Aviation Investigation Final Report

Location:	Branson, Missouri	**Incident Number:**	DCA14IA037
Date & Time:	January 12, 2014, 18:10 Local	**Registration:**	N272WN
Aircraft:	Boeing 737 7H4	**Aircraft Damage:**	None
Defining Event:	Miscellaneous/other	**Injuries:**	131 None
Flight Conducted Under:	Part 121: Air carrier - Scheduled		

Analysis

The flight crew briefed a plan to have radar vectors to the final approach course at Branson Airport and to use the RNAV (GPS) Runway 14 to line up on the final approach. The flight crew programmed the flight management system for the approach and set up the onboard navigation systems accordingly; including the use of distance measuring equipment from another approach navigation aid to provide additional situation awareness. During descent, the flight crew discussed the navigation information displayed, compared it to the lights they could see on the horizon, and confirmed what they believed to be the airport beacon based on that comparison early in the descent.

The approach controller cleared the flight direct to the final approach fix depicted on the RNAV approach to the runway of intended landing. While still about 20 miles from the destination airport, the approach controller advised the crew the airport was located at their 11 o'clock position and 15 miles although at the time, that position more closely approximated Downtown Airport. Branson Airport was slightly left at their 10 o'clock position and almost 20 miles. The flight crew called the airport in sight and accepted a visual approach clearance and handoff to Branson control tower. Upon checking in with Branson Tower, the crew was cleared to land on runway 14 at Branson.

When the crew identified what they believed to be Branson Airport early in the descent, they did not crosscheck or verify the airport position using onboard navigation after that point. Perceiving they were a little high on the approach into Downtown Airport, they widened the base leg for descent and then descended below approach control radar coverage as they turn onto final approach. Therefore, from the perspective of the approach controller this appeared to be a normal flight path into Branson Airport up to the point when radar contact was lost.

Instead, the flight crew lined up on final approach to runway 12 at Downtown Airport and proceeded to land. The captain recognized the error soon after touchdown when he realized the runway was shorter than expected and he applied maximum braking, coming to a stop about 300 feet from the end of the

paved surface.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be:

The Flight crew's failure to properly identify the airport and runway of intended landing.

Contributing to the incident was the flight crew's failure to comply with procedures for use of navigation information and visual cues to verify the airport and runway of intended landing and the air traffic controller's issuance of erroneous airport geographic information without including the location of proximate airports.

Findings

Personnel issues	Identification/recognition - Flight crew
Personnel issues	Use of equip/system - Flight crew
Personnel issues	(general) - Flight crew
Personnel issues	Incomplete action - ATC personnel
Environmental issues	(general) - Effect on operation

Factual Information

History of Flight

Approach	Course deviation
Landing	Miscellaneous/other (Defining event)

HISTORY OF FLIGHT

On January 12, 2014, about 1810 Central Standard Time (CST), Southwest Airlines flight 4013 (SWA4013), a Boeing 737-7H4, registration N272WN, mistakenly landed at M. Graham Clark Downtown Airport (PLK), Branson, Missouri, which was 6 miles north of the intended destination, Branson Airport (BBG), Branson, Missouri. The flight had been cleared to land on runway 14 at BBG, which was 7,140 feet long, however, landed on runway 12 at PLK, which was 3,738 feet long. There were no injuries to the 124 passengers and 7 crewmembers and the aircraft was not damaged. The aircraft was being operated under the provisions of 14 *Code of Federal Regulations* (CFR) Part 121 as a regularly scheduled passenger flight from Chicago Midway International Airport (MDW), Chicago, Illinois. Night visual meteorological conditions prevailed at the time.

The flight was scheduled to depart MDW at 1545 CST but due to delays from the previous flight, did not depart until 1643 CST.. The first officer was the pilot flying, the captain was the pilot monitoring, and a company dispatcher occupied the flight deck jumpseat as an observer. During preflight preparation the first officer loaded the flight plan into the flight management computer (FMC). The departure and initial climb were uneventful.

At 1702, after climbing through 18,000 feet, the crew initiated a discussion about the planned landing runway at BBG. The first officer indicated he had been there only one time before when he had landed on runway 32.

At 1708, the crew discussed the wind conditions at BBG and agreed runway 14 would be used for landing. They discussed the fact that runway 14 was not served by an ILS approach and that they would conduct a visual approach backed up with an RNAV instrument approach and use of the Heads Up display (HUD). The captain stated that he was setting up distance measuring equipment (DME) from the runway 32 localizer in his avionics. From 1708 to 1734, the crew discussed the airplane fuel system and the fuel crossfeed operations required due to the airplane having inoperable equipment deferred in accordance with the Federal Aviation Administration (FAA) approved minimum equipment list.

At 1727 the first officer began to brief the approach into BBG. He indicated a plan to have radar vectors to the approach and let the RNAV line them up for a visual. He noted the inbound final approach course was 143 degrees and the touchdown zone elevation was 1,278 feet. The crew then engaged in a discussion regarding the after landing taxi route to the gate. After the first officer initially indicated they would not need to make a 180 degree turn on the runway to taxi back to the gate, the captain prompted

further discussion and the crew agreed they would need to make a 180 degree turn on the runway when landing from this direction.

At 1744 Air Traffic Control (ATC) cleared the flight to descend to 24,000 feet and at 1746 cleared the flight direct to BBG.

At 1750 the crew received the current BBG automated terminal information service (ATIS) weather report via radio indicating runway 14 was in use and a few minutes later, as the airplane descended through 18,000 feet, the first officer called for the descent checklist.

At 1752:22, when the flight was approximately 60 nautical miles northeast of BBG, ATC cleared the flight to descent to 4,000 feet, advised them to expect a visual approach to runway 14, and to proceed direct to VUCUG intersection, the final approach fix on the RNAV (GPS) runway 14 approach.

At 1752:53 while conducting the descent checks, the crew noted that they were putting a 5 and 10 mile ring around "it" in reference to BBG airport on their navigation display.

During the next few minutes, the crew (including the observer occupying the jumpseat) discussed the navigation fixes and stations on the navigation display and compared them to the lights visible from the flight deck. They confirmed which lights they believed to be Branson and which lights they believed to be Springfield.

At 1800:10 Springfield ATC advised BBG tower that SWA4013 was 20 miles northeast of BBG for a visual approach to runway 14.

At 1801:57 the first officer said "well I see the beacon down there…no runway yet."

At 1802:06 the captain said "I think that's it. I see a bunch of bright white lights to the right and just a little to the left of the beacon."

About 1802:51 ATC advised the airport was located at "…eleven o'clock and one five miles."

At 1802:57, after the crew conferred, the captain responded to ATC "…field in sight."

At 1803:00 ATC cleared the flight for a visual approach to runway 14, terminated radar service, and advised the flight to contact BBG tower.

At 1803:15, the captain reported to BBG tower that the flight was descending out of 6,600 feet for 3,000 feet direct to VUCUG for a visual approach and the BBG tower controller cleared them to land on runway 14.

From 1805:41 through 1808:09, the crew configured the airplane for landing, deployed flaps, landing gear, and completed the landing checklist. The crew then exchanged callouts regarding speed, altitude, glidepath, and sink rate until touchdown on runway 12 at PLK at 1809:15.

The airplane touched down about 300 feet past the displaced threshold.

During the landing roll, following callouts for operation of the speedbrake, thrust reversers, and autobrakes, the captain stated "this ain't it" and the crew applied maximum braking. The airplane came to a stop about 300 feet from the end of the paved surface for runway 12.

At 1809:45 the captain called BBG tower and stated "I assume I'm not at your airport."

INJURIES TO PERSONS

There were no injuries to the 124 passengers and 7 crewmembers.

DAMAGE TO AIRPLANE

The aircraft was not damaged.

PERSONNEL INFORMATION

The crew consisted of two pilots, three flight attendants, and a company dispatcher who occupied the flight deck jumpseat as an observer.

The Captain, age 58, was hired by Southwest Airlines in June 1999 as a first officer on a Boeing B-737. He upgraded to captain on the B-737 in July 2005.

The captain reported approximately 15,700 hours total time including about 9,035 hours pilot-in-command and 10,400 hours on the B-737. There was no record of previous aviation incidents, accidents, or enforcement actions involving the captain. He held a valid FAA Airline Transport Pilot (ATP) certificate with type ratings for DC-9, BA3100, and B737, and a current FAA first-class medical certificate with no limitations. The captain stated in an interview that since his last FAA medical evaluation, he had started to wear glasses and that he was wearing them at the time of the incident.

The first officer, age 62, was hired by Southwest Airlines in June 2001. He reported 20,538 hours total time including 9,880 hours in the B-737. There was no record of previous aviation incidents, accidents, or enforcement actions involving the first officer. He held a valid FAA ATP certificate with type ratings for BA3100, BA4100, and B737, and a current FAA first-class medical certificate with a limitation stating that he must have available glasses for near vision. He indicated in an interview that he was not wearing the glasses at the time of the incident.

Company records indicated the first officer had attempted an upgrade training event to become a captain on the B-737 but received an unsatisfactory grade during the Line Oriented Flight Training (LOFT) portion of the training in December 2011. He re-entered upgrade training on January 4, 2012 for "situational awareness training", and received an unsatisfactory grade during the LOFT for the second time on January 5, 2012. He then returned to line flying as a first officer.

Company records indicated the captain had not flown to BBG before, and the first officer had flown into BBG one time previously on June 24, 2013.

The captain and first officer had started the first day of their respective trips together but were then separated, flying different flight schedules until meeting again to fly on the third day. The incident flight

was the second flight on the third day of the captain's 3-day trip and the first flight (following two deadhead legs) of the third day of the first officer's 4-day trip.

At the time of the incident, the captain had been on duty for approximately 8 hours and the first officer had been on duty for approximately 10 hours.

AIRCRAFT INFORMATION

The incident airplane, manufacturer serial number 32527, was a Boeing B737-7H4 equipped with two CFM International CFM56-7B24 turbofan engines. The certificated maximum gross weight of the airplane was 154,000 pounds, the maximum landing weight was 128,000 pounds, and the actual landing weight was 124,763 pounds.

Company records indicated that the airplane was operated on the incident flight with two deferred maintenance items. The number 2 aft fuel boost pump and the right retractable landing light were both inoperative and deferred in accordance with the FAA-approved minimum equipment list.

METEOROLOGICAL INFORMATION

There was no official aviation weather observation recorded for PLK. The aviation routine weather report (METAR) recorded at 1747 and reported as ATIS information Delta at BBG, approximately 6 miles south of PLK, indicated wind from 150 degrees at 12 knots gusting to 23 knots, visibility 10 statute miles, few scattered clouds at 25,000 feet, temperature 17 degrees Celsius, dewpoint minus 2 degrees Celsius, altimeter setting 29.70 inches mercury, and visual approaches for runway 14 in use.

The flight crew received BBG ATIS information Delta via radio and the BBG METAR via the ACARS (Aircraft Communications Addressing and Reporting System) about 20 minutes prior to landing.

AIDS TO NAVIGATION

The crew briefed a plan to conduct a visual approach and use the RNAV approach as a reference. The RNAV (GPS) Runway 14 was a straight in approach that began over WUTIB waypoint at 4,000 feet, proceeded to cross VUCUG, the final approach fix, at 3,000 feet on an inbound course of 143 degrees. A vertical descent path began at VUCUG which was located 5.2 miles from the end of BBG runway 14 and about 2 miles southwest of PLK.

There was no localizer based approach to BBG runway 14 though DME was available from the runway 32 localizer frequency.

COMMUNICATIONS

No communications problems were noted at any time during the incident.

FAA order 7110.65, "Air Traffic Control", stated, in part, that Air Route Traffic Control Centers (ARTCC) and approach controls may clear aircraft for visual approaches using the following procedures: "In those instances where airports are located in close proximity, also provide the location of the airport that may cause the confusion." When ATC communicated the airport location and

provided an approach clearance to the flight crew, the approach controller did not provide the location of other airports in the area.

AIRPORT INFORMATION

Branson Airport is located 8 miles SSE of Branson, Missouri at an elevation of 1302 feet above mean sea level. The airport has two runways, 14 and 32. The runway of intended landing, runway 14, is grooved concrete 150 feet wide and 7,140 feet long with available landing distance of 7,140 feet and a touchdown zone elevation of 1,278 feet above mean sea level. The runway is served by a 4-light precision approach path indicator with a 3 degree glideslope on the left side of the runway, runway end identifier lights (REILs) and high intensity runway edge lights.

Air traffic control services at Branson Airport are provided by a federal contract tower. Airfield lighting was controlled by the air traffic control tower personnel during hours of tower operation from 0700 to 2100 daily.

M. Graham Clark Downtown Airport is located 1 mile south of Branson, Missouri at an elevation of 940 feet above mean sea level. The airport has two runways, 12 and 30. Runway 12 is grooved asphalt 100 feet wide and 3,738 feet long with a displaced threshold of 289 feet providing an available landing distance of 3,449 and a touchdown zone elevation of 940 feet above mean sea level. The runway is served by REILs located at the displaced threshold and medium intensity edge lights. There is no visual approach slope guidance for runway 12.

There was no ATC control tower located at PLK and airfield lighting was activated by a pilot controlled lighting system operating on the common traffic advisory frequency.

FLIGHT RECORDERS

The cockpit voice recorder (CVR), a Honeywell model 6022, serial number 09032, was removed from the airplane and downloaded at the NTSB Vehicle Recorder Laboratory. The CVR contained 2 hours, 5 minutes of recording on two sets of audio data files; a 2-channel recording containing the last 2 hours of recorded data and a 4-channel file containing the last 30 minutes of recorded data. The audio quality of the channels containing information from the captain's and first officer's audio panels, was characterized as excellent, and the audio quality of the channel containing information from the cockpit area microphone was characterized as good. The recording included events from the flight beginning with the departure climb out of 10,000 feet, and ending when the CVR was deactivated about 53 minutes after landing. Timing on the CVR summary was established by correlating CVR elapsed time to common events on the flight data recorder (FDR) and adjusting to local CST.

The FDR, a Honeywell Model 980-4700, serial number 10856, was removed from the airplane and downloaded at the NTSB Vehicle Recorder Laboratory. The recorder arrived in good condition and contained approximately 27 hours of data which was extracted normally. Correlation of the FDR data to event local time, CST, was established using the recorded GMT (Greenwich Mean Time) parameter.

MEDICAL AND PATHOLOGICAL INFORMATION

On January 13, 2014, the captain and first officer complied with a company request to submit to drug and alcohol screening tests. Results of these tests were negative for alcohol and major drugs of abuse.

ORGANIZATIONAL AND MANAGEMENT INFORMATION

Southwest Airlines is owned and operated by Southwest Airlines Co. who also owned Air Tran Airways. Southwest Airlines is based in Dallas, Texas. As of December 31, 2013, Southwest Airlines and AirTran Airways together operated flights to 96 destinations in the United States, Aruba, the Bahamas, Dominican Republic, Jamaica, and Mexico with a fleet of 614 Boeing B-737's and 66 B-717's.

AirTran Airways started service into BBG in 2009 and Southwest Airlines added service to BBG in March 2013. In December 2013 Southwest Airlines announced they would cease operations in BBG effective June 7, 2014.

The incident aircraft is owned by Southwest Airlines Co. and operated by Southwest Airlines for common carrier passenger operations.

ADDITIONAL INFORMATION

Air Traffic Control Services

Approach control services were provide to SWA4013 by an approach controller at Springfield Terminal Radar Approach Control (SGF TRACON) and the airport ATC services were provided by BBG Air Traffic Control Tower (ATCT). BBG ATCT, a federal contract tower, did not have radar monitor capability and both BBG and PLK were located at elevations below SGF radar coverage. Interviews with SGF controllers indicated that radar coverage ceased and radar contact was normally lost for aircraft arriving BBG when they descended below about 2,200 to 2,600 feet and no minimum safe altitudes alerts were triggered for SGF controllers for this flight.

The BBG tower controller indicated he normally kept the runway edge lights off, in order to save money, until an aircraft was reported on arrival.

FAA order 7110.65, "Air Traffic Control", stated in part, to turn on runway edge lights, from sunset to sunrise, for instrument flight rules arrivals before the aircraft begins final approach or for visual flight rules arrivals before the aircraft enters Class B, Class C, or Class D surface area associated with the airport.

There were no records or airfield lighting system recording capability to determine when the runway lights were turned on at BBG. The BBG tower controller indicated in an interview that he had turned on the runway edge lights after receiving notification from SGF TRACON at 1800:10 that SWA4013 was inbound. Prior to that time, he stated that only the runway end identifier lights and the precision approach slope indicator had been on for the runway of intended landing.

Approach Briefing

The flight crew conducted a briefing for a visual approach to runway 14 using an RNAV approach as a reference on the navigation display. During the approach briefing, the crew discussed the final approach course, the touchdown zone elevation, and the runway and airport layout. There was no discussion of airport lighting or visual approach path guidance.

The Southwest Airlines AOM required pilots to conduct an approach briefing prior to every approach. The AOM indicated that for visual approaches under visual meteorological conditions, flight crews must brief the final approach course and navaid frequency of the charted instrument approach for the expected runway. Although the procedures did not specify that airport lighting should be included in a briefing for a visual approach, interviews with Southwest Airlines personnel indicated that some pilots would include this information in their approach briefings.

The Southwest Airlines AOM Approach Briefing Requirements for an instrument approach specified that runway and approach lighting was to be reviewed during the briefing. Following this incident, Southwest Airlines revised the AOM to include runway lighting as a component in visual approach briefings.

Flight Crew Use of Onboard Navigation

During the approach brief and preparation, the crew had programmed RNAV approach guidance in the FMC and was navigating direct to the final approach fix. The crew stated they setup 5 and 10 mile distance rings around BBG on their navigation displays, and the captain stated he setup DME from runway 32 localizer to provide additional situation awareness.

Once they had what they believed to be BBG in sight, the crew stated that they did not reference on board navigation guidance and transitioned to outside visual reference. The Southwest Airlines Flight Operations Manual included specified pilot flying and pilot monitoring duties and required that flight crew members monitor flight and navigation instruments and crosscheck for consistency and accuracy. In addition, the Southwest Airlines AOM provided guidance indicating that flight crews should, when conducting a visual approach, reference an issued charted procedure contained in the FMC navigation database to assist with lateral and vertical guidance to the correct runway.

During the approach, the captain stated he used the heads up display (HUD) in VMC (visual meteorological conditions) mode. Southwest Airlines procedures do not require use of the HUD, which is only installed on the captain's side, for visual approaches but provides guidance allowing the HUD to be used in VMC mode. Southwest Airlines AOM guidance indicated that when using the HUD in VMC mode, the alignment with the landing runway should normally be accomplished by visually acquiring the runway and maneuvering the aircraft using outside references. The HUD could be used for descent rate reference in VMC mode by adjusting rate of descent to hold a reference line over the point of intended touchdown. The HUD does not provide navigation or flight director guidance in VMC mode.

Pilot Information

Certificate:	Airline transport	**Age:**	58
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	August 12, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 10, 2013
Flight Time:	(Estimated) 15700 hours (Total, all aircraft), 10400 hours (Total, this make and model), 9035 hours (Pilot In Command, all aircraft), 188 hours (Last 90 days, all aircraft), 63 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	**Age:**	62
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	5-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	December 5, 2013
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 28, 2013
Flight Time:	(Estimated) 20538 hours (Total, all aircraft), 9880 hours (Total, this make and model), 8295 hours (Pilot In Command, all aircraft), 125 hours (Last 90 days, all aircraft), 55 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Boeing	**Registration:**	N272WN
Model/Series:	737 7H4 7H4	**Aircraft Category:**	Airplane
Year of Manufacture:	2007	**Amateur Built:**	
Airworthiness Certificate:	Transport	**Serial Number:**	32527
Landing Gear Type:	Retractable - Tricycle	**Seats:**	
Date/Type of Last Inspection:		**Certified Max Gross Wt.:**	154500 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo fan
Airframe Total Time:		**Engine Manufacturer:**	CFM INTL
ELT:		**Engine Model/Series:**	CFM56-7B24
Registered Owner:	SOUTHWEST AIRLINES CO	**Rated Power:**	10142 Horsepower
Operator:	SOUTHWEST AIRLINES CO	**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:		**Operator Designator Code:**	SWAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	KBBG,1302 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	17:47 Local	**Direction from Accident Site:**	170°
Lowest Cloud Condition:	Few / 24000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots / 23 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	150°	**Turbulence Severity Forecast/Actual:**	/ N/A
Altimeter Setting:	29.7 inches Hg	**Temperature/Dew Point:**	17°C / -2°C
Precipitation and Obscuration:			
Departure Point:	Chicago, IL (KMDW)	**Type of Flight Plan Filed:**	IFR
Destination:	Branson, MO (KBBG)	**Type of Clearance:**	IFR
Departure Time:	16:54 Local	**Type of Airspace:**	

Airport Information

Airport:	M. Graham Clark Downtown KPLK	**Runway Surface Type:**	Asphalt
Airport Elevation:	940 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	12	**IFR Approach:**	None
Runway Length/Width:	3738 ft / 100 ft	**VFR Approach/Landing:**	Full stop;Straight-in

Wreckage and Impact Information

Crew Injuries:	7 None	**Aircraft Damage:**	None
Passenger Injuries:	124 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	131 None	**Latitude, Longitude:**	36.625831,-93.228889(est)

Administrative Information

Investigator In Charge (IIC):	Helson, David
Additional Participating Persons:	
Original Publish Date:	September 2, 2015
Last Revision Date:	July 8, 2024
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=88667