |
| 0230 <b>:03</b> | EA     | US Air one oh five turn left heading<br>two four zero to intercept the<br>backcourse  |
| 0230 : 07       | USA105 | Two four zero   |
| 0230 : 09       | EA     | PAT one thirty do you have the airport<br>in sight  |

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|-----------|---------|--|
| 0230:11   | PAT130  | No ma'am that we do not  |
| 0230:13   | EA      | PAT one thirty roger you're over KENZY<br>and can you shoot the ILS from there or<br>do you need another turn on from the<br>northeast |
| 0230: 18  | PAT130  | Oh we've got it now  |
| 0230:20   | EA      | PAT one thirty cleared visual approach<br>runway one niner contact Downtown tower<br>one three three point three                       |
| 0230:23   | PAT130  | Three point three good day   |
| 0230:25   | EA      | Midway two twenty five turn left<br>heading of two seven zero  |
| 0230:28   | MID225  | Turning two seven zero Midway two<br>twenty five   |
| 0230:31   | EA      | Northwest eleven eighty seven turn left<br>heading of one one zero   |
| 0230 : 35 | NWA1187 | One one zero Northwest eleven eighty<br>seven  |
| 0230 : 43 | EA      | Braniff six ninety <b>five turn</b> right<br>heading of one five zero  |

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| <b>APPENDIX B</b> 0230: 49 | BNF695 | One five zero Braniff six ninety five   |
|----------------------------|--------|---|
| 0230:52                    | USA105 | Approach US Air one zero <b>five</b> we need alternate ah missed ah instructions                          |
| 0230:55                    | EA     | US Air one zero five roger ah whatever<br>you need southeast southeast or<br>northeast at three thousand  |
| (0231)                     |        |   |
| 0231:03                    | USA105 | Okay south ah three thousand  |
| 0231:05                    | EA     | Roger and tell the tower I gave that to<br>you and contact International tower one<br>two eight point two |
| 0231:08                    | USA105 | Eight two good day  |
| 0231:10                    | EA     | Braniff six ninety five turn right<br>heading of two zero zero  |
| 0231:12                    | BNF695 | Two zero zero Braniff six ninety five   |
| 0231:15                    | EA     | Midway two twenty five reduce speed<br>to one seven zero  |
| 0231:17                    | MID225 | A hundred and seventy knots Midway two twenty five  |

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|----------|---------|---|
| 0231:20  | EA      | Braniff six ninety five turn right<br>heading two three zero  |
| 0231:22  | BNF695  | Two three zero for Braniff six ninety<br>five   |
| 0231:24  | EA      | Midway two twenty five turn<br>left heading two four. zero  |
| 0231:27  | MID225  | Two forty heading Midway two twenty<br>five   |
| 0231:31  | EA      | Northwest eleven eighty seven turn left<br>heading of one zero zero   |
| 0231:34  | NWA1187 | One zero zero Northwest eleven eighty<br>seven  |
| 0231:38  | EA      | Braniff six ninety five turn right<br>heading two four zero   |
| 0231:41  | BNF695  | Two four zero Braniff six ninety five   |
| 0231:43  | EA      | All aircraft on this frequency the<br>visibility at International Airport is<br>one half mile if you copy ident with ah<br>rain |
| 0231: 55 | MID225  | Two twenty five we can't shoot an approach with a half mile   |
| 0231:57  | EA      | Who was that <b>talkin</b>  |

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|------------|---------|---|
| 0231:59    | MID225  | Midway two two five   |
| 0232: 00   | EA      | Midway two twenty five climb and<br>maintain four thousand turn left<br>heading one two zero  |
| 0232:03    | MID225  | One two zero four thousand Midway two<br>twenty five  |
| 0232:11    | EA      | Northwest eleven eighty seven can you<br>shoot it   |
| 0232:22    | EA      | Braniff six ninety five your two miles<br>from MIZZO maintain three thousand til<br>established on the backcourse cleared<br>localizer backcourse runway two seven<br>and they are carrying a half mile at<br>the airport now |
| 0232:32    | BNF695  | Cleared for the approach ah Braniff six<br>ninety five  |
| 0232:35    | EA      | Northwest eleven eighty seven can you shoot the backcourse  |
| 0232:39    | NWA1187 | I'll tell you we need at least a mile<br>ah we're probably 'gonna need ta go<br>somewhere and hold out here in the<br>clear   |
| 0232:45    | EA      | Northwest eleven eighty seven climb and maintain five thousand  |

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| 0232:49 | NWA1187 | Maintain five thousand Northwest eleven eighty seven  |
|---------|---------|---|
| 0232:51 | EA      | Midway two twenty five climb and maintain four thousand   |
| 0232:54 | MID225  | Four thousand we'd like to wait it out<br>for a little bit at least   |
| 0232:57 | EA      | Midway two twenty five roger and ah climb and maintain four thousand  |
| (0233)  |         |   |
| 0233:01 | MID225  | Four thousand two twenty <b>five</b> one<br>twenty heading  |
| 0233:04 | BNF695  | Braniff six ninety five were gonna have<br>ta have a mile also we'd like a left<br>turn back out somewhere                  |
| 0233:08 | EA      | Braniff six ninety five turn left<br>heading one one zero climb and maintain<br>four thousand                               |
| 0233:13 | BNF695  | To one one zero up to four thousand<br>Braniff six ninety five thank you  |
| 0233:22 | EA      | Midway two twenty five proceed direct<br>Napolean hold north maintain <b>ah four</b><br>thousand you want a higher altitude |

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| APPENDIX B<br>0233:29 | MID225  | Ah no for now this is good Napolean  |
|-----------------------|---------|--|
|                       |         | hold north Midway two twenty five  |
| 0233:33               | EA      | (Roger)*   |
| 0233:35               | EA      | Northwest eleven eight seven proceed<br>direct Napolean maintain ah five<br>thousand hold north of Napolean one<br>minute legs |
| 0233:44               | NWA1187 | Okay north of Napolean at five thousand<br>one minute legs Northwest eleven eighty<br>seven                                    |
| 0233: 49              | EA      | Braniff Six ninety five climb and<br>maintain six thousand   |
| 0233:54               | BNF695  | Six thousand Braniff ah six ninety five  |
| (0234)                |         |  |
| 0234 : 22             | EA      | Northwest eleven eighty seven turn<br>right heading of one six zero I'll have<br>the frequency for you in just a second        |
| 0234 : 27             | NWA1187 | One six zero Northwest eleven eighty<br>seven  |
| 0234 : 29             | EA      | Northwest ah eleven eighty seven<br>Napolean frequency one one four point<br>zero  |

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| 0234 <b>:</b> 34 | NWA1187 | Well thank you  |
|------------------|---------|---|
| 0234:36          | EA      | Midway two twenty five Napolean<br>frequency one one four point zero  |
| 0234 : 40        | MID225  | We've found it  |
| (0235)           |         |   |
| 0235:27          | MID225  | Apwrcach Midway two twenty five you<br>want us to hold north (and the)* right<br>hand turn  |
| 0235:36          | EA      | Midway two twenty five hold north of<br>Napolean ah right turns maintain four<br>thousand   |
| 0235:40          | MID225  | Right turns four thousand Midway two<br>twenty five   |
| 0235 : 42        | EA      | Braniff six ninety five proceed direct<br>Napolean frequency one one four point<br>zero hold north of Napolean right turns<br>maintain six thousand there will be<br>other traffic there at four and five<br>thousand |
| 0235 : 52        | BNF695  | Okay hold north right turns ah at<br>Napolean <b>Braniff</b> six ninety five  |

| APPENDIX B |         |   |
|------------|---------|---|
| 0235: 57   | USA105  | (Approach)* US Air one zero five were<br>at three thousand on a missed ah we<br>need vectors out of this weather please           |
|            |         | need vectors out of this weather preuse   |
| (0236)     |         |   |
|            |         |   |
| 0236:02    | EA      | US Air one oh five turn left heading<br>one one zero climb and maintain four<br>thousand that's the earliest I can get<br>you out |
|            |         |   |
| 0236:07    | USA105  | To one one zero and up to four thousand<br>US Air one zero five   |
| 0236:26    | Ē٨      | US Air one zero five climb and maintain   |
| 0230.20    |         | seven thousand  |
| 0236:28    | USA105  | To seven thousand   |
|            |         |   |
| 0236:31    | USA105  | We want to stay at three thousand US<br>Air one zero five   |
|            |         |   |
| 0236 : 34  | EA      | US Air one oh five maintain three<br>thousand   |
|            |         |   |
| 0236 : 36  | USA105  | Окау  |
| 0236 : 39  | NWA1187 | Approach eleven eighty seven  |
| 0236 • 43  | FΔ      | Northwest eleven eighty seven approach  |
| 0200.40    |         | tertimest eleven eighty seven approach  |

- 0236:45 NWA1187 Yes ma'am ah hows the weather look ah west of the airport ah we get an estimate on how long its gonna take before we can ah make an approach or something
- 0236:52 EA Well it goes completely off my scope which is over Topeka VOR which is about forty miles west
- 0236:59 NWA1187 Do you have an idea of the rate of ah movement
- (0237)
- 0237:02 EA US Air one oh five climb and maintain four thousand for now I'll have a lower altitude for you shortly I got traffic coming off of Downtown Airport be climbing to three thousand
- 0237:09 USA105 Okay we want to stay at three we lost hydraulics A and B ah we've got an emergency situation
- 0237:13 EA US Air one oh five turn left heading three six zero
- 0237:16 USA105 Left to three six zero US Air one zero five
- 0237:30 DHL408 (Hello)\* departure DHL four zero eight's with you out of two thousand seven hundred for three thousand

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|------------|--------|---|
| 0237:35    | EA     | DHL four <b>zero</b> eight departure radar<br>contact turn right heading zero niner<br>zero   |
| 0237:40    | DHL408 | Right turn zero <b>hine</b> zero DHL four <b>zer</b> o<br>eight   |
| 0237:48    | EA     | DHL four zero eight turn right heading<br>one five zero   |
| 0237:50    | DHL408 | One <b>fıve</b> zero DHL four zero eight  |
| (0238)     |        |   |
| 0238:06    | EA     | DHL four zero eight climb and maintain<br>one five thousand   |
| 0238:09    | DHL408 | Out of three for one five thousand four zero eight  |
| 0238:12    | EA     | DHL four zero eight turn right heading<br>of one five zero  |
| 0238:15    | DHL408 | We're in a right turn to one five zero<br>four zero <b>eight</b>  |
| 0238:18    | EA     | US Air one zero <b>five I</b> can turn you<br>back out to the east now ah turn back<br>right <b>heading</b> of zero <b>eight</b> zero |
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0238:23 USA105 Zero eight zero okay that sounds good And ah wha what do you need right now 0238:25 ΕA do do you know yet 0238:28 USA105 No we dont know we just want to get out of this so we can evaluate the situation 0238:32 ΕA US Air one oh five roger turn back right heading of zero niner zero maintain three thousand 0238:36 USA105 Zero niner zero and three thousand Midway two twenty five entering holding 0238:38 MID225 at ah thirty eight 0238:41 ΕA Midway two twenty five roger and there will be other traffic there holding with you at five thousand 0238:45 HID225 Yeah we see em no problem Northwest eleven eighty seven **entering** the **hold** ten mile legs okay 0238:51 NWAII87 Affirmative ten mile legs will be fine 0238:54 ΕA NWAII87 Thanks 0238:56

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|------------|---------|---|
| 0239:57    | 3NF695  | How about ten mile legs for Braniff ah<br>six ninety five                 |
| 0238:59    | EA      | Braniff six ninety five ten mile legs<br>for you is will be fine also     |
| (0239)     |         |   |
| 0239:02    | BNF695  | Okay thank you  |
| 0239:04    | BNF563  | Braniff five sixty three one nine zero<br>heading two point three for six |
| 0239:08    | EA      | Braniff five sixty three departure<br>radar contact                       |
| 0239:12    | MID225  | Twenty five ten mile  |
| 0239: 15   | EA      | Braniff five sixty three contact<br>approach on one two four point seven  |
| 0239: 18   | BNF563  | Twenty four seven   |
| 0239:21    | tlID225 | Ten mile legs for <b>Midway</b> two twenty<br>five                        |
| 0239:23    | EA      | Midway two twenty five affirmative ten mile legs for you too              |

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| 0239:26 | USA105 | And approach can you <b>ah get</b> current.<br>weather at Wichi <b>ta</b> for us   |
|---------|--------|--|
| 0239:30 | EA     | Affirmative I'll get current weather at<br>Wichita   |
| 0239:32 | USA105 | (Thank you)*   |
| 0239:33 | EA     | DHL four zero eight altitude amendment<br>maintain niner thousand on your<br>climbout please   |
| 0239:36 | DHL408 | We'll stop it at niner thousand four<br>zero eight   |
| 0239:45 | EA     | DHL four zero eight turn right h <b>ead</b> ing<br>of cne six <b>zer</b> o   |
| 0239:49 | DHL408 | Okay ah a right turn to one six zero<br>four zero eight  |
| (0240)  |        |  |
| 0240:12 | EA     | Wichita weather six thousand correction<br>Wichita weather six hundred scattered<br>estimated five thousand broken<br>visibility eight the wind one niner<br>zero at seven |
| 0240:34 | MID225 | Approach two twenty five I just caught<br>the last part of that was that the<br>weather at Kansas City   |

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| APPENDIX B |        |   |
|------------|--------|---|
| 0240:38    | EA     | That was Wichita's weather  |
| 0240:40    | MID225 | Roger   |
| 0240: 42   | USA105 | Okay say again Wichita weather  |
| 0240:45    | EA     | Wichita weather six hundred scattered<br>estimated five thousand broken<br>visibility eight the wind one niner<br>zero at seven |
| 0240:56    | USA105 | US Air ah one zero five we'd like tc 90<br>to Wichita please  |
| 0241:00    | EA     | US Air one oh five turn right heading<br>two one zero maintain three thousand<br>for now  |
| 0241:04    | USA105 | Two one zero and ah three thousand  |
| 0241:06    | EA     | US Air one oh five there's traffic<br>twelve o'clock five miles northbound at<br>four thousand                                  |
| 0241:10    | USA105 | Okay we got ah traffic in sight   |
| 0241:12    | EA     | Roger there's traffic about five miles behind <b>um</b> at five thousand  |

- 0241:17 BNF695 Braniff \$1x ninety five's Napolean there had Napolean at four zero past the hour six thousand feet entering the hold
- 0241:22 EA Braniff six ninety five roger
- 0241:26 EA US Air one oh five turn right heading of two two zero
- 0241:28 USA105 Two two zero US Air one zero five
- 0241:40 EA Midway two twenty five time now zero two four one expect further clearance at zero three one five
- 0241:46 MID225 Okay we'll expect further clearance three one five Midway two twenty five
- 0241:50 EA Northwest eleven eighty seven time now zero two four one expect further clearance at zero three two five
- 0241:59 EA Zero three five two five further clearance ah Northwest eleven eighty seven

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0242:04 EA Braniff six ninety five time now zero two four two expect further clearance at zero three three five

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|------------|--------|--|
| 0242:09    | BNF695 | Zero three three five Braniff six<br>ninety five   |
| 0242:11    | EA     | US Air one zero five climb and maintain<br>one five thousand and what's the<br>altitude request down to Wichita  |
| 0242:18    | USA105 | One five oh ah well let's say ah maybe<br>ah ten thousand  |
| 0242:23    | EA     | Okay US Air one zero five maintain ore<br>zero thousand climb and maintain one<br>zerc thousand  |
| 0242:27    | USA105 | We'll climb and maintain ten thousand<br>for now we've got to evaluate a few<br>things here  |
| 0242:30    | EA     | US Air one zero five roger   |
| (0243)     |        |  |
| 0243:06    | EA     | DHL four zero eight maintain niner<br>thousand the center will have higher<br><b>al titude</b> for you you can contact Kansas<br>City Center one one niner point six<br>five |
| 0243:13    | DHL408 | Kansas City on one nineteen sixty five<br>maintaining niner thousa'nd DHL four<br>zero eight good night  |
| 0243:17    | EA     | Good night   |

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| 0243:29  | EA     | US Air one zero five turn back left<br>heading one niner zero keep you well<br>clear of that weather   |
|----------|--------|--|
| 0243:33  | USA105 | One nine zero US Air one zero five   |
| (0244)   |        |  |
| (0245)   |        |  |
| 0245: 04 | BNF695 | And approach Braniff six ninety five<br>could we bother you for Des Moines<br>weather please   |
| 0245:08  | EA     | Braniff six ninety five Des Moines<br>weather stand by and I'll get it for<br>you  |
| 0245:11  | BNF695 | Oh thank you   |
| 0245:13  | N477CA | Four seven seven Charlie alpha is with<br>you seven thousand <b>looking</b> for lower  |
| 0245:17  | EA     | Commander four seven seven Charlie<br>alpha roger fly heading of three zero<br>zero descend and maintain four thousand<br>vectors <b>ILS</b> three circle to runway one<br>at downtown |
| 0245:28  | N477CA | Yes ma'am but I'm unable to ILS three<br>with this aircraft  |

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# APPENDIX B

| APPENDIX B<br>0245:31 | EA     | Okay what do you need  |
|-----------------------|--------|--|
| 0245:33               | N477CA | Ah VOR twenty one ILS <b>one</b> nine or maybe<br>a visual looks like we might get a<br>visual from here   |
| 0245:37               | EA     | (Unintelligible) Okay they there down<br>to three miles in thunderstorms and<br>rain and fog ah proceed direct<br>Riverside and we'll check it out when<br>you get closer in   |
| 0245:44               | N477CA | Thats fine and still at seven thousand   |
| 0245:47               | EA     | Ah no ah Commander four seven seven<br>charlie alpha descend and maintain four<br>thousand   |
| 0245: 50              | N477CA | Four thousand thank you  |
| 0246:00               | EA     | US Air one zero five turn back right<br>heading two one zero   |
| 0246:03               | USA105 | Two one zero US Air one zero five  |
| 0246: 10              | EA     | Commander four seven seven charlie<br>alpha downtown weather sky partially<br>obscured estimated ceiling two thousand<br>overcast visibility three thunderstorms<br>rain fog temperature seven three the<br>wind two niner zero at one five gust<br>two five altimeter two niner eight one |

0246:26 N477CA Okay I'll I'll try to make a contact into ah twenty one 1'11 let you know when I got it

0246:29 EA Roger

- 0246:36 EA Braniff six ninety five Des Moines weather measured ceiling five hundred broken visibility one five ah disregard that Braniff ah ah Des Moines weather measured ceiling five hundred broken one thousand five hundred overcast visibility four rain and fog the winc three six zero at seven altimeter two niner eight one
- 0246:54 BNF695 Okay I got it thank you very much

0246:56 EA Roger

- (0247)
- 0247:10 Unknown Approach what are **the** ah conditions at ah the airport now'
- 0247:14 EA The International Airport indefinite ceiling five hundred sky obscured visibility one half thunderstorms heavy rain showers the wind two five zero at two two gust three eight
- 0247:27 Unknown Okay thank YOU

APPENDIX B

| APPENDIX R |        |  |
|------------|--------|--|
| 0247:29    | BNF695 | And approach Braniff ah <b>six</b> ninety five<br>we're gonna have to go to Tulsa                |
| 0247:32    | EA     | Braniff six ninety five fly heading of<br>two two zero maintain six thousand                     |
| 0247:38    | BNF695 | Two two zero maintain six thousand<br>Braniff six ninety five thank you                          |
| 0247:44    | EA     | Braniff six ninety five what altrtude<br>are you requesting <b>down</b> to Tulsa                 |
| 0247:47    | BNF695 | How about <b>nineteen</b> thousand for <b>Braniff</b> six ninety <b>five</b>                     |
| 0247:49    | EA     | Eraniff six ninety five <b>roger climb</b> and maintain one five thousand                        |
| 0247:53    | BNF695 | Up to one five thousand Braniff six<br>ninety five   |
| 0247:58    | USA105 | Approach ah we need to get Wichita here<br>as soon as we can get ah through this<br>hole up here |
| (0248)     |        |  |
| 0248:03    | EA     | Is that US Air one oh five   |
| 0248:05    | USA105 | Thats correct  |

- 0248:06 EA US Air one oh five roger ah I can clear you direct right now if that this that heading would probably put you in a little bit of weather just west of Inaustrial
- C248:13 USA105 Thats affirmative we're showing a hole up here about ah oh thirty miles ah we'll have to take a right turn through there in about thirty miles
- 0248:21 EA US Air one oh five deviate as necessary when able proceed direct Wichita
- 0248:25 USA105 Wichita when able US Air one oh five
- 0248:40 EA Braniff six ninety five youre cleared to Tulsa fly heading of two two zero for radar vectors maintain one five thousand
- 0248:47 BNF695 Okay heading two two zero for Braniff six ninety five and up to one five thousand correct
- 0248:51 EA Affirmative

- 0248:52 USA105 Approach US Air one zero five
- 0248:54 EA US Air one oh five approach

| APPENDIX B<br>0248:55 | USA105  | Okay we need seven thousand that's<br>about all this thing will do right now                    |
|-----------------------|---------|---|
| 0248:58               | EA      | US Air one oh five roger maintain seven<br>thousand   |
| 0249:00               | USA105  | Seven thousand US Air one zero five   |
| 0249: 04              | NWA1187 | And Northwest eleven eighty seven we'd<br>like to get clearance to Wichita go<br>there and land |
| 0249:09               | EA      | Northwest eleven eighty seven fly<br>heading two three zero for now maintain<br>five thousand   |
| 0249: 14              | NWA1187 | Two three zero <b>maintain</b> five thousand<br>Northwest eleven eighty seven                   |
| 0249: 19              | MID225  | (This is)* Midway two twenty five could<br>I bother you for Tulsa weather                       |
| 0249:22               | EA      | Midway two twenty five standby and I'll<br>get it for ya  |
| 0249 : 34             | MID225  | (Sorry)* two twenty five make that<br>Topeka weather  |
| 0249 : 36             | EA      | Roger stand by and I'll get it for <b>ya</b>  |
| 0249:58               | EA      | Braniff six ninety five contact Kansas<br>City Center one two five point five                   |

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(0250)

- 0250:02 ENF695 Twenty five fifty five for Braniff six ninety five we'll see ya later
- 0250:05 EA Roger
- 0250:22 EA Northwest eleven eightv seven climb and maintain one one thousand
- 0250:25 NWA1187 Climb to one one thousand Northwest eleven eighty seven (thank you)\*
- 0250:40 USA105 Approach US Air one zero five
- 0250:42 E A US Air one zero five approach
- 0250:44 USA105 Yeah we ah are not! romeo equipped tonight ah what's our approximate distance from here to ah Wichita
- 0250:51 EA Stand by and I'll find out for you
- 0250:52 USA105 Thank you
- 0250:55 Unknown About one sixty

| Appendix B |         |  |
|------------|---------|--|
| 0250 : 58  | Unknown | About a hundred and sixty  |
| (0251)     |         |  |
| 0251: 02   | EA      | Center departure east side   |
| 0251:18    | EA      | Northwest eleven eighty seven Tulsa<br>weather two five thousand <b>scattered</b><br>visibility one five the wind one seven<br>zero at one five altimeter two niner<br>seven six |
| 0251:27    | NWA1187 | Okay <b>thanks for</b> the information ah<br>Wichita is where were going to be ah<br>requesting the clearance to please  |
| 0251:32    | ΕA      | Wichita weather stand by and I'll get<br>that for ya   |
| 0251:34    | NWA1187 | Yes <b>ma'am</b>   |
| 0251:39    | EA      | Northwest eleven eighty seven what<br>altitude are you requesting to Wichita   |
| 0251:42    | NWA1187 | Ah we were just looking at it ah oh<br>eighteen ah one nine oh two one oh  |
| 0251:48    | EA      | Roger  |
| 0251: 49   | EA      | Ah US Air one oh five approximately a<br>hundred and fifty nautical miles  |

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0251:52 USA105 One fifteen or one five zero

0251:54 EA One five zero

- 0251:55 USA105 (Thank you)\*
- 0251:59 EA Northwest eleven eighty seven Wichita weather six hundred scattered estimated five thousand broken visibility eight wind one niner zero at seven
- (0252)

- 0252:09 NWA1187 Ah thank you ma'am eleven eighty seven ah (okay)\* one nine oh will be fine
- 0252:14 EA Roger
- 0252:23EAAnd Midway two twenty er five for you<br/>Topeka weather indefinite ceiling eight<br/>hundred sky obscured visibility five<br/>eighths heavy thunderstorms wind three<br/>two zero at eight altimeter two niner<br/>seven eight
- 0252:35 MID225 Thank you two twenty five

| APPENDIX B<br>0252:40 | EA      | Commander four seven seven <b>charlie</b><br>alpha descend and <b>maintain</b> three<br>thousand          |
|-----------------------|---------|---|
| 0252:43               | N477CA  | Out of four for three seven Charlie<br>alpha  |
| 0252:51               | EA      | US Air one zero five contact Kansas<br>City Center one two five point five<br>five                        |
| 0252:55               | USA105  | (Point)* five five twenty <b>five</b> fifty<br>five was it  |
| 0252:57               | EA      | <b>Yes</b> sir one two five point five five   |
| 0252:59               | USA105  | Twenty five fifty five so long  |
| (0253)                |         |   |
| 0253:01               | EA      | So long   |
| 0253:12               | EA      | Northwest eleven eighty seven climb and<br>maintain one five thousand                                     |
| 0253:28               | EA      | Northwest eleven <b>eighty</b> seven<br>correction on the altitude maintain one f<br>four <b>thousand</b> |
| 0253:33               | NWA1187 | Okay I'm ah we're another radio there<br>could you say that again please for<br>eleven eighty seven       |

| 0253:38 | EA      | Northwest eleven eighty seven climb and maintain one four thousand                                  |
|---------|---------|---|
| 0253:42 | NWA1187 | One four thousand thank you we're out of one one  |
| 0253:44 | EA      | Northwest eleven eighty seven fly<br>heading of two zero zero                                       |
| 0253:47 | NWA1187 | Two hundred degrees   |
| 0253:50 | EA      | Northwest eleven eighty seven contact<br>Kansas City Center one two five <b>point</b><br>five five  |
| 0253:54 | NWA1187 | Two five five five thanks for your help   |
| 0253:56 | EA      | (Roger)*  |
| (0254)  |         |   |
| 0254:01 | EA      | Braniff <b>six</b> ninety <b>five</b> contact Kansas<br>City Center one two five point five<br>five |
| 0254:14 | EA      | Midway two twenty five that weather's about twelve miles west of ya now moving east                 |

APPENDIX B

| APPENDIX B |         |  |
|------------|---------|--|
| 0254:32    | Unknown | Visibility picking up any on the field<br>y <b>et</b>  |
| 0254:35    | EA      | Ah negative visibility's still one half<br>mile thunderstorms heavy rain showers   |
| 0254:40    | Unknown | Okay ah it <b>oughta</b> be passing though<br>here shortly then I guess  |
| 0254:44    | EA      | Well it might be passing through but<br>its an awful big one it goes completely<br>off my scope to the west and that's<br>about forty miles West |
| 0254:50    | Unknown | Okay   |
| (0255)     |         |  |
| 0255:05    | BNF658  | Departure <b>Braniff</b> six fifty <b>e</b> ight   |
| 0255:07    | EA      | Braniff six fifty eight departure  |
| 0255:09    | BNF658  | We're on the ground at Kansas City and<br>when you have time we have a question<br>(for you)*  |
| 0255:12    | EA      | Braniff six fifty eight go ahead with<br>the question  |
| 0255:14    | BNF658  | Ah we're <b>unable to</b> use our radar the<br>way we're pointed on the ground ah<br>we're trying to get down to St. <b>Louis</b>                |

## APPENDIX B

ah how long does it look like according to your radar this ah line of weather's going to be ah keep the field closed

- 0255:24 EA I think it goes about ah sixty miles. west of the airport **ah** and then its going to break up a little bit ah it is moving east ah **fairly** rapidly
- 0255:34 BNF658 Okay any idea on time ah how long it might take
- 0255:40 EA Maybe about forty five more minutes
- 0255:42 BNF658 (We sure appreciate it)\*
- (0256)

\*

- 0256:03 N477CA Seven chat-lie alpha will take a contact into Downtown
- 0256:05 EA Commander four seven seven Charlie alpha cleared contact approach to Downtown airport you're six southeast contact the tower one three three point three
- 0256:10 N477CA To the tower thanks for your help we just broke out here
- 0256: 12 EA Okay

# APPENDIX B

(0257)

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(0258)

# END OF TRANSCRIPT

\*This portion of the recording is not entirely clear but this represents the **best interpretations possible** under the circumstances.

APPENDIX B INFORMATION: Transcription concerning the September 11. 1989 accident involving USA105, Boeing 737, on Date: September 9, 1989 at 0235 UTC Air Traffic Manager

Kansas City International Tower

This transcription covers the time period from 0226 UTC on September 9, 1989, to 0241 UTC on September 9, 1989.

| Agencies Making Transmissions                    | Abbreviation |
|--|--------------|
| Kansas City International Tower<br>Local Control | LC           |
| Kansas City International Tower<br>East Arrival  | EA           |
| Kansas City International Tower<br>East Handoff  | ЕНО          |
| US Air 105                                       | USA105       |
| Midway 225                                       | MID225       |
| PAT 130  | PAT1 30      |
| Braniff 695                                      | BNF695       |
| Braniff 215                                      | BNF215       |
| Braniff 563                                      | BNF563       |
| Continental 188                                  | COA188       |
| King Air N13P                                    | N13P         |
|  |              |

I HEREBY CERTIFY that the following is a true transcription of the recorded conversations pertaining to the subject aircraft accident.

WILLIAM T. KOLF

Plans and Procedures Specialist

| APPENDIX B |        |   |
|------------|--------|---|
| 0226:00    | MID225 | Thousand left turn left zero nine zero  |
| 0226:03    | LC     | Roger   |
| 0226: 13   | LC     | Midway ah two twenty five contact de<br>departure on one two six point six  |
| 0226:24    | MID225 | Twenty six six Midway two twenty five<br>good day   |
| 0226:26    | LC     | Good evening  |
| 0225:29    | LC     | The FVR for runway 19 touchuown two<br>thousand eight hundred midfield two<br>thousand eight hundred rollout one<br>thousand eight hunared    |
| 0226:39    | LC     | PAT one three zero maintain three<br>thousand fly heading one seven zero<br>contact approach control on one two six<br>point six good evening |
| 0226 : 46  | PAT130 | Twenty six point six roger good <b>da</b> y   |
| 0226:48    | LC     | Roger   |
| 0226:49    | LC     | Go ahead override   |
| 0226:50    | EA     | Wheres PAT going  |
| 0226:51    | LC     | Where's PAT going a hundred seventy<br>heading three thousand   |
| 0226:53    | EA     | What what's going on nobodys <b>going</b> to<br>land  |

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|         |        | APPENDIX B   |
|---------|--------|--|
| 0226:54 | BNF695 | Tower Braniffsix ninety five(just<br>outside of)* PENZZ ILS one nine   |
| 0226:55 | LC     | No I I can't even fee the edge of the tower heavy rain   |
| (0227)  |        |  |
| 0227:10 | BNF695 | Kansas City Tower Braniff six ninety<br>five Just outside of PENZZ inbound for<br>ILS one nine   |
| 0227:17 | LC     | Braniff Six ah ninety five<br>International Tower there's heavy rains<br>at the airport the wind is estimated<br>two Seven zero decrees two zero gust to<br>three eight do you still want to<br>continue with the approach |
| 0227:27 | BNF695 | Thats negative lets go somewhere else and wait tillit moves over   |
| 0227:29 | LC     | Alright standby right there sir and ah   |
| 0227:33 | LC     | Go ahead override is this ah   |
| 0227:34 | EHO    | Yeah the winds are from the west to the<br>northwest we need to go to two seven<br>have CC call us so we can coordinate  |
| 0227:39 | LC     | l don't care l Braniff ah six fifty<br>nine  |
| 0227:46 | LC     | Don't hang up on me Braniff six fifty<br>nine wants to go around three thousand<br>where do you want him   |
| 0227:51 | EHO    | Braniff six fifty nine just leave him<br>runway heading at three   |

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| APPENDIX B |        |   |
|------------|--------|---|
| 0227:54    | LC     | Alrıght   |
| 0227:55    | EHO    | DW  |
| 0227:55    | LC     | From there  |
| 0227:57    | ЕНО    | Ah where's he at right at south end of<br>one nin <b>e</b>  |
| 0227:58    | LC     | No he's at PENZZ right now hon  |
| 0228:00    | ЕНО    | Oh okay okay yeah ah right now leave<br>him straight at three thousand I'll get<br>back with ya   |
| 0228305    | LC     | Alright hundred seventy heading hows that   |
| 0228:06    | EHO    | Sounds good DW  |
| 0218:10    | LC     | And the wind reported from the weather<br>bureau again is estimated as two six<br>zero degrees two four knots gust three<br>niner   |
| 0228:16    | BNF695 | Ah Braniff six ninety <b>five</b> we'd like to<br>go ahead and execute a missed approach<br>ah <b>like</b> new instructions we'll go out<br>and wait til it passes over the field                     |
| 0228:23    | LC     | Six ninety five <b>yes</b> sir turn left<br>heading one seven zero climb and<br>maintain three thousand and maintain<br>three thousand and change back to<br>approach on one two <b>six</b> point six |
| 0228:30    | BNF695 | Twenty six point six hundred seventy on<br>the heading maintain three thousand<br>Braniff six nInety five talk to <b>ya</b><br>later  |

| APP | END | IX | В |
|-----|-----|----|---|
|-----|-----|----|---|

- 0228:35 LC Bye bye
- (0229)

- 0229:04 LC Braniff two fifteen you Just want to sit there for a minute and see whats going on with this weather
- 0229: 16 LC Braniff two f if teen tower
- 0229: 18 BNF215 Two fifteen
- 0229:20 LC You want to take off in this ah weather here or do you want to an wait for a minute
- 0229:24 ENF215 Standby just one second let me get ah
- 0229:27 LC (Alright)\*
- 0229:29 LC The wind from the weather bureau is two six zero at two four gusts three nimer
- 0229:32 BNF215 Ah two fifteen thats a negative on this runway here
- 0229:35 LC Alright we'll just hold rrght there sir we'll see what happens here in about the next two or three minutes
- 0229:39 BNF215 Fifteen copy
- (0230)
- (0231)

| APPENDIX B |        |   |
|------------|--------|---|
| 0231:13    | USA105 | Tower Us Air one zero five with you<br>three thousand ah for the back course<br>two seven   |
| 0231:18    | LC     | Us Air one zero five International<br>Tower runway two seven cleared to land<br>the wind is estimated ah two six zero<br>at two four gusts three niner but does<br>appear that ah the wind is ah dying<br>down a little bit |
| 0231:30    | USA105 | Okay and our alternate missed<br>instructions are ah three thousand<br>south heading  |
| 0231 : 33  | LC     | Yes sir one seven zero and three<br>thousand  |
| 0231:35    | USA105 | Okay one seventy  |
| (0232)     |        |   |
| 0231:36    | LC     | US Air ah one ze-o five let me know<br>when you see the ah runway sir l'm<br>gonna turn the lights up for you   |
| 0232:41    | USA105 | (Okay)*   |
| 0232:45    | LC     | They're up full bright in case you need<br>them down or anything  |
| 0232:47    | USA105 | (Okay)*   |
| (0233)     |        |   |

(0234)

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| 0234 : 23 | LC     | US Air one zero five I can't tell for<br>sure but it appears we have lost the<br>lighting on the south side of the<br>airport   |
|-----------|--------|---|
| 0234: 29  | USA105 | (Okay)*   |
| 0234:30   | LC     | Looks like the ah tell the best I can<br>see the runway lights are on but ah<br>appears no taxiway lights no terminal<br>lights |
| 0234:38   | USA105 | (Okay )*  |
| 0234:52   | LC     | And Air Mid Braniff two fifteen at the approach end of one nine ah did the taxiway lights just go out                           |
| 0234:57   | ENF215 | Affirmative fer two fifteen the just taxiway the runway lights are or   |
| (0235)    |        |   |
| 0235:01   | LC     | Alright the runway lights are on but<br>the all the other lights are Off I<br>think   |
| 0235:04   | BNF215 | Affirm  |
| 0235:05   | LC     | (Alright)*  |
| 0235:36   | USA105 | Can you give us a vector US Air one oh<br>five out of all this  |
| 0235:39   | LC     | Yes sir one <b>zero</b> five <b>yes</b> sir <b>change</b><br>back to approach on one two six point<br>six                       |
| 0235: 43  | USA105 | Twenty six six  |

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APPENDIX B

| APPENDIX B |        |  |
|------------|--------|--|
| 0235:54    | LC     | Eraniff two flfteen the weather bureau<br>reports the wind as two two zero at one<br>four  |
| (0236)     |        |  |
| 0230:02    | BNF215 | Two fifteen the wind sounds good to us<br>but we've got a ah Continental and<br>we've got one of our seven two's<br>ahead of us  |
| 0236 : 07  | LC     | Alright whose number one at the approach end of ah one mine  |
| 0236:10    | BNF563 | Braniff five sixty three we'll take it   |
| 0236: 12   | LC     | I'm sorry I thought you were number two<br>Braniff five sixty three fly runway<br>heading runway one nine cleared for<br>takeoff |
| 0236:49    | LC     | Continental one eighty eight you'r-e<br>next behind the an Braniff seven twenty<br>seven is that correct                         |
| 0236 : 59  | LC     | <b>Braniff</b> flve sixty three did you copy<br>fly runway heading runway one nine<br>cleared for takeoff sir                    |
| (0237)     |        |  |
| 0237:03    | BNF563 | Affirmative  |
| 0237 : 04  | LC     | Okay I can't <b>see</b> is the reason I ask  |
| 0237:07    | BNF563 | Ah okay we're on our way   |
| 0237:09    | LC     | Alright  |

- I'll let you know about the hi.ghspeeds here in a second on the lighting 0237:10 BNF563 0237:12 LC Yeah I don't I don't think they're ah working I can't see any on the south of the airport 0237: 17 LC Oop now they're starting to come back 0237:25 LC Continental one eighty eight ah tower 0237:38 Continental one eightv eight tower LC 0237:58 LC Continental one eighty eight ah tower (0238) 0238:22 LC Braniff five sixty three runway heading contact departure good evening Okay we're airborne changing over 0238:26 **BNF563** good night
- 0238:27 LC Good night now

- 0238:29 LC Continental one eighty eight tower
- 0238:41 LC And Continental one eighty eight International Tower
- 0238:45 BNF215 Continental's answering you this is Braniff ah two one five we're able to get around him if he doesn't want to go

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0238:49 LC He is answering me
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## APPENDIX B

| APPENDIX B<br>0238:51 | BNF215 | Affirmative   |
|-----------------------|--------|---|
| 0238:52               | LC     | Alright I'm not hearing a thing ah<br>Continental one eighty eight Braniff<br>two ah one five ah would you relay back<br>to me Continental one eighty <b>eight</b> fly<br>runway heading runway one nine cleared<br>for takeoff |
| (0239)                |        |   |
| 0239:09               | BNF215 | I think he just want over to ground now<br>ah this is Braniff two one five again<br>and I ah believe he wants to wait   |
| 0239: 13              | LC     | Alright   |
| 0239: 18              | LC     | Braniff Just said he thought he w <sub>ent</sub><br>backt o y <b>ou go</b> ahead override   |
| 0239:20               | EHC    | (Ship)* Braniff five sixty three  |
| 0239:22               | LC     | Who   |
| 0239:23               | EHO    | Disregard we've got him on the west DW  |
| 0239:24               | CGA188 | Continental one eighty eight you hear<br><b>this</b> receiver or <b>transmitter</b>   |
| 0239:28               | LC     | l can hear you now Continental one<br>eighty <b>eight</b> da you ready to ah go sir   |
| 0239:31               | COA188 | We want to wait a little but we're<br>right in the middle of a thunderstorm<br>the way we see it  |
| 0239:37               | LC     | Alright ah can I get aircraft around<br>you   |



| 0239:43         | COA188 | APPENDIX B<br>We can move here in a minute if you<br>want us to start our engines now   |
|-----------------|--------|---|
| 0239:46         | LC     | Braniff two fifteen you ah do you wish<br>to takeoff sir  |
| 0239:49         | BNF215 | Ya <b>sa</b> y the winds please   |
| 0239:50         | LC     | The wind is estimated two two zero at<br>one four knots and the flags ah in<br>front of the tower look like they<br>thats the way they are about from the<br>south southwest there and their not<br>standing straight cut yet |
| (0240)          |        |   |
| 0240: <b>02</b> | BNF215 | We'll take it Braniff twc one five  |
| 0240:04         | ΓĊ     | Alright Braniff two fifteen when you<br>can ah fly runway heading runway one<br>nine cleared for takeoff  |
| 0240: 12        | ENF215 | Runway heading two fifteen here we go   |
| 0240:48         | N13P   | Tower this is ah one three pop with<br>you at ah two seven we're going to<br>hold here for a little while kind of<br>see what happens with the<br>(unintelligible) here   |
| 0240:54         | LC     | One three papa okay sir just pull over<br>to the ah northwest side there so I<br>can aet aircraft around you  |

# APPENDIX B

# (0241)

# END OF TRANSCRIPT

-....

\* This portion of the recording is not entirely clear but this represents the best interpretations possible under the circumstances

### APPENDIX C

#### PERSONNEIINFORMATION

## USAir Fliaht 105

Captain George J. Neely

Captain George J. Neely, age 40, was employed by Allegheny Airlines, a corporate predecessor of USAir, on August 28, 1978. He held airline transport pilot certificate No. 1724034 with Boeing 737, airline multi-engine land and instrument helicopter type ratings and commercial privileges in airplane single-engine land and rotorcraft-helicopter aircraft. He also held flight engineer's certificate No. 168402365, with turbo jet ratings. His first class medical certificate, dated March 16, 1989, contained no waivers or limitations.

At the time of the incident, the captain had accrued about 14,300 flight hours, of which about 2,000 were in the Boeing 737, all of which were as pilot-in-command. In the previous 90 days, 30 days, and 24 hours, the captain had flown 110,62.35, and 0 hours, respectively.

#### First Officer Michael J. Dean

First Officer Michael J. Dean, age 38, was hired by USAir on June 30, 1986. He held airline transport pilot certificate No. 301483346 with Cessna CE-500 and airplane multi-engine land type ratings, and commercial privileges in airplane single-engine land type aircraft. His first class medical certificate, dated June 27, 1989, contained no waivers or limitations.

At the time of the incident, the first officer had accrued about 7,500 total flight hours, of which about 2,300 were in the Boeing 737, all as second-in-command. In the previous 90 days, 30 days, and 24 hours, the first officer had flown 140, 84.13, and 0 hours, respectively.

# <u>MCI Air Traffic Control Personnel</u>

Gloria J. Kirby, East Arrival Radar

Ms. Kirby, age 39, was employed by the FAA on June 22, 1973. She had previously been an air traffic controller with the US Army at Ft. Leavenworth, Kansas for 4 years. She entered duty at MCI on June 27, 1973, and became facility rated on March 24, 1976. At the time of the incident, she was a full-performance-level controller. She was medically certified to perform the duties of air traffic controller with the restriction that she wear corrective lenses for distant vision while performing those duties. While at the MCI facility, she had held the positions of Evaluation and Proficiency Development Specialist for 1 year and Area Supervisor for 5 years. Frank D. Guy, Area Supervisor, West Arrival Radar

Mr. Guy age.52 was employed by the FAA on February 24, 1960 and was facility rated at MCI on November 15, 1982. He had previously been an air traffic controller with the US Navy. After his employment with the FAA, he vas assigned to the Des Mbines, Iowa, air traffic control tower; Sioux City, Iowa. air traffic control tower; Chicago O'Hare International Airport air traffic control facility; and the Waterloo, Iowa, air traffic control facility. At the time of the incident, he was a full-performance-level controller and area supervisor. He was medically certified to perform the duties of air traffic controller with the restriction that he wear corrective lenses for near vision while performing those duties.

#### Thomas A. Keller, Local Controller

Mr. Keller, age 46, was employed by the FAA on January 30, 1967. He was facility-rated at MCI on October 19, 1972. He had previously been an air traffic controller with the US Marine Corps for 4 years. After joining the FAA, he was assigned to the Indianapolis air traffic control tower; Detroit Wfllow Run air traffic control tower; and the Kansas City (downtown) air traffic control tower. At the time of the incident, he was a fullperformance-level controller and an Evaluation and Proficiency Development Specialist. He was medically certified to perform the duties of air traffic controller with the restriction that he wear corrective lenses for near vision while performing those duties.

Robert M Smothers, Cab Coordinator/Controller-in-Charge

Mr. Snothers, age 31, was hired by the FAA on April 29, 1983. He was facility rated at MCI on August 22, 1989. He had previously been assigned to the Omnha, Nebraska, air traffic control tower and to the Omnha TRACON. At the time of the incident, he was a full-performance-level controller. He was medically certified to perform the duties of air traffic controller with the cestriction that he wear corrective lenses for near vision while performing those duties.

## Sheryl L. Johnson, Flight Data/Clearance Delivery

Ms. Johnson, age 31, was hired by the FAA on September 7, 1982. She was facility rated at MCI on May 31, 1989. She had previously been assigned to the Des Mbines, Iowa, air traffic control tower; the Columbia, Missouri, air traffic control tower; and the Kansas City (downtown) air traffic control tower. She was medically certified to perform the duties of air traffic controller with the restriction that she wear corrective lenses for near vision while performing those duties.

## Harold Simpson, FAA Inspector

Mr. Simpson had accrued over 8,000 hours in command of transportcategory turbine aircraft at the time of the incident. He held an airline transport pilot certificate with type ratings in the following airplanes: DC-8, Boeing 727, Boeing 757, and Boeing 767. Mr. Simpson was asked by the Safety Board to provide information regarding his FAA medical certification. He declined the Safety Board's request and did not provide this information.

## APPENDIX D

## AIRPLANE INFORMATION

The airplane, registration No. N283AU, was a Boeing 737-200A, mnnufactured on December 19, 1983, and delivered to USAir on December 22, 1983. It has been operated by USAir continuously since that date. At the time of the incident, the airframe had accrued 17,045 total hours, and 13,991 cycles. It had received its last "C" mnintenance check on June 8, 1989.

The airplane was equipped with two Pratt & Whitney JT8D-15 engines. At the time of the incident, the left engine, Serial No. 709085, had accrued a 17,493 total hours, and 3,031 hours since its last inspection. At the time of the incident, the right engine, Serial No. 709023, had accrued 17,975 total hours and 1,547 hours since its last inspection.
# APPENDIX E

# BAROGRAPH DATA





## STATEMENT OF FAA INSPECTOR AND EN ROUTE INSPECTION FORM 12 September 1989

## STATEMENT REGARDING USAIR, INC. PLIGHT 105 OF 8 SEPTEMBER 1989 AT KANSAS CITY INTERNATIONAL AIRPORT, HISSOURI.

I am Harold F. Simpson, a Federal Aviation Administration Aviation Safety Inspector, Operations, assigned to the Pittsburgh Flight Standards District Office 19. My present job function is B-767 Aircrew Program Hanager for the USAir, Inc. certificate. I am an Airline Transport Pilot with ratings in DC-9, B-727, B-757, B-767 aircraft. To date, I have logged in excess of 8000 hours as pilot in command of transport category turbine aircraft.

As a part of my job function, on the evening of 8 September, 1989 I was traveling to the TWA Simulator Facility located adjacent to Kansas City International Airport, Kansas City, Misscuri to perform airman certification (additional type rating) for a USAir, Inc. B-767 Captain candidate. In compliance with Federal Aviation Administration policy and directives, I was performing and Enroute Inspection on USAir Flight 105, (US105) of 8 September, 1989 between Greater Pittsburgh International Airport, (PIT) and Kansas City International Airport, (MCI).

| US105/08 was a B-737-200, PW-JT-  | 8-17 engines, N289AU.   |
|-----------------------------------|-------------------------|
| Pilot In Command (Captain)        | George Neely ATP1724034 |
| Second In Command (First Officer) | Michael Dean #301483346 |
| Senior Flight Attendant (A)       | Lori A. Kulin-Hinder    |
| Flight Attendant (B)              | Rebecca Kjos            |
| Flight Attendant (C)              | Carol Ellis             |
| Flight Attendant (D)              | Karen <b>McNamara</b>   |

Additional personnel on board US105/08 were the following USAIR, Inc. (USAir) employees. Brad Lee Dusenbery, \$505723278, B-737-200 P/O PIT Howard Albert Collins, Jr. \$1810225 B-737-300 F/O PIT Kenneth Smith, Customer Service Supervisor, HCI

There were 58 passengers including the USAir personnel.

US105/08 was scheduled to depart PIT at 2015 EDT (0015 GMT) and arrive at MCI et 2128 CDT (0228 GMT). The flight was pushed off the gate at PIT at 0023 GMT and was airborne at 0038 GMT. Prior to departure, USAir maintenance replaced the standby vertical gyro and removed the Minimum Equipment List Placard (MEL). An amended dispatch release was transmitted to the aircraft via ACARS. Tao MEL Placards remained in the Aircraft Log Book, MEL 34-20 First Officer's radio altimeter inoperative and MEL 34-00 Aircraft not CAT II (Category II).

Prior to departure, I performed a cabin inspection,

introduction and interview with the cabin crew and no discrepancies wera noted.

Preflight, engine start, taxi, takeoff, climb and cruise far the first hour of the flight was normal. Over Indiana, numerous areas of thunderstorm activity were observed on the aircraft radar. The crew requested and was cleared to avoid all radar returns. During the last 250NM the thunderstorm activity became more numerous and more intense. Prior ta, and along the MCI arrival route, the crew requested and was granted rerouting to avoid the buildups.

Prior to Kansas City Center (MCIARTC) handoff to MCI Approach Control (MCIAPP) the crew received the Automatic Terminal Information Service (ATIS) information Romeo. To the best of my memory, information Romeo was: MCI two thousand five hundred scattered, seven thousand broken, ten miles, wind 180 at eleven altimeter 29.74, landing runway 19 (RW19).

Upon initial contact with HCIAPP, the flight was cleared to descend to seven thousand, expect visual approach to RW19. I believe the aircraft was on a heading of approximately 240 degrees at this time. Shortly thereafter US105 was given instructions to turn right to 260 degrees. The crew accepted the turn to 260 and accomplished the Preliminary Landing checklist and tuned the VHF Navigation radios for the RW18 Instrument Landing System (ILS) approach.

At **this time** the radar was displaying a **very** large area of intense **thunderstorm** activity on the right (North) side of the scope beginning at the 12 o'clock position (50NM range) back toward the aircraft to a point approximately 2NM off the right **wing**. This radar return had a very **sharp** gradient, transitioning **from** no return to solid magenta in less than 1/4" on the scope.

The Captain told the F/O "I need about 5 (degrees) left." Tho F/O requested 5 left from HCIAPP and MCIAPP granted the request. Almost immediately the Captain told the F/O "I need another 5". The F/O requested and MCIAPP advised "Ok for another 5". I then became aware that aircraft inbound to RW19 were being given ILS approaches. Shortly afterward, HCIAPP broadcast "Aircraft are missing (executing missed approaches) on RW19." US105 F/O then asked HCIAPP "US105 what about us?". HCIAPP then advised "How about RW27?" US105 answered "That's what we had in mind". MCIAPP then issued the following. "US105 turn left 240, descend to 3000, cross Missu (?) (Intersection) at 3000, cleared for localizer back approach to RW27, contact Tower at Missu." US105 acknowledged "US105".

During the last 30NM inbound to the airport the aircraft had been in Visual Flight Conditions (VMC) with ground lights continuously visible.

The Captain closed the throttles, disengaged the autopilot, extended the speed brakes and started a descent. At some point just prior to this or just after, MCIAPP advised "US105 slow to 190 (KIAS)". The Captain commanded "Gear" and the F/O extended the landing gear. I am uncertain as to the exact distance we were from the field, but estimate that we were between 12 and 15NM. The Captain commanded "1 (degree) flap" and the F/O complied. At some paint the Captain dialed the ILS frequency for RW27 in his VHF Nav receiver and set the final approach course. The Captain appeared to be making a max performance descent.

The Captain commanded "15 flaps" end the F/O complied. The Captain then lowered the speed brakes, commanded "Identify my radio (ILS)". The F/O replied "I got it", and began to read the procedure to the Captain.

As we approached 3000' the localizer was almost pegged to the left of the Captain's HSI. The Captain made a small (10-20 degree) left turn and commanded "Checklist" and the F/O read the before landing checklist stopping at "Flaps". The F/O then called MCI Tower and reported "US105 just inside Missu". MCI Tower replied "US105 cleared to land RW27, wind 243 at 24 gust to 39 estimated."

About this time we entered heavy rain that increased in intensity thruout the approach. The Captain commanded "CO Fleps" and the F/O extended the flaps to 40 degrees and challenged "Flaps" and the Captain replied "40 flaps",

At this **time** I observed the Captains altimeter to be reading 2500' and that he was **correcting** a slight overshoot **cf** the **localizer** (of approximately 1/2 dot) and was tracking the localized **descending** at **between** 800 and 1500' **per** minute.. We had entered light turbulence **with** the rain and the turbulence **was** increasing, approaching **a moderate** level. The Captain's Minimum Descent Altitude (MDA) salmon bug on his altimeter was **set** at 400' equating to **the** approach MDA of 1400'.

The Captain leveled the aircraft at 1400' and upproximately 5 seconds later, the F/O responded "Runway in sight". The Captain came off instruments and stated "I've got it" and started a slow (300-400FPM) descent along with a slight right turn. Thru out the entire approach, I was able to see ground lights out both side windows and portions of both windscreens. Due to the position of the jump seat on the B-737 and the heavy rain, and tht fact that the windshield wipers do not cover the

center portion of the windscreen, I could not see anything directly in front of the aircraft. During this entire flight, I at no time, ever had visual contact with the MCI Airport or the runway environment.

**From** the time the Captain went "heads up", both pilots were outside the cockpit apparently making a visual descent .

Some 20-30 seconds after the Captain left the MDA altitude, there was a loud bang which I perceived to be on the left side of the aircraft. At exactly the same instant of the impact the F/O commanded loudly "Go around". At a point in time just prior to the impact or coincident with the impact, I observed the Captain's altimeter to read 1200'. From my position, I could only see the right half of the Captain's instruments and the left, half of the F/O's instruments. I do not remember looking at any of the F/O's instruments during this approach, rather I was monitoring the Captain's instruments because from my position they gave me more information and it is difficult to transition back and forth between the two instrument panels. The Captain's Distance Measuring Equipment (DME) was not visible from my position, SC I was never aware of our exact distance from the the runway.

I was aware that the Captain had flown a fairly stable approach **as** far as airspeed was concerned, holding the indicated **airspeed** to bug +5 to **bug** +10. I believe the bug speed was 134K.

Almost imsediately after the impact and the **F/O's** go around command the Captain commanded "Go around", slammed the throttles to the *firewall*, activated the go around switches and called "*Flaps* 15". The F/O retracted the flaps and reached over to pull the throttles back to Go Around **Power**. While he was doing this the Captain commanded "*Gear up*" and reached over the F/O's hand on the throttles and retracted the gear. The gear warning horn began to sound because the **flaps** had not had tioe to retract out of the landing range.

The horn stopped when the flaps reached the **15** degree position. The Captain called "What was that?" and the **F/O** responded "I didn  $\bullet$  t see anything".

About this time, HCI Tower transmitted **"Kansas** City has **just** lost **our** lights". The Captain was executing a **max performance** climb and at this time commanded the F/O, "Get me a **vector out of** this shit". The F/O then transmitted "Tower this **USAir** give us a vector out of the weather". The **tower responded** with "Contact Approach frequency ----". The F/O threw the corn switch over to the previous frequency and transmitted "Approach US105 give us a vector out of this weather". Approach responded "Turn left 170, climb to \$000". The F/O responded "170 3000"

Prior to the approach the crew had requested and received an alternate missed approach procedure of "Turn left to 170, climb and maintain 3000, advise Tower." Because of the maximum performance climb, we had reached 3000' by the time the left turn was initiated. As we leveled, the Captain commanded "Flaps up".

Immediately after the impact, *I observed* the "B" Wyd Sys Qty Low Caution light illuminate on the F/O's forward instrument panel. About 5-10 seconds later, the right "B" Hyd Sys Lou Press Caution light on the overhead panel illuminated. Approximately one minute later, the left "B" Hyd Sys Low Fress Caution light on the overhead panel began to flash intermittently.

We were in light to moderate turbulence, and the aircraft was wallowing thru the air as the Captain accelerated to about 220KIAS. There was a great deal of noise coming from the nose gear ares and the level and type of noise changed with any airspeed change. Additionally, it felt as if we were dragging something.

The 170 heading had not gotten us out of the weather and at the Captain's command, the F/O requested an Easterly heading which was issued by HCIAPP along with a climb to 4000'. The Captain started the turn and told the F/O that he wanted to stay at 3000'. The F/U then advised MCIAPP, "US105 we have an emergency here, we've lost our hydraulics and want to stay at 3000'. HCIAPP replied "US105 maintain 3000', do you want another approach to MCI? The F/O requested the MCI weather and MCIAPP replied that the field was under a severe thunderstorm.

The Captain then commanded the P/O "Get us a vector to Wichita (ICT)" which the F/O did. HCIAPP replied "US105, turn right to 210, cleared direct to ICT when able, climb and maintain one five thousand". The Captain told the F/O " I want ten thousand\*'. The F/O requested 10 thousand and HCIAPP replied "Maintain ten thousand US105".

The Captain then commanded Hydraulic Failure checklist. The P/O accomplished the "B" System Hydraulic Failure checklist and the **crew** began to evaluate what they had **lost**. The **major** item **being** the yaw damper.

During the climb, the aircraft was not performing very well and when passing 7000' the Captain told the F/O to request 7000' as a final altitude. The F/O requested 7000' and MCIAPF advised "Maintain 7000". The crew requested and was granted several diversions to avoid

weather and was eventually handed off to MCIARTC. Additional vectors were given to ICT and to avoid weather buildups.

The Captain then turned to **me** and asked if **I** would go into the cabin and make **E** wing **& engine** visual inspection. I folded up the jump seat, put on my coat and proceeded to the rear of the aircraft making a **visual** inspection of the wings and engines as I walked thru the cabin. I observed several passengers removing empty seat cushions and placing then in front of themselves. There wasn't any obvious damage to the wings and engines visible *from* the cabin.

I continued on to the rear of the aircraft which was yawing severely, approximately 8 to 10' laterally with very little pitch oscillations, The two Flight Attendants strapped into the aft jump seat were very nervous and I spent about two sinutes calming them and advising that we were going to ICT, that we had a minor hydraulic problem and that the weather at MCI was too bad to land. They seemed to calm dawn a great deal and I started back to the front of the Aircraft.

As I came forward the A Flight Attendant was attempting to encourage **the** passengers to return the seat cushions to the seats. She followed me back to the forward galley and I briefed her and the other Flight Attendant on the forward jump seat as I hsd the two in the rear. The A Flight Attendant was nervous, but composed. The Flight Attendant on the jump seat appeared to be frozen with' fear. She stared straight ahead and did not move during my briefing.

I returned to the cockpit. Approximately **SONM** from ICT the flight was advised that the weather at ICT was now a severe thunderstorm. The Captain the had the F/O request the nearest available airport and MCIARTC began giving vectors for Salina, Kansas. The Captain inquired if anyone had any suggestions. I then advised him that he should advise his company of their situation, that he should advise the passengers where they were going and that he should brief his cabin crew.

The F/O then accomplished' these three items. While I was in the cabin I had spoken to the two USAir F/O's who were passengers. They reported that at the time of the impact they had observed a very bright blue-green flash around the aircraft. While I do not remember telling the Captain a&out the flash, I did advise that we had probably struck some power lines and could be dragging wires. The Captain acknowledged my advice and I believe he concurred although he did not say so. I then advised the Captain that the two F/O's were in the back and suggested that they be used as additional emergency personnel. The Captain agreed, and I advised the Captain that I would brief the Plight Attendants and I returned to the cabin. I motioned the A Flight Attendant into the forward galley. I advised her to prepare the cabin for an emergency landing, to bring the two P/O's up to first class and to use them as assistants. I advised her that she had about 12 minutes to prepare the cabin. She was nervous, but composed and only asked me if we would be all right. I reassured her and she seemed to "hitch herself up". The other Flight Attendant on the forward junp seat still seemed to be frozen by fright.

I again returned to the cockpit and we began the approach into Salina. About 12 miles from the runway the gear was extended. The mains came down normally, but the nose gear showed unsafe (Red warning, no green). I then advised the Captain to advise the Flight Attendants to be prepared for a nose gear up landing and that if an evacuation was needed or required, that they should attempt to evacuate thru the forward doors and not thru the aft doors. The F/O then briefed the Flight Attendants by interphone.

The Captain executed a visual approach to runway 35 at Salina end landed with 40 flaps approximately 2500' down the runway flying about bug +20. Touchdown was normal. The Captain extended the speed brake slowly and held the nose gear off the runway till about 90KIAS. The nose was lowered and the gear was down so the Captain then actuated reverse thrust and slowly decelerated the aircraft using very minimum brakes. As we approached a full stop, he ordered the F/O to sake a PA advising the passengers to remain seated.

As soon as the aircraft stopped, the Captain lowered the speed brakes, set the parking brake, activated the emergency exit lights and shut down both engines. He then started the APU. I had gotten, up, stowed the jump seat and had opened the cockpit door. The Crew followed me into the entranceway and asked the A Flight Attendant if the aircraft had an airstair. She did not know. The Captain told her to disarm the door slide which confused her, I believe because she was prepared to activate the emergency egress system. The Captain then told her again to deactivate the slide. She bent down, still appearing to be confused so I said, we don't want to blow the slide, we want to open the door. She seemed to immediately understand and disarmed the slide.

The Captain opened the **door** and with the assistance of the F/O extended the airstair. The Captain went down onto the stairs and tried to extend the handrails but could not find the locking releases. I then told him to get the

passengers off, which the Flight Attendants began tc accomplish.

The Captain and I went down the stairs and observed fluid coming from the left main gear area. We approached the gear and discoversd the left outboard brake line severed and shielded antiskid wires damaged, Incidentally, within seconds of the impact the two antiskid lights also illuminated. We then approached the nose gear and observed the left nose gear door damaged and the right nose gear door missing aith the entire nose pear area wet with hydraulic fluid.

We then proceeded to the right main gear area and observed an inspection door missing from the right engine. We got down and inspected the underside of the engine and found that it had been compressed from approximately 1/2" to 2" along about 75% of it's length. As we started to return to the left side of the aircraft, we observed a penetration of the right wing to fuselage fairing.

When we got back to the left side of the aircraft, the passengers had deplaned and were about 100' from the aircraft in a group. We returned to the cockpit where I retrieved the gear pins. The gear warning horn was still sounding, It had been on since the extension of the gear. The F/O began looking for the circuit breaker and I advised the Captain the pull the voice recorder circuit breaker, which he did. The F/O found the breaker to silence the gear warning.

I descended the stairs and located the F/O passengers and instructed them to insert the main gear pins, No one wanted to go into the nose gear well to insert the nose gear pin because the nose gear was still showing unsafe. After several minutes, a mechanic from a local fixed base operator arrived and he installed the nose gear pin,

The Captain and I accompanied the airport manager in his vehicle to the terminal and Air Hidnest's operations. There were three people in the office when we arrived, the Air Hidaest Agent, the USAir agent who was on the aircraft and a young pregnant lady sitting in a chair. For some reason, I assumed that she was the wife of the Air Midwest agent. The Captain called his company, his ALPA representative and when the F/O arrived, he talked to the ALPA representative. When they had finished using the telephone (the only one available except for pay phones in the lobby where the passenger were located), I called my Supervisor in Pittsburgh, Hr. Alvin Zito, Operations Manager, FSDO 19 and briefed him on what had happened.

Hr. Zito advised that he would call me back. I was introduced to the CFR Chief who advised me that the woman

in the operations center Was a newspaper reporter. I then had security escort her from the building. Apparently to keep her away from the passengers, the USAir agent had invited her into operations and had failed to inform anyone as to her identity.

Later, on a conference call, I briefed FSDO 19, Eastern Region and Washington Headquarters on the incident.

Still later, I briefed ICT FSDO, MCI ATC, NTSB and Central Region on another conference call. At approximately 0200, I was called by the NTSB to impound the aircraft. Inmediately thereafter, I was called by Central Region requesting impoundment of the aircraft. I requested security from the airport manager and he advised that he would secure a private security service to protect the aircraft. A few minutes later, Hr. Zito called to again request impoundment of the aircraft.

The aircraft was placed under guard at approximately 0300. I briefed the guard that no one may approach the aircraft **unless** that person had NTSB identification or FAA form 110A identif icstion.

At approximately 0400, three USAir mechanics arrived vis lear jet. I escorted them to the aircraft and allowed them to make an exterior visual inspection. At approximately 0530, FAA Inspectors from the ICT FSDO arrived and I transferred the aircraft to their custody.

At approximately 0630 at the **request** of the NTSE, I accompanied the ICT Inspectors and the USAir mechanics to the **aircraft** where altimeter readings were taken and the flight and **voice** recorders were removed and placed into the custody of the ICT Inspectors. During this trip to the aircraft, a cut of about 12" deep by about 3/4" nide was found in the vertical stabilizer due to it now being daylight. This cut was about 24" below the top of the fin.

I departed the airport for the hotel at approximately 0800.

Harold F. Simpson

| UNIFORM TASK REPORT                             |                      |  |              |             |         |                |             |                                    |              |                      |  |  |
|---|----------------------|--|--------------|-------------|---------|----------------|-------------|------------------------------------|--------------|----------------------|--|--|
| POTUDAL TUME                                    |                      |  |              |             |         |                |             |                                    |              |                      |  |  |
| WORK PROGRAM-MANAGEMENT SYSTEM TRANSMITTAL FORM |                      |  |              |             |         |                |             |                                    |              |                      |  |  |
| RECTION 1. WPHS DATA                            |                      | BECTION 2. PERBONNEL DATA  |              |             |         |                |             |                                    |              |                      |  |  |
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| supervisor's Init                               | 1.1.1                |  |              |             |         |                |             |                                    |              |                      |  |  |
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| INSTRUCTIONS TO B                               | ISTRICT OFFICE:      | INSTRUC  | :110         | <b>#5</b> 1 |         | ENTER INFORMA  | TION IN SEC | 11                                 |              | NENT WENS OUSDELINES |  |  |
| ENTER WENS PATA P                               | RON BECTION 1 ONLY.  | ENTER I  |              | RHA         | TI      | ON IN SECTION  | 9 2, 3, AND | 4                                  | AS APPROPRIS | TE. USE THE          |  |  |
| USE CURRENT WINS INSTRUCTIONS AND               |                      | FOLLOWING CODES FOR THE OPINION COLUMN: U = UNACCEPTABLE, P = POTENTIAL, |              |             |         |                |             |                                    |              |                      |  |  |

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# THE FOLLOWING CORRECTIONS SHOULD BE MADE TO THE ATTACHED REPORT AS FOLLOWS

Aircraft Accident Report USAir, Inc., Flight 5050 Boeing 737-400, N416US LaGuardia Airport Flushing, New York September 20, 1989

| Page | 5,  | paragraph 2, | line 10 | Change        |
|------|-----|--------------|---------|---------------|
|      |     |              |         | sytem         |
|      |     |              |         | To            |
|      |     |              |         | system        |
| Page | 6,  | paragraph 2, | line 4  | <u>Change</u> |
|      |     |              |         | CFM-56-32B    |
|      |     |              |         | To            |
|      |     |              |         | CFM-56-3B2    |
| Page | 16, | paragraph 2, | line 3  | <u>Change</u> |
|      |     |              |         | Pilot's       |
|      |     |              |         | To            |
|      |     |              |         | Pilots        |
| Page | 17, | paragraph 5, | line 5  | Change        |
|      |     |              |         | then          |
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| Page | 20, | paragraph 3, | line 1  | Change        |

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|      |     |                      | To                                 |
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| Page | 20, | paragraph 4, line 5  | Change                             |
|      |     |                      | its                                |
|      |     |                      | To                                 |
|      |     |                      | the aircraft's                     |
| Page | 33, | paragraph 1, line 3  | Change                             |
|      |     |                      | airport                            |
|      |     |                      | <u>To</u>                          |
|      |     |                      | Airport                            |
| Page | 34, | paragraph 1, line 4  | Change                             |
|      |     |                      | action                             |
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|      |     |                      | Action                             |
| Page | 61, | paragraph 2, line 2  | Delete                             |
|      |     |                      | /General Electric Aircraft Engines |
| Page | 63, | paragraph 62, line 4 | Change                             |
|      |     |                      | CFM-56-32B                         |
|      |     |                      | <u>To</u>                          |
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