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NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

March 29, 1996

AIR TRAFFIC CONTROL

Group Chairman's Factual Report
by Richard J. Wentworth

A. ACCIDENT

Location:	near Buga, Colombia
Date:	December 20, 1995
Time:	2142 local standard time (0242 UTC)[1]
Aircraft:	American Airlines Flight 965, B-757-223, N651AA
NTSB Number:	DCA96RA020

B. GROUP

Chairman: Richard J. Wentworth
National Resource Specialist (ATC)
National Transportation Safety Board

Member: Harold R. Donner
Federal Aviation Administration, AAI-100
Washington, D.C.

Member: Victor H. Tamariz
Federal Aviation Administration
International Area Office
Miami, Florida

Member: Manuel R. Hugonnett
American Airlines
Miami, Florida

Member: Ivan Rivera Nistal
Allied Pilots Association
Miami, Florida

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[1] All times shown will be in standard time based on the 24-hour clock with the exception of those times in the "History of Flight" which will be shown in Universal Coordinated Time (UTC) unless otherwise indicated.

SUMMARY

At 2142 EST, on December 20, 1995, American Airlines, Flight 965, a Boeing 757, on a regularly scheduled passenger flight from Miami, Florida, to Cali, Colombia, crashed into mountainous terrain during a descent from cruise altitude in visual meteorological conditions under instrument flight rules. The location of the accident site was near the town of Buga, 33 miles northeast of Cali VOR. The aircraft struck near the summit of El Deluvio, at about the 8,900-foot level, approximately 10 miles east of Airway W3. Of the 164 passengers and crewmembers on board, four passengers survived the accident.

The accident investigation is being conducted jointly by the Aerocivil of Colombia and the National Transportation Safety Board in accordance with the provisions of Annex 13 to the Convention on International Civil Aviation. Assistance is being provided by advisers from the Federal Aviation Administration, American Airlines, Allied Pilots Association, the Boeing Commercial Airplane Group and Rolls-Royce.

D. DETAILS OF THE INVESTIGATION

1. History of the Flight

American Airlines flight 965 made initial radio contact with the Miami ground controller at 2256:03 and advised that they were at spot five and requested taxi. At 2256:07, the flight crew was issued taxi instruction to runway 27R. At 2234:32, the flight was cleared for takeoff on runway 27R and instructed to fly runway heading. At 2335:25, the flight was instructed to contact departure control. All communications with Miami Terminal Radar Approach Control (TRACON) and Miami Air Route Traffic Control Center (ARTCC) were normal and routine. The flight was issued a final cruise altitude of flight level (FL) 370 by Miami ARTCC. Upon initial radio contact with Barranquilla Area Control Center at approximately 0112, the flight crew of AAL 965 advised, "Barranquilla Control American Airlines nine six five over KILER." The controller replied, "American nine six five, uh report level." The flight crew then reported, "American nine six five, we're just over KILER we're at flight level three seven zero, estimating NESMO at zero one three one then Cartagena go ahead." The controller replied, "American nine six five report NESMO maintain three seven zero." The flight crew then asked, "all right sir cleared and uh can you approve direct present position to BUTAL for us." The controller replied, "roger from KILER direct to BUTAL report abeam Cartagena." The flight crew responded, "ok direct to BUTAL from KILER and we'll call you abeam Cartagena muy amable gracias." At approximately 0148, the flight crew of AAL 965 transmitted, "Barranquilla American nine six five abeam Cartagena." The controller then transmitted, "American nine six five report BUTAL." The flight crew replied, "ok we'll report BUTAL estimate BUTAL at zero two zero eight thank you sir." At about 0202, the controller advised, "American nine six five...[unintelligible]..frequency one two five decimal one Bogota...[unintelligible]." The flight crew replied, "ok say the frequency again please American nine six five." The radio frequency was repeated. The flight crew then transmitted, "one two five one feliz navidad American nine six five."

At about 0203:22, the flight crew of AAL 965 made initial radio contact by transmitting, "Bogota Control American Airlines nine six five buenas tardes buenas noches." The radar controller replied, "American nine six five buenas noches Bogota go ahead." The flight crew stated, Si American nine six five our estimate for BUTAL is...zero two zero seven flight level three seven zero it'll be romeo negro golf after that." At 0203:38, the controller transmitted, "roger American nine six five fly present position direct TULUA uniform lima quebec V-O-R maintain flight level three seven zero and squawk alpha two three one five, report ready for descent." The flight crew replied, "ok yeah your transmission little bit garbled understand present position to TULUA and we'll do that thank you very much muy amable and say the other part." The controller then responded, "report ready for descent and please squawk code alpha two three one four." The flight crew of AAL 965 replied, "ok squawk two two one four uh and report ready for descent gracias."[2] The controller replied, "de nada."

The controller at Cali Approach then received an interphone (air traffic service direct speech circuit) call from the radar controller at Bogota Area Control Center. The radar controller at Bogota Control advised she had estimates on aircraft that were either inbound to Cali or were going to overfly the airspace. At 0204:54, the controller at Cali Approach advised, *"siga"* (go ahead).[3] At 0204:57, Bogota advised, *"El primero va a ser el Challenge Air uno nueve seis, Quito Cali va a estar por el VOR a las treinta y tres"* (The first is going to be Challenge Air one nine six, Quito Cali, going to be by the VOR at 33). At 0205:05, the Cali controller responded, "Cero dos tres tres, siga" (zero two three three go ahead). The Bogota controller continued, "*El segundo es el American nueve seis cinco de Miami Cali cuarenta y cinco*" (the second is American nine six five from Miami to Cali forty five). The Cali controller replied, "siga" (go ahead). At 0205:16, she continued, *"y el SAM uno uno siete siete de San Andres Cali cinco nueve*" (and SAM one one seven seven from San Andres to Cali five nine). The Cali controller responded, *"cinco nueve el SAM ...[unintelligible]...de"* (five nine SAM...unintelligible...from) Bogota reiterated, *"San Andres."* The Cali controller continued, *"San Andres, entonces demosle al Challenge Air demosle uno nueve cero"*(San Andres then we give the Challenge Air one nine zero). The Bogota controller replied, *"uno nueve cero"* (one nine zero). At 0205:40, the Cali controller said, *"al segundo, el American nueve seis cinco demosle dos cero cero"* (the second American nine six five we give him two zero zero). The radar controller at Bogota continued, *"dos cero cero"* (two zero zero). At 0205:48, the Cali controller responded, *"y al tercero demosle dos tres cero"* (and the third we give him two three zero). At 0205:50, the Bogota controller finished the exchange, stating, *"dos tres cero, recibido"* (two three zero, roger). It was noted that the Bogota controller did not advise the Cali controller that AAL 965 was proceeding on a direct route to the TULUA VOR.

At 0226:32, the flight crew of AAL 965 transmitted, "Bogota American nine six five request descent." The controller replied, "American nine six five descend and maintain flight level two four zero report reaching." The flight crew responded, "ok

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[2] The ATC Group noted that the controller first issued a transponder code of 2315 and later issued a transponder code of 2314; however, the flight crew of AAL 965 also responded with the wrong transponder code, 2214 rather than 2314 which was issued. A review of the flight strip from Bogota Control indicated that the controller amended the transponder code to coincide with the code acknowledged by the flight crew.

[3] Words shown in *italics* are taken directly from ATC communications. Words in parentheses are the English translation.

we're leaving three seven zero descend and maintain two four zero twenty four thank you ma'am American nine six five." The controller replied, "that's correct." The flight crew of AAL 965 then transmitted, "American nine six five is level two four zero." There was no reply because their transmission had been blocked by another aircraft. At 0232:27, the flight crew again advised that they were level at flight level two four zero. The Bogota controller then transmitted, "stand by two minutes for lower." At 0234:07, the flight crew transmitted, "and American nine six five request lower." The controller responded, "American nine six five continue descent to flight level two zero zero report leaving two four zero." At 0234:14, the flight crew advised, "we're leaving two four zero now descending to two zero zero." The controller then transmitted, "roger call Cali frequency one one nine decimal one buenas noches." The flight crew asked to have the frequency repeated which the controller did. At 0234:29, the flight crew transmitted, "one one nine decimal one uh feliz navidad senorita." The controller responded, "muchas gracias lo mismo." The flight crew transmitted, "gracias."

At 0234:21[4], the flight crew of AAL 965 made initial radio contact with the controller at Cali Approach stating, "and American nine six five leaving flight level two four zero descending to two zero zero buenas tardes." There was no response. At 0234:39, although somewhat garbled by another aircraft, the flight crew again transmitted, "ah Cali Approach American nine six five." At 0234:42, the controller replied, "American nine six five good evening go ahead." At 0234:48, the flight crew transmitted, "ah buenas noches senor American nine six five leaving two three zero descending to two zero zero go ahead sir." At 0234:53, the controller inquired, "roger distance D-M-E from Cali." At 0234:55, the flight crew replied, "yeah the D-M-E is six three." At 0234:58, the controller transmitted, "roger is cleared to Cali V-O-R ah descend and maintain one five thousand feet altimeter three zero zero two no delay expected for approach report eh TULUA V-O-R." At 0235:13, the flight crew replied, "ok understood cleared direct to Cali V-O-R uh report TULUA and altitude one five that's fifteen thousand three zero zero two is that all correct sir." At 0235:24, the controller responded, "affirmative." The flight crew transmitted, "thank you."

At 0236:17, the approach controller had a conversation in Spanish, with the tower controller regarding the surface winds and departures. At 0236:25, the approach controller transmitted, "American nine six five Cali." The flight crew replied, "...go ahead please." At 0236:30, the controller advised, "kay sir the wind is calm are you able to approach runway one niner." At 0236:39, the flight crew replied, "ah yes sir we need lower altitude right away though." At 0236:43, the radar controller transmitted, "roger nine six five is cleared to V-O-R D-M-E approach runway one niner ROZO number one arrival report TULUA V-O-R." At 0236:52, the flight crew replied, "cleared the V-O-R D-M-E to one nine ROZO one uh arrival and we'll report the V-O-R thank you sir." The controller transmitted, "report eh TULUA V-O-R." At 0237:00, the flight crew replied, "report TULUA."

At 0237:28, the flight crew inquired, "ah can American Airlines eh nine six five go direct to ROZO and then do the ROZO arrival sir." At 0237:36, the controller replied, "affirmative direct eh ROZO one runway one niner the wind is calm." At 0237:41, the flight crew responded, "all right ROZO ROZO one to one nine thank you American nine six five." At 0237:46, the controller transmitted, "affirmative report TULUA and ah

[4] It was noted by the ATC Group that a time disparity of 8 seconds existed between Bogota Control and Cali Approach.

twenty one eh miles uh five thousand feet." At 0237:53, the flight crew replied, "ok report TULUA twenty one miles at five thousand feet American nine uh six five." At 0238:17, the controller provided, in Spanish, air traffic control service to other aircraft. At 0238:40, the Cali controller inquired, "nine six five distance now." The flight crew of AAL 965 replied, "ah what do you want sir." The controller transmitted, "distance D-M-E." At 0238:47, the flight crew replied, "ok the D-M-E is eh from Cali is uh three eight." The controller responded, "roger."

At 0239:48, the controller initiated a non-pertinent telephone call. At 0240:00, the flight crew of AAL 965 stated, "and...and American ah we're three eight miles north of Cali and you want us to go to TULUA and ah do the ROZO to uh the runway right...runway one niner." Concurrent with "we're" in the previous transmission, the telephone call ended (about 23 seconds for the call). At 0240:12, the controller replied, "ok to RO...if you can...land uh runway one niner you can use runway one niner what is your altitude and need D-M-E from Cali. At 0240:22, the flight crew responded, "ok we're thirty seven D-M-E at ten thousand feet."

At 0240:26, the controller transmitted, "roger report ah five thousand and ah final to one one runway one nine." There was no response from the flight crew. At 0241:03, the controller transmitted, "niner six five altitude." At 0241:05, the flight crew responded, "nine six five nine thousand feet." This was a very weak transmission. At 0241:11, the controller transmitted, "roger distance now." There was no response. At 0242:16, 0242:17 and 0242:45, the controller called the flight crew and did not receive a response. At 0242:55, the controller conducted a radio check with the crew of an Avianca aircraft that was on the frequency. At 0242:59, 0243:12, and 0243:26, the controller again attempted to make radio contact with the flight crew without success.

2. Colombian Air Traffic Control Facilities

Barranquilla Control

The Barranquilla Central Control Area is located in city of Barranquilla, Colombia. It renders air traffic services in the Barranquilla FIR which is divided into 3 sectors. The upper control area (UCA) that services flights at or above FL200 within the boundaries of the FIR. Barranquilla Approach Control that combines the services of approach and area to the flights below FL200 and within the lateral limits of the Terminal Control Area (TCA) of Barranquilla and the Barranquilla Flight Information Services that assist all air transit below FL200 and outside of the Barranqulla TCA. The Barranquilla Area Control Center provides radar surveillance services within the area of radar coverage.

Bogota Control

The Bogota Area Control Center is located in the city of Bogota, Colombia. It renders air traffic services to flights within the Bogota Flight Information Region which is divided into 5 sectors. Two sectors of UCA divided laterally by the line that joins the radials 180 and 360 of the Bogota VOR with a lower limit of FL200 with the exception of the terminal areas of Bogota, Medellin, Pereira and Cali in which the limits are

FL230. Two sectors of combined area and approach control lie below the lateral limits of the Bogota TCA and there is also a sector of flight information services to assist the traffic in the airspace below the UCA's and outside of the TCA's. The Bogota Area Control Center provdes radar surveillance services within the area of radar coverage. The airspace surrounding the area at the TULUA VOR is above FL220.

Cali Approach Control

The Cali approach control office is located inside the Alfonso Bonilla Aragon Airport Control Tower. The control tower is adjacent to the airport terminal. The approach controller utilizes an open boom microphone. He sits about 8 to 10 feet from the controller who is responsible for tower operations. Flight progress strips are used to keep track of aircraft that are inbound or outbound from the airport and for aircraft that will traverse that airspace designated to Cali. Operations are conducted in a non-radar environment. It provides service for TCA and approach control to the air traffic below FL230 inside of the lateral limits of the Cali TCA. The approach controller works at a console located on the south side of the control tower and coordinates, with the local control, coordinator, and surface control which are aligned in front of the eastern side of the tower facing the runway environment.

The supervisor's desk is located near the approach controller's position. There is a commercial telephone at the desk which is used as an alternate method of coordinating air traffic services in the event of a primary communications failure. According to Mr. Juan Francisco Martinez, a supervisor, this phone is moved to the approach controller's area when the supervisor goes on break.

During a tour of the tower, the ATC Group noticed that there is a monitor panel for the ILS and VOR, which will provide an alarm in the event of a failure of either of these components. The Group was informed by a facility supervisor that the operation of the TULUA VOR and the ROZO NDB is checked by a guard that is posted at each respective navigational aid. In the event of an observed malfunction, the guard will telephone the facility and will also notify, by radio, maintenance personnel.

3. Equipment Certifications

There were no equipment certifications conducted. There were no reports of navigational equipment malfunctions or outages prior to the time of the accident. There was no indication of communications difficulties prior to the accident.

4. Weather

Based on weather observations taken at the Cali Airport for 0200 and 0300 UTC, in addition to pilot reports, before and after the accident indicated that visual meteorological conditions existed. Observations are contained as an attachment.

5. Controller Information

Margarita Maria Gonzalez	Bogota Control
Date of birth:	[redacted], 1955
Date of admission to U.A.E. Aerocivil:	March 15, 1979
Date began working at Bogota Control:	November 02, 1988
Qualification in Bogota Area Control:	March 1990
Date medical license effective until:	March 16, 1996
Nelson Rivera Ramirez	Cali Approach
Date of birth:	[redacted] 1968
Date of adminission to U.A.E. Aerocivil:	October 1988
Date began working at Cali Approach:	October 1988
Qualification in Cali Approach Control:	May 09, 1995
Date medical certificate effective until:	February 07, 1996

6. Interview Summary

On January 26, 1996, the ATC Group interviewed the approach controller who was in communication with the flight crew of AAL 965 at the time of the accident. The interview was conducted at Cali, Colombia. Under the direction of Colonel Medrano of Aeronautica Civil, the interview was conducted in Spanish; however, those questions posed in English were answered in English.[5]

Mr. Nelson Rivera was born on [redacted] 1968, in Huila, Colombia and lived in Bogota where he finished high school in 1985. He studied a year of English and in 1987 took the basic course of Air Traffic Control. He passed and began a course of study which lasted 15 months. He began his air traffic control career during October 1988 and has been employed since at the Cali airport. Going through as a flight information service controller, airport controller and in 1994 he entered a four month course to become an IFR controller. He started his duties as such for the Cali terminal area during May 1995. In July 1995 he initiated a course in radar control which lasted 3 months and in September 1995 until present holds the job as a Cali area approach controller. During his training as an air traffic controller he has received courses in technical English for air traffic control services and in basic English. His general

[5] Because of translation, the interview summary is paraphrased to capture the thrust of the controllers responses to questions which were posed to him.

academic performance, and particularly in the English language was above average with grades between 85 and 95 out of a perfect score of 100. Additionally in Cali he took additional 3 levels in the English language and considers himself to have a good level of proficiency in it, particularly in comprehension; with room for improvement in vocabulary and fluency.

During the course of a day on the job he handles an average of 3 flights in which the use of English is required and he believes that his proficiency in technical English is maintained but he would like to be able to practice conversational English more often in order to improve. He said that he wished he knew more general English so that he'd be able to understand the conversations and thoughts of the flight crews. In the same manner he expressed an opinion that it would be a great contribution to the job of the controller if the English speaking flight crews did not speak so quickly and would reduce the use of non-standard phraseology in their transmissions. Mr. Rivera stated that normally he and other Colombian controllers work every day of the week in 6 hour shifts and that the mechanism used to get a day off is to get another controller to work the shift. He said that the maximum combined work time of a controller is limited to 12 hours a day and that when that happens it is due to working an extra shift or by replacing another controller. Of each 6 hour shift there is one hour of rest and the rest is spent on duty. Mr. Rivera asked to have his vacation during July 1995 rescheduled in order for him to attend the radar control training. He considered the training a break from his regular work routine.

The day before the accident, Mr. Rivera worked an extra shift for a total of 12 hours. He was on duty from 0600 to 1800 local time and had a 24 hour rest period before returning to work at 1800 local time on December 20, 1995. He considered his overall activities during the period as routine. He picked up his wife after work, went to his apartment, he went to bed about 2200 and woke up at 0600 that morning. He slept some additional time after that when his wife left for work and he stayed in his apartment until he left for the airport to go to work. Mr. Rivera also stated that he was not taking any medication nor had he consumed any alcoholic beverages prior to reporting for work. During the beginning of the shift, everything was normal and all five controllers that handled the airport, approach and control tower services were present. Mr. Rivera requested to take his break a little after 1800 and was replaced by another controller who is also a supervisor until he returned at 1900. The supervisor offered to substitute for him until about 2100 because he was scheduled to be on duty until 0600 the next morning. When Mr. Rivera returned to the tower and assumed his duties as the approach controller at 2100, the supervisor left to go on break and Mr. Rivera was left as the controller-in-charge. Mr. Rivera worked the whole time sitting at the approach position. He noted that favorable meteorological conditions existed and that there was a low traffic load prior to the time of the accident of AAL 965.

During periods of high traffic volume, 10 or more flights are handled; however, during the period prior to the time of the accident he only handled 5 flights of which 2 aircraft (AAL 965 and AVA 1231) were estimated to be inbound to Cali at approximately the same time. Mr. Rivera said that in the Cali area the flights normally proceed along the ATS routes due to the fact that there is no radar coverage that could assist in observing the position of the aircraft and that in the event that an aircraft would enter his airspace in order to navigate off-route for any circumstances the handoff controller should inform him of this fact. He was always convinced that AAL 965 would be flying toward TULUA established on UG438 [airway] prior to making radio contact with him.

Mr. Rivera said that although the flight crew in their first contact did not mention the routing they had been cleared to follow, he issued them their clearance to proceed to Cali via the TULUA VOR. He said that the pilot's readback to the initial clearance was fairly lengthy and ended in a non-standard expression with them saying, "is that all correct sir." By his response of "affirmative" and his reiteration for the pilot to report the TULUA VOR, he thought that they would indeed overfly TULUA and not that they would fly from their present position directly to the CALI VOR. According to the handovers received by Mr. Rivera of the flights that were estimating the CALI VOR, he was initially planning the approach sequence would bring AAL 965 behind Avianca (AVA 1231), but due to the fact that AVA 1231 was a slower aircraft, (as indicated by the flight strip), he changed the approach sequence offering AAL 965, which was closer to Cali, the more direct runway that was available, which was runway 19. This would allow AAL 965 a direct and non-delayed arrival. AVA 1231 could then approach from the south to runway 01 without having any delays. In order to do this, Mr. Rivera said that he coordinated with the tower controller, and verified the wind conditions and traffic conditions to make sure that they would allow the approach of AAL 965 to runway 19.

Mr. Rivera said that his comprehension of the pilot's transmissions (AAL 965) was satisfactory and he believed that the pilot also understood him based on the fact that they did not have to ask each other to repeat transmissions. Mr. Rivera said that when the pilot of AAL 965 asked to proceed direct to ROZO he thought that the pilot meant that he was requesting clearance for the ROZO one arrival procedure and that's why he responded, "affirmative, cleared direct the ROZO one." He did not understand why the pilot was requesting to proceed from his position direct to the ROZO NDB. He said that it was unusual for a pilot to make a request to fly from their present position, which the controller would not know, to the arrival transition in a non-radar environment[6]. At 0240:00 UTC Mr. Rivera had engaged in telephone conversation that was unrelated to his air traffic control duties. However, he emphasized that this telephone call was of a short duration, and did not prevent him from receiving or understanding any transmissions from the flight crew of AAL 965. A question from AAL 965 in which they asked if they should proceed direct to the TULUA VOR in conjunction with their stating they were 38 miles north of CALI made no sense to Mr. Rivera. Since his language capabilities did not allow him to inquire on the nature of his question, he decided to restate, they were cleared to proceed to runway 19 and requested the flight's distance from the CALI VOR. Upon hearing from the pilot that the flight was 37 miles from Cali, Mr. Rivera remained calm because he had no doubt that the pilot had passed the TULUA VOR but maybe had just forgotten to communicate his report over TULUA. He was asked by a group member what he would have said to a Spanish speaking flightcrew in the same situation, and he replied that he would have told them that their request made no sense, that their request was illogical, and incongruent, but he did not know how to convey these thoughts to the flightcrew of AAL 965 in English.

[6] A discussion outside of the context of the interview ensued between group members concerning the use of direct in English and in Spanish. After a group member stated that phraseology for "direct" in the US, meant direct from point to point, an indirect question was posed to Mr. Rivera in which he confirmed that "directo" in Spanish could mean a pilot would proceed along a filed route without delay as in a "straight-in" approach; however, there were no questions posed to Mr. Rivera concerning his expectation of AAL965 proceeding direct to the Cali VOR.

He then requested that the pilot report 5,000 feet at 21 miles, a designated point on the Rozo arrival to runway 19. He did not notice any alterations, nervousness, or confusion in the voice of the pilot at any time during these conversations. Although he noted the pilot's ambiguity when they asked if they should go to the TULUA VOR, because of their earlier report that they were 38 miles from Cali, he had no doubt that the flight was proceeding toward runway 19 and that he never expected that the pilot was deviating from the route centerline for that runway. Mr. Rivera never thought to verify the aircraft's position with respect to the center line and he said he was sure that the aircraft was flying on it's centerline since the pilot appeared to be using the same flight plan filed for the ROZO ONE route. And when Mr. Rivera affirmed that the pilot was proceeding to runway 19, the pilot's answer reflected that he was familiar with that route. Thus, Mr. Rivera never expected that the aircraft was off of its center of flight when it started toward the TULUA VOR. Mr. Rivera said that one minute passed between the time the pilot reported he was 38 miles away and when he reported he was 37 miles away but he thought that the pilot had made a mistake when he reported he was at 38 miles away.

He said that normal procedure requires that pilots are to inform the controller of their deviations from the assigned routing, in which case they become responsible for keeping their own terrain clearance. Additionally Mr. Rivera added that according to his knowledge of the Cali terminal area if an imaginary straight line was to be drawn from the CALI 63 DME over the UG438 airway to the CALI VOR that line would pass virtually over the TULUA VOR or at perhaps the most, 3 miles west of the VOR. Mr. Rivera included an explanation of the data and codes that appear on the flight progress strip for AAL 965 and he was asked what would be the symbol to indicate the abeam crossing for an aircraft over a given point to which he answered that the procedure would be to put parentheses around the identifier for that point. It was noted that no parentheses appeared on the flight strip for AAL 965. Since the TULUA report did not appear on the flight progress strip for AAL 965 Mr. Rivera estimated that the aircraft should have passed TULUA at about 0237 UTC taking into consideration the crossing at TOROL intersection. Finally, Mr. Rivera described his unsuccessful attempts to re-establish radio contact with AAL 965 after 0242 UTC and that he conducted a radio check with another airborne aircraft to make sure that the microphone was in working order. He later on described his despair in trying to get information about the position of AAL 965 and the measures that he took to keep the approach path clear, which included lost communications procedures and finally the closing of the airport. He then proceeded to initiate the alert and emergency phases for the flight and to initiate a search and rescue effort. A later phone call confirmed that the airplane had crashed. At that time Mr. Rivera re-opened the airport and continued duties as the controller-in-charge since the supervisor had not returned to the tower. He concluded the interview by reiterating his hopes that the investigation would prove successful for establishing recommendations to prevent this type of accident and personally expects to continue his career as an air traffic controller. Prior to the time of the interview he had been relieved of his duties pending the completion of an internal investigation.

7. ICAO Regulations and Procedures

The following information is contained within the "Foreword" of the Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services (PANS-RAC) Document 4444:

The scope and purpose of the document is stated in paragraph 2, subparagraph 2.1 and 2.2 as:

"The procedures for Air Navigation Services - Rules of the Air and Air Traffic Services (PANS-RAC) are complementary to the Standards and Recommended Practices contained in Annex 2 - Rules of the Air and in Annex 11 - Air Traffic Services. They are supplemented when necessary by regional procedures contained in the Regional Supplementary Procedures (Doc 7030)."

"The Procedures for Air Navigation Services - Rules of the Air and Air Traffic Services (PANS-RAC) specify, in greater detail than in the Standards and Recommended Practices, the actual procedures to be applied by air traffic services units in providing the various air traffic services to air traffic."

PART II GENERAL PROVISIONS

Part II, Number 1, Note 2 states: "The objectives of the air traffic control service as prescribed in Annex 11 do not include prevention of collision with terrain. The procedures prescribed in this document do not therefore relieve the pilot of his responsibilities of ensuring that any clearance issued by air traffic control units are safe in this respect, except when an IFR flight is vectored by radar."

Section 10, Clearances and Information

10.1.4 - "If an air traffic clearance is not suitable to the pilot-in-command of an aircraft, he may request and, if practicable, obtain an amended clearance."

Section 10.2, Issuance

10.2.2 - states in part: "Similarly, aircraft arriving and/or departing within a terminal control area shall, where possible, be cleared by the most direct route from the point of entry to the aerodrome of landing or from the aerodrome of departure to the point of exit."

Section 14, Position Reporting

14.1.1 - states: "On routes defined by designated significant points, position reports shall be made when over, or as soon as possible after passing, each designated compulsory reporting point, except as provided in 14.1.3. Additional reports over other points may be requested by the appropriate air traffic control services when so required for air traffic services purposes."

14.1.2 - states in part: "...the last position report before passing from one flight information region or control area to an adjacent flight information region or control area shall be made to the air traffic services unit serving the airspace about to be entered."

14.1.5 - states: "If a position report is not received at the expected time, subsequent control shall not be based on the assumption that the estimated time is accurate. Immediate action shall be taken to obtain the report if it is likely to have any bearing on the control of other aircraft."

PART IV - APPROACH CONTROL SERVICE

ARRIVING AIRCRAFT

7. General Procedures for Arriving Aircraft

7.3 states: "An IFR flight shall not be cleared for an initial approach below the appropriate minimum altitude as specified by the State concerned nor to descend below that altitude unless:

(a) the pilot has reported passing an appropriate point defined by a radio aid; or

(b) the pilot reports that he has and can maintain the aerodrome in sight; or

(c) the aircraft is conducting a visual approach; or

(d) the aircraft's position has been positively determined by the use of radar.

10. Instrument Approach"

10.3 states: "A particular approach procedure may be specified to expedite traffic. The omission of a specified approach procedure will indicate that any authorized approach may be used at the discretion of the pilot."

12. Approach Sequence

12.1.1 states in part : "The approach sequence shall be established in a manner which will facilitate arrival of the maximum number of aircraft with the least average delay."

Section V, Aerodrome Control Service

5. Selection of Runway-in-use

5.1 states: "The term "runway-in-use" shall be used to indicate the runway that at a particular time is considered by a unit providing aerodrome control service to be the most suitable for use by the type of aircraft expected to land or take off at the aerodrome."

5.2 states: "Normally, an aircraft will land and take off into wind unless safety, the runway configuration, or air traffic conditions determine that a different direction is preferable. In selecting the runway-in-use, however, the unit providing aerodrome control service shall take into consideration, beside surface wind speed and direction, other relevant factors such as the aerodrome traffic circuits, the length of runways, and the approach and landing aids available."

5.3 states: "If the runway-in-use is not considered suitable for the operation involved the pilot-in-command may request permission to use another runway."

SECTION IX, PHRASEOLOGIES

2. General

2.1 states: "Most phraseologies contained in Section 3 of this Part show the text of a complete message without call signs. They are not intended to be exhaustive, and when circumstances differ, pilots, ATS personnel and other ground personnel will be expected to use appropriate subsidiary phraseologies which should be as clear and concise as possible and designed to avoid possible language confusion by those persons using a language other than one of their national languages."

2.2 states in part: "The phraseologies are grouped according to types of air traffic service for convenience of reference. However, users shall be familiar with, and use as necessary phraseologies from groups other than those referring specifically to the type of air traffic service being provided."[7]

ANNEX 10, AERONAUTICAL COMMUNICATIONS

Attachment B to Volume II - Development of Radiotelephone Speech for International Aviation is an attachment to this report.

COLOMBIAN DOCUMENTS

b.1.1. Number 0021 states: "If a clearance given by the air traffic control center is not satisfactory to the pilot of the aircraft, the pilot can request an amended clearance, and if possible, he will receive an amended clearance."

b.1.2 Number 0025 states: "Unless exempted by the authority of the ATS or other related offices, a controlled flight should notify these offices as soon as possible of the time and the level at which they pass each one of the mandatory reporting points."

b.1.3 Circular ZJZ-010, Page 170-2 states: "Pilots must remember that the objectives of air traffic control cannot be met if they involuntarily do not ask for clarifications of ATC clearances and instructions or if they do not correctly report their position while in flight."

[7] Examples of phraseology are contained as an attachment to this report

COLOMBIAN AERONAUTICAL INFORMATION PUBLICATION (AIP)

b.2.1 RAC 5, Number 3.4.2 states: "The pilot will ask that ATC, if there is any doubt at any time, for a detailed description of the route."

b.3. AERONAUTICAL REGULATION MANUAL

The text is not transcribed because it coincides with the previously cited text

b.3.1 Number 5.8.3

b.3.2 Number 5.8.3.1a

[redacted]
Richard J. Wentworth
National Resource Specialist
Air Traffic Control

AS-300
4-9-96