FLIGHT SAFETY FOUNDATION
Accident Prevention
Vol. 54 No. 10 *For Everyone Concerned with the Safety of Flight* October 1997

Collision with Antenna Guy Wire Severs Jet's Wing During Nonprecision Approach

The crew lost control of the aircraft, which collided with terrain. The crew's disregard of minimum descent altitude on the nonprecision step-down approach caused the accident.

FSF Editorial Staff

The crew of the twin-turbofan Cessna 550 Citation II was on a very high frequency omnidirectional radio range (VOR)/distance measuring equipment (DME) approach to the Marco Island Airport (KMKY), Florida, U.S., when it collided with the guy wire of a 214-meter (700-foot) antenna located 6.2 kilometers (3.36 nautical miles [NM]) from the runway threshold. During the collision, a section of the left wing estimated at 2.6 meters (8.5 feet) separated from the aircraft. The aircraft continued flying for 3.1 kilometers (1.7 NM) before it collided with terrain.

The two flight crew members were killed in the Dec. 31, 1995, accident. There were no passengers on board. The aircraft was destroyed by impact forces and a postaccident fire.

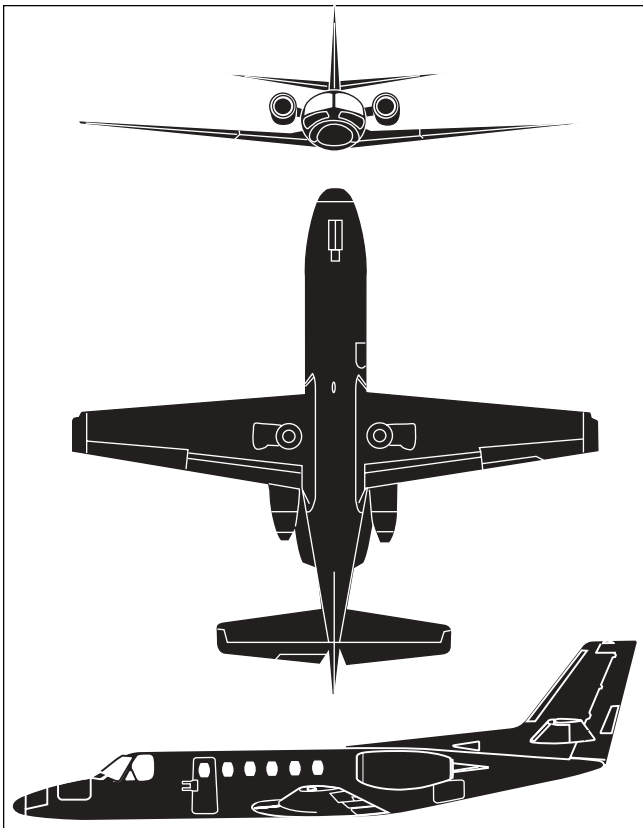
The accident occurred during daylight in instrument meteorological conditions (IMC).

The final accident investigation report of the U.S. National Transportation Safety Board (NTSB) said that the probable cause of the accident was "the pilot's disregard for the MDA [minimum descent altitude] for a specific segment of the VOR/DME approach, which resulted in the in-flight collision with a guy wire of an antenna and separation of 8.5 feet of the left wing."

The accident aircraft was operated by Moran Foods Inc., St. Louis, Missouri, U.S., and was equipped with a cockpit voice recorder (CVR). On the day of the accident, the crew departed the Cahokia/St. Louis Airport, Illinois, U.S., at 0824 hours local time on an instrument flight rules (IFR) flight plan. The crew consisted of a contract pilot, who occupied the left seat and was both the pilot-in-command (PIC) and the pilot flying for the trip to KMKY. A full-time company pilot occupied the right seat and was the copilot.

The crew was scheduled to pick up five passengers at KMKY and return to St. Louis. (KMKY is located on the west coast of Florida, about 138 kilometers [75 NM] west-northwest of Miami. It has no control tower but is equipped with an automated weather observing system [AWOS]. The landing area comprises a single runway [17/35] that is 1,525 meters [5,000 feet] long.)

The flight proceeded uneventfully to the Florida coast. At 1156:45, the crew was descending to flight level (FL) 240



Cessna 550 Citation II

The Cessna 550 Citation II, a 10-passenger business jet, first flew on Jan. 17, 1977. It is powered by two Pratt & Whitney Canada JT-15D-4B turbofan engines, which give it a cruising speed of 713 kilometers per hour (385 knots) at average cruise weights and a service ceiling of 7,680 meters (25,200 feet). Flying controls include single-slotted flaps and hydraulically actuated air brake. Maximum takeoff weight is 6,396 kilograms (14,100 pounds). Its range varies from 3,222 kilometers (1,740 nautical miles [NM]) to 3,704 kilometers (2,000 NM) depending on fuel and passenger loading.

Wingspan of the Cessna 550 is 15.90 meters (52 feet, two inches), and its length overall is 14.39 meters (47 feet, 2.5 inches). Its cabin height is 1.46 meters (four feet, 9.5 inches).

The Cessna 550 requires a crew of two on a separate flight deck. Passengers sit in a carpeted main cabin. A pressurization system maintains a sea-level cabin altitude to 6,720 meters (22,040 feet) or a 2,440-meter (8,000-foot) cabin altitude up to 12,495 meters (41,000 feet). Tricycle landing gear is hydraulically retractable.

Source: *Jane's All the World's Aircraft*

(7,320 meters [24,000 feet]) and monitoring the automatic terminal information service (ATIS) at Naples Municipal Airport, located 20 kilometers (11 NM) northwest of KMKY. The ATIS reported the Naples weather as: 366 meters (1,200 feet) broken, 915 meters (3,000 feet) overcast, with 9.7 kilometers (six miles) visibility in fog. The temperature was 23 degrees C (73 degrees F) and the dew point 19 degrees C (67 degrees F).

At 1206:22, after a series of descents and vectors, the crew was given the Fort Myers, Florida, altimeter setting of 30.00 inches of mercury by the Fort Myers approach control facility and told to expect the Runway 17 approach. The cockpit conversation indicates the crew then began to set up its equipment for the VOR/DME approach to Runway 17 at KMKY, and the PIC commented, "We otta be able to get a visual."

As the crew prepared for the approach, the copilot said, "Three fifty-four on your doohickey over there." The number "354" to which the copilot referred was the height above touchdown for the straight-in MDA (108 meters [354 feet]) when using the KMKY altimeter setting, not the setting for Fort Myers.

At 1207:19, the crew was cleared to descend from 3,355 meters (11,000 feet) to 2,135 meters (7,000 feet). About one minute later, the crew was cleared direct to the Cypress VOR, which is the initial approach fix for the VOR/DME approach into KMKY.

At 1209:29, the copilot said, "Obviously, try to land to the north if we can." The terminal building where the crew was scheduled to meet its passengers was located on the north end of the runway.

Shortly afterward, the copilot remarked, "Man, it is cruddy down here." The copilot also remarked that the weather was not very good for the passengers' vacation. The crew then discussed an intermittent problem with the windscreen bleed air.

The flight was cleared down to 1,525 meters (5,000 feet) and, at 1214:30, the crew was again told to expect the VOR/DME approach to Runway 17 at KMKY.

At 1216:37, ATC gave the crew a radar vector to intercept the final approach course, which the copilot acknowledged, and the crew again discussed whether the windshield bleed air was working properly.

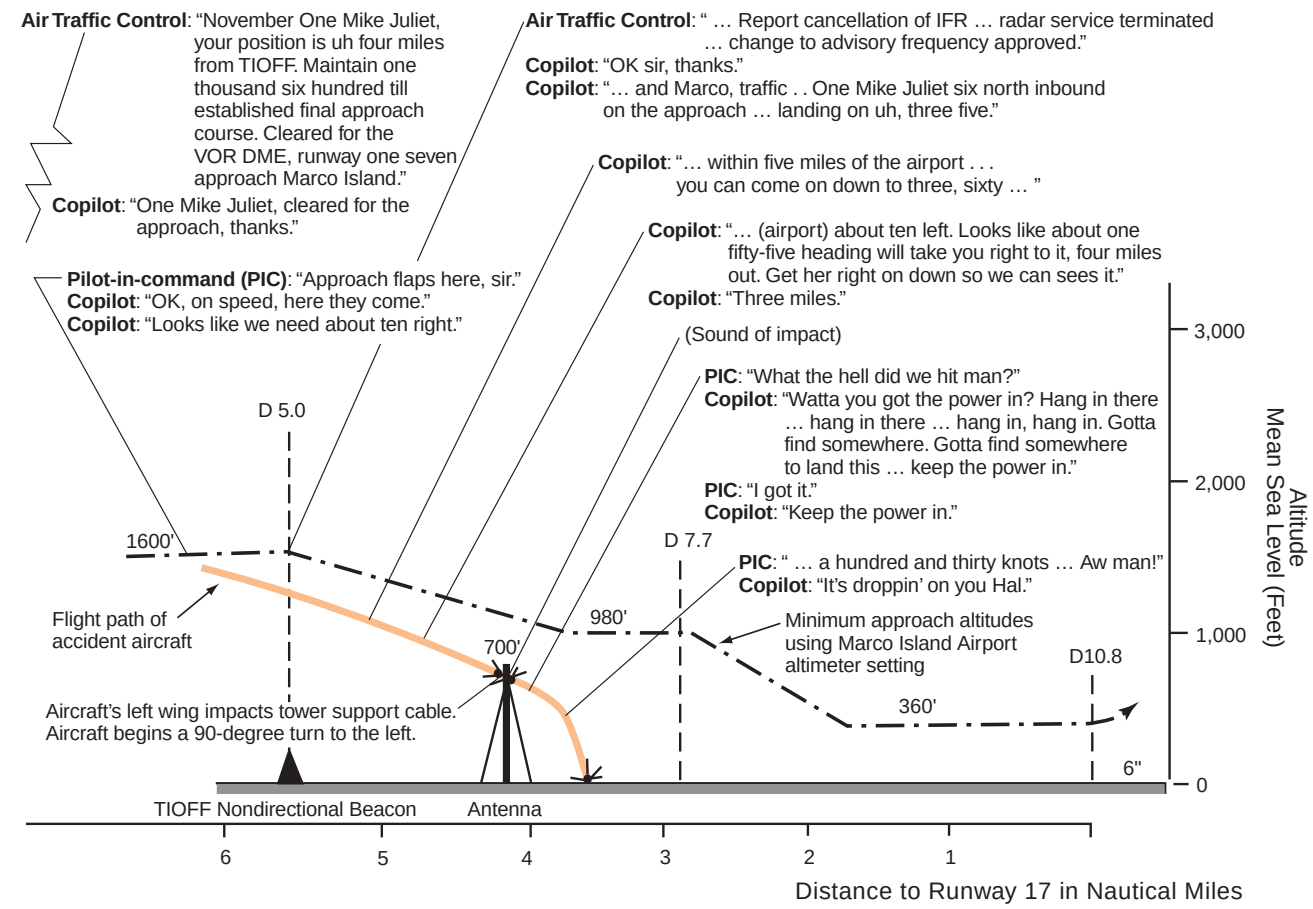
The flight was eventually cleared to descend to 610 meters (2,000 feet). The PIC asked the copilot, "What was the MDA for the approach?"

The copilot replied, "Oooh, it's about three sixty." The copilot then briefed the PIC on the initial altitudes for the approach.

There was a brief discussion about the MDA of 110 meters (360 feet), which was interrupted by the PIC who said, "He [the controller] didn't clear us for the approach. You might ask him about that."

The copilot asked ATC if the flight was cleared for the approach. The controller responded that the flight would need to remain at 610 meters for a short time because of conflicting

Flight Path Profile, Cessna 550 Citation II, Marco Island, Florida, U.S., Dec. 31, 1995



Source: AlliedSignal

Figure 1

traffic. The copilot then told the PIC that, as soon as they were cleared for the approach, they could descend to 488 meters (1,600 feet). The copilot added, "It's more than [eight kilometers (five miles)] and it will be all the way down to nine eighty."

At 1221:56, ATC advised the crew that it was 6.4 kilometers (four miles) from TIOFF (the final approach fix) and cleared the crew for the approach. The PIC then asked the copilot for "approach flaps."

ATC terminated radar service with the flight at 1223:15. The crew then broadcast its position on the common traffic advisory frequency (CTAF) at KMKY and announced that the flight would land on Runway 35.

The copilot told the PIC, "You otta be in pretty good shape if you don't mind sneaking around a little bit." He then told the PIC that they could descend to 110 meters (360 feet) when they were within eight kilometers of the airport.

At 1223:53, the copilot said, "Yuk." Seconds later, he told the PIC that the airport was "a little bit to your left."

At 1224:01, the copilot told the PIC they were 6.4 kilometers (four miles) out and that he should "get her right on down so we can see it." Eighteen seconds later, the sound of an altitude alert could be heard on the CVR. The copilot said, "Three miles [4.8 kilometers]."

One of the pilots said, "There's just a ..." and, at 1224:24, the CVR recorded the sound of an impact. The aircraft's left wing contacted a 1.27-centimeter (0.5-inch) guy wire that supported a 214-meter (700-foot) high tower. The conversation following the strike indicated that "the pilots were aware that the aircraft struck something, but did not know what it was," the report said.

At 1224:54, 30 seconds after the collision, the PIC said, " ... a hundred thirty knots." (The stall speed of an undamaged Cessna 550 Citation II at maximum landing weight is 155 kilometers per hour [84 knots].)

Cockpit Voice Recorder Transcript, Cessna 550, Dec. 31, 1995

[Note: In the following transcript supplied by the NTSB, in contrast to the usual practice, CAM-1 represents the right-seat pilot (copilot) and CAM-2 represents the left-seat pilot (the PIC).]

Time	Source	Content
1216:20	**APR2**:	Citation Nine One Mike Juliet, descend and maintain three thousand.
1216:23	**RDO-1**:	cleared down to three, Mike Juliet.
1216:27	**CAM**:	[Several unintelligible comments]
1216:37	**APR2**:	* Nine One Mike Juliet, turn uh, ten degrees left, join the final approach course.
1216:41	**RDO-1**:	ten left to join, Mike Juliet.
1216:52	**CAM**:	[Several unintelligible comments]
1217:07	**CAM-1**:	now it's working all right, it ...
1217:09	**CAM-2**:	what?
1217:11	**CAM-1**:	windshield ... bleed air.
1217:14	**CAM-2**:	* I turned it (on).
1217:15	**CAM-1**:	oh, did ya?
1217:16	**CAM-2**:	yeah.
1217:16	**CAM-1**:	turn it on let it ...
1217:18	**CAM-2**:	*** .
1217:19	**CAM**:	[Sound of click]
1217:19	**CAM-1**:	just leave it on.
1217:25	**CAM-1**:	it's noisy enough to be working.
1217:29	**CAM-?**:	You know.
1217:32	**CAM**:	[beep similar to altitude alert signal]
1217:33	**CAM-1**:	one down.
1217:38	**APR2**:	Citation Nine One Mike Juliet as practical reduce your speed to one nine zero knots for a departure coming off of Naples.
1217:44	**RDO-1**:	'K, we'll slow it down to one ninety, Mike Juliet.
1217:46	**APR2**:	thank you.
1218:11	**CAM-1**:	[sound of yawn]
1218:29	**CAM-1**:	got a capture.
1218:31	**CAM-2**:	oh thanks corporal.
1218:43	**CAM**:	[Several nonpertinent comments between pilots]
1219:21	**APR2**:	Citation Nine One Mike Juliet, descend and maintain two thousand.
1219:24	**RDO-1**:	all right, down to two thousand, Mike Juliet.

"Numerous witnesses on the ground near the tower reported that the top of the tower was obscured by clouds and the airplane was observed to descend below the base of the clouds, then collided with a guy wire of the antenna," the report said. "A section of the airplane was observed to fall to the ground and the airplane rolled to [the] left nearly inverted, then rolled wings level while descending [and] flying in an easterly direction. Witnesses closer to the accident site observed the airplane roll to the left, pitch nose down, then impact the ground and a fireball was observed."

The airplane collided with the ground on a golf course and created an initial impact crater that measured about 14 meters (46 feet) long, 2.7 meters (nine feet) wide and 0.46 meter (1.5 feet) deep. "The wreckage located near the impact crater consisted of the separated right wing, separated engines, cockpit section and empennage," the report said. "Located in the crater were left-engine and left-wing components. Fire damage to weeds north of the impact crater was observed, as well as fire damage along the wreckage path."

The report continued: "An approximate [2.7-meter (nine-foot)] section of the left wing and section of the left wing aileron were found near an antenna that was located [3.2 kilometers (1.75 nautical miles)] and about 260 degrees magnetic from the impact crater. The empennage and cockpit section, which was heat damaged, was located about [74 meters (242 feet)] from the initial impact crater. Examination of the empennage revealed that the left horizontal stabilizer was displaced up at about a 45-degree angle and aft."

The report said, "The right wing was located about [81 meters (267 feet)] from the impact crater and had sustained heat damage with the wing tip displaced up about 45 degrees. Examination of the wing spars of the right wing revealed evidence of positive overload failure."

Both the landing gear and the speedbrakes were retracted at impact.

A postmortem examination of the pilot and copilot indicated that "the cause of death for both was multiple blunt force injuries," the report said. Toxicological tests of both pilots were negative for alcohol and drugs.

The PIC, 57, held an airline transport pilot (ATP) certificate with type ratings for the Cessna 500 and the Nord 265. He also held a commercial certificate for airplane single- and multi-engine land, instrument airplane, and a flight instructor certificate for airplane single- and multi-engine land and instrument airplane. The PIC held a U.S. Federal Aviation Administration (FAA) first-class medical certificate with the limitation to wear corrective lenses. He had 13,026 hours of flight time, with 2,500 hours in the C-500. In the previous 90 days, the PIC had logged 11 hours in the accident airplane.

1219:27	**CAM-1**:	***.
1219:28	**CAM**:	[Sound of three beeps similar to altitude alert signal]
1219:35	**CAM**:	[Several non-pertinent comments between pilots]
1219:55	**CAM-2**:	what's the MDA for the approach, remember?
1219:58	**CAM-1**:	say again.
1219:58	**CAM-2**:	what was the MDA for the approach?
1220:01	**CAM-1**:	oooh, it's about uh, three sixty.
1220:17	**CAM-1**:	two thousand till established and once you pass the VOR, you can * down to sixteen hundred ... (to or possibly for) five miles ... thence ...
1220:30	**CAM-2**:	down to three ...
1220:34	**CAM-1**:	after five miles *** come down …
1220:40	**CAM-2**:	three sixty.
1220:44	**CAM-1**:	thence … as the book says.
1220:57	**CAM-2**:	he didn't clear us for the approach. you might quiz him about that ...
1221:01	**CAM-?**:	*** to ask?
1221:02	**CAM-?**:	ya.
1221:20	**RDO-1**:	and approach, is One Mike Juliet cleared for the approach?
1221:22	**APR2**:	Nan One Mike Juliet uh, very shortly. I gotta stop you at two thousand uh, for the Naples airport traffic I'll have lower for you in just about a half a mile.
1221:30	**RDO-1**:	very good sir, thanks.
1221:33	**CAM-1**:	well, whenever he does clear you, down to sixteen hundred ...
1221:36	**CAM-2**:	OK ...
1221:37	**CAM**:	[Two beep sounds similar to altitude alert signal]
1221:41	**CAM-1**:	it, it's more than five miles and it will be all the way down to nine eighty.
1221:51	**CAM-?**:	(You know.)
1221:55	**CAM-?**:	*.
1221:56	**APR2**:	November One Mike Juliet, your position is uh, four miles from TIOFF. maintain one thousand six hundred till established final approach course. cleared for the VOR DME, runway one seven approach Marco Island.
1222:06	**RDO-1**:	One Mike Juliet, cleared for the approach, thanks.
1222:09	**CAM-1**:	OK.

The PIC had undergone a check ride in accordance with U.S. Federal Aviation Regulations (FARs), Part 135, in October 1995 in a Beechcraft Model 58. He had undergone a proficiency check in the C-500 in March 1994. The PIC was a contract pilot who would fill in for the operator of the accident aircraft when one of the full-time copilots was unavailable.

The copilot, 41, held an ATP certificate with type ratings for the C-500 and the Nord-265. He also held a commercial certificate for airplane single- and multi-engine land, instrument airplane, and a flight instructor certificate for airplane single- and multi-engine land. The copilot held an FAA first-class medical certificate with no limitations. He had 10,395 hours of flight time, with 3,024 hours in the C-500. In the previous 90 days, the copilot had flown 70 hours in the accident airplane.

The copilot had undergone recurrent training in the C-500 at FlightSafety International (FSI) in January 1995. He was scheduled to return to FSI for recurrent training three days after the accident flight.

In its review of the CVR, the NTSB said that "the pilots were personal friends and there was much personal conversation and a very relaxed atmosphere apparent in the cockpit."

The VOR/DME approach to Runway 17 begins at the Cypress (CYY) VOR and is flown by following the CYY 148-degree radial at a minimum altitude of 488 meters (1,600 feet) until crossing TIOFF (the final approach fix) at 5.0 DME.

Minimum altitudes for the rest of the approach to KMKY vary with the altimeter setting used. If the local altimeter setting is used, the minimum altitude between TIOFF and the stepdown fix at 7.7 DME is 299 meters (980 feet), and after leaving 7.7 DME the straight-in MDA is 110 meters (360 feet).

If the Fort Myers altimeter setting is used, as it was in the accident aircraft, these minimums increase to 323 meters (1,060 feet) for the leg from TIOFF to DME 7.7 and 134 meters (440 feet) for the straight-in MDA.

"[The copilot] mentioned the 980-foot level at one point in his conversation with [the PIC], but it appeared that he was not aware of the need to hold the higher altitude to 7.7 DME, or he was not fully aware of the position of the aircraft," the report said.

Because the crew had planned to land on Runway 35, the circling minimums were also relevant. The circling MDA when using the local altimeter setting was 128 meters (420 feet), and 152 meters (500 feet) when using the Fort Myers altimeter setting. The flight crew "did not discuss the missed-approach procedure, nor the MDA and visibility minimums for a circle-to-land approach," the report said.

1222:10	**CAM-2**:	approach flaps here, sir.
1222:11	**CAM-1**:	OK, on speed, here they come.
1222:14	**CAM-?**:	oop.
1222:41	**CAM-1**:	looks like we need about ten right.
1222:51	**CAM-1**:	one down at nine eighty.
1222:52	**CAM**:	[Beep sound similar to altitude alert signal]
1222:57	**CAM**:	[Two beep sounds similar to altitude alert signal]
1223:06	**CAM-1**:	shoot.
1223:07	**APR2**:	November Nine One Mike Juliet, report cancellation of IFR on this frequency uh, unable that on the ground on one two zero point eight.
1223:13	**RDO-1**:	One Mike Juliet will do, thanks.
1223:15	**APR2**:	One Mike Juliet, radar service terminated and uh, change to advisory frequency approved uh, talk to you in a little bit.
1223:21	**RDO-1**:	OK sir, thanks.
1223:24	**RDO-1**:	and Marco, traffic Nine One Mike Juliet
1223:27	**CAM**:	[Beep sound similar to altitude alert signal]
1223:27	**RDO-1**:	… six north inbound on the approach. will be landing on uh, three five.
1223:32	**CAM-2**:	hopefully.
1223:34	**CAM-1**:	yeah, you otta be in pretty good shape if you don't mind sneaking around a bit. yeah, within five miles of the airport there you can come on down to three, sixty ...
1223:45	**CAM**:	[Two beep sounds followed by a single beep similar to altitude alert signal]
1223:53	**CAM-1**:	yuk.
1223:56	**CAM-2**:	set the alarm.
1223:57	**CAM-1**:	ah, the airport's a little bit to your left ...
1223:59	**CAM**:	[Sound of three beeps similar to altitude alert signal]
1224:01	**CAM-1**:	... about ten left. looks like about one fifty-five heading will take you right to it, four miles out. get her right on down so we can sees it.
1224:19	**CAM**:	[Sound of long beep similar to altitude alert signal]
1224:21	**CAM-1**:	three miles.
1224:24	**CAM-?**:	there's just a …

The report noted that "at no time during the time recorded on the CVR did [the crew] report seeing the ground."

The antenna struck by the accident aircraft was located about 0.8 kilometer (0.5 mile) north of the 7.7 DME stepdown fix and 579 meters (1,900 feet) east of the final approach course. "There was no mention during the conversation on the [CVR] tape of the presence of the tower [antenna] near the VOR 17 approach," the report said.

The flight crew was using instrument approach charts published by Jeppesen Sanderson Inc. The antenna struck by the accident flight was prominently and accurately displayed on the plan view of the VOR/DME Runway 17 approach chart for KMKY. Investigators could not find the approach chart in the wreckage of the accident aircraft. But they did locate the flight crew's Jeppesen approach chart manual, which listed the most current revision.

Investigators reviewed the weather encountered by the accident flight. The flight crew of another aircraft that had flown into KMKY 30 minutes before the accident flight told investigators that it had executed the VOR/DME approach to Runway 17, but discontinued the approach when it encountered visual meteorological conditions (VMC) approximately 6.4 kilometers (four miles) from the airport.

The same flight crew also told investigators that it had departed KMKY approximately 44 minutes after the accident and that there was an overcast layer at 76 meters to 91 meters (250 feet to 300 feet) mean sea level (MSL) when it departed. The flight crew said that the tops of the first cloud layer were at 305 meters (1,000 feet) and that there were higher clouds above it.

The pilot of another aircraft that departed KMKY at about the same time also said that the cloud bases were at 76 meters to 91 meters MSL with not more than 4.8 kilometers (three miles) visibility, and that the cloud tops were 610 meters to 762 meters (2,000 feet to 2,500 feet). This pilot, who was conducting an instrument proficiency flight on the day of the accident, told investigators that when flying the VOR/DME approach to Runway 17 at KMKY, he always maintained an altitude of 335 meters (1,100 feet) MSL until crossing the 7.7 DME stepdown fix because of the presence of the antenna tower.

The accident report said, "The Marco Island Airport … AWOS … was not operational/commissioned on the day of the accident." (An AWOS consists of various sensors, a processor, a computer-generated voice subsystem and a transmitter to broadcast local, minute-by-minute weather data directly to a pilot who is within 46 kilometers [25 NM] of the AWOS site. A fully equipped AWOS can report the ceiling, visibility, temperature, dew point, altimeter setting and density altitude.)

1224:25	**CAM**:	[Sound of impact]
1224:26	**CAM-2**:	hey.
1224:27	**CAM-1**:	God bless Hal, what the?
1224:28	**CAM-2**:	#.
1224:28	**CAM-1**:	Hang in there buddy, hang in, hang in, hang in ...
1224:29	**CAM**:	[Sound of horn]
1224:30	**CAM-1**:	... hang in, hang in.
1224:33	**CAM-2**:	what the hell did we hit, man?
1224:36	**CAM-1**:	watta you got the power in?
1224:39	**CAM-1**:	hang in there, hang in there ... hang in, hang in. gotta find somewhere. gotta find somewhere to land this ... keep the power in.
1224:53	**CAM-2**:	I got it.
1224:53	**CAM-1**:	keep the power in.
1224:54	**CAM-2**:	** a hundred and thirty knots.
1225:01	**CAM-2**:	aw man.
1225:04	**CAM-1**:	It's droppin' on you Hal.
1225:04	**CAM**:	[Sound of screaming]
1225:07		end of recording

RDO =	Radio transmission from accident aircraft
CAM =	Cockpit area microphone voice or sound source
APR2 =	Radio transmission from Fort Myers approach controller
-1 =	Voice identified as co-pilot
-2 =	Voice identified as pilot-in-command (PIC)
-? =	Voice unidentified
* =	Unintelligible word
# =	Expletive
( ) =	Questionable insertion
[ ] =	Editorial insertion
.... =	Pause

Source: U.S. National Transportation Safety Board

Investigators examined the antenna guy wire that was struck by the accident aircraft. "The broken guy wire by design was attached about [8.5 meters (28 feet)] below the top of the [213 meter–tall (700 foot–tall)] tower and was the uppermost wire of a series of eight that were secured to a base located northwest of the tower," the report said. "The [1.27-centimeter (0.5-inch)] cable [struck by the aircraft] was not secured to the attach point at the base and was wrapped around the remaining upper guy wires."

Statements of Three Cessna 550 Accident Witnesses, East Naples, Florida, U.S., Dec. 31, 1995

- "I first heard the engines of the twin Citation jet coming and going above the tower, but in cloud so I couldn't ... see the aircraft. I would estimate about [397 meters (1,300 feet)]. About one to two minutes later, the aircraft broke cloud cover base at [198 meters (650 feet)] and virtually immediately struck one of the steel guide wires. I heard within one second firstly a pop and then a twang. I think that the pop was the port wing being cut through and then the twang sounding like a guitar string breaking the guide wire.

  "I saw the aircraft after the strike ... descending wing-tip down with both engines roaring — as if the pilot was trying to gain height. I assumed they were trying to regain control — fighting like mad. ... After a two- to two-and-one-half-minute silence, I though they had pancaked somewhere. But ... immediately after that I heard a loud boom and knew they had crashed.

  "As an ex-pilot, I would like to have seen the strobe lights on the tower — on during the day as well as at night. It might make the tower more visible in bad flying weather conditions."

- "I was standing on the sixth green at Eagle Creek Country Club when I heard a loud roar to my right. An airplane came shooting out of the clouds about [92 meters to 122 meters (300 feet to 400 feet)] above my head. I was looking at the underside of the plane. The landing gear was retracted but the gear doors were open. The tower was to my left and I knew the plane was too low to avoid hitting some part of it.

  "The plane hit the right wires of the tower and one large part of the plane ... flew into the woods on the left. As the plane went through the wires, debris and a large section of the wing flew towards the no. 7 tee. The plane tilted very hard to the right, struggled for control and continued flying."

- "I have [flown] the VOR DME 17 at [K]MKY many times and never had a problem, however ... my personal minimums are [336 meters (1,100 feet) above] MSL until eight DME, because in my opinion that tower is too damn close. It shouldn't be there!"♦

The report said, "The broken cable was later removed, and examination revealed a dark spot on the cable lasting about [2.1 meters (seven feet)], starting about [30.5 meters (100 feet)] down the attach point to the tower. This corresponds to about [179 meters (587 feet)] above ground level [AGL]."

The antenna tower was equipped with a lighting system. Reports from witnesses indicated that the tower lights were not operating at the time of the accident. "The day after the accident, the lighting system, [including the] monitor and emergency generator of the tower antenna, were operationally checked, which revealed no evidence of preimpact failure or malfunction," the report said.

The antenna tower was also examined to determine if the painted obstruction markings on the tower conformed to FAA guidelines. The report said that the paint on the tower was "badly faded and chipped," and did "not appear to meet the required 'hue,' 'value' or 'chroma' standards of the color tolerance chart."

The technician responsible for maintaining the tower told investigators that he knew that the tower was in need of repainting, and that the repainting had been scheduled for the previous year. "However, because of subsequent management discussions to replace the tower, [the technician] had made the decision to postpone the painting until after a determination was made as to whether the tower would be replaced," the report said.

During the investigation, an aerodynamic analysis was conducted to determine if the crew could have maintained control of the aircraft after the section of the left wing had separated. "Level flight may have been possible with about 15 degrees up-deflection of the right aileron," the report said. "The [Cessna] 550 has 19 degrees up-aileron travel available. The assumptions used for this analysis are questionable; however, according to witness statements and the CVR tape, the pilots apparently had some remaining control of the aircraft."♦

Editorial note: This article was adapted from a factual aviation report, identification no. MIA96FA051, prepared by the U.S. National Transportation Safety Board (NTSB) on Cessna 550, N91MJ, East Naples, Florida, Dec. 31, 1995.

ACCIDENT PREVENTION

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