NATIONAL TRANSPORTATION SAFETY BOARD
Office of Research and Engineering
Vehicle Recorder Division
Washington, DC 20594

GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

CEN13FA196

By
Christopher Babcock

WARNING

The reader of this report is cautioned that the transcription of a cockpit voice recorder audio recording is not a precise science but is the best product possible from a Safety Board group investigative effort. The transcript or parts thereof, if taken out of context, could be misleading. The transcript should be viewed as an investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

NATIONAL TRANSPORTATION SAFETY BOARD
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December 16, 2013

Cockpit Voice Recorder

Group Chairman's Factual Report
By Christopher Babcock

1. EVENT

Location:	South Bend, Indiana
Date:	March 17, 2013, 1623 Eastern Daylight Time (EDT)[1]
Aircraft:	Hawker Beechcraft 390
Operator:	Private
Registration:	N26DK
NTSB Number:	CEN13FA196

2. GROUP

A group was convened on March 26, 2013.

Chairman: Christopher Babcock
Aerospace Engineer
National Transportation Safety Board

Member: Andrew Todd Fox
Investigator-in-Charge
National Transportation Safety Board

Member: Robert Hendrickson
Air Safety Investigator
Federal Aviation Administration

Member: Constantine Kleissas
Air Safety Investigator
Federal Aviation Administration

Member: Mark Mohler
Senior Demonstration Captain
Beechcraft Corporation

[1] All times are expressed in local EDT, unless otherwise noted

3. SUMMARY

On March 17, 2013, a privately operated Beechcraft 390, registration N26DK, collided with residential structures and terrain following several aborted landing attempts at the South Bend Regional Airport in South Bend, Indiana. The flight was operating under Title 14 Code of Federal Regulations (CFR) Part 91 as a passenger flight from Tulsa, OK, to South Bend. The pilot and copilot sustained fatal injuries. The two passengers and one person on the ground received serious injuries.

The solid-state cockpit voice recorder (CVR) from the aircraft was sent to the National Transportation Safety Board's Audio Laboratory for evaluation. The CVR group meeting convened on March 26, 2013, and a complete transcript was prepared for the entire 31 minute and 11 second recording.

4. DETAILS OF INVESTIGATION

On March 19, 2013, the NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **L-3 Communications FA2100-1010**
Recorder Serial Number: **446023**

4.1. Recorder Description

Per federal regulation, US registered, multi-engine, turbine-powered, aircraft requiring two pilots and containing six or more passenger seats, and operating under 14 CFR Part 91 and manufactured prior to April 7, 2010, must be equipped with a CVR that records a minimum of the last 30 minutes of audio data; this is accomplished by recording over the oldest audio data. When the CVR is deactivated or removed from the airplane, it retains only the most recent 30 minutes of aircraft operation.

This model CVR, the L-3 Communications FA2100-1010, records 30 minutes of digital audio on a continuous loop in a 4-channel format.

4.2. Recorder Damage

Upon arrival at the audio laboratory, it was evident that the CVR had not sustained any heat or structural damage and the audio information was extracted from the recorder normally, without difficulty.

4.3. CVR Channels

The recording consisted of four channels of audio information. Two of the channels contained excellent quality audio information from the pilot's and copilot's audio panels.[2] One channel contained good quality CAM audio information. The fourth channel contained cabin public address and chimes.

4.4. Timing and Correlation

Timing on the recording was determined by synchronizing the VHF radio transmissions from the aircraft recorded on the CVR with the corresponding

[2] See Attachment I for the CVR Quality Rating Scale

transmissions recorded by the FAA air traffic facilities. The FAA recordings contain an embedded IRIG time code that reports Universal Coordinated Time (UTC). Nineteen hours, 45 minutes, and 30.8 seconds were added to the CVR elapsed time to align the CVR transcript with UTC time. A 4 hour offset was applied to convert from the UTC time embedded in the FAA recordings to local EDT.

4.5. Summary of Recording Contents

The recording began at 1545:30.8 EDT with the aircraft in cruise toward South Bend. It contained events from the cruise, descent, and accident sequences. The recording ended at 1616:31.5 EDT, while the aircraft was still in flight.

Christopher Babcock
Aerospace Engineer
Vehicle Recorder Division

Attachment I

CVR Quality Rating Scale

The levels of recording quality are characterized by the following traits of the cockpit voice recorder information:

Excellent Quality Virtually all of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate only one or two words that were not intelligible. Any loss in the transcript is usually attributed to simultaneous cockpit/radio transmissions that obscure each other.

Good Quality Most of the crew conversations could be accurately and easily understood. The transcript that was developed may indicate several words or phrases that were not intelligible. Any loss in the transcript can be attributed to minor technical deficiencies or momentary dropouts in the recording system or to a large number of simultaneous cockpit/radio transmissions that obscure each other.

Fair Quality The majority of the crew conversations were intelligible. The transcript that was developed may indicate passages where conversations were unintelligible or fragmented. This type of recording is usually caused by cockpit noise that obscures portions of the voice signals or by a minor electrical or mechanical failure of the CVR system that distorts or obscures the audio information.

Poor Quality Extraordinary means had to be used to make some of the crew conversations intelligible. The transcript that was developed may indicate fragmented phrases and conversations and may indicate extensive passages where conversations were missing or unintelligible. This type of recording is usually caused by a combination of a high cockpit noise level with a low voice signal (poor signal-to-noise ratio) or by a mechanical or electrical failure of the CVR system that severely distorts or obscures the audio information.

Unusable Crew conversations may be discerned, but neither ordinary nor extraordinary means made it possible to develop a meaningful transcript of the conversations. This type of recording is usually caused by an almost total mechanical or electrical failure of the CVR system.

Transcript of a cockpit voice recorder installed on a Beechcraft 390 (N26DK) that crashed while attempting to land in South Bend, Indiana.

LEGEND

CAM	Cockpit area microphone voice or sound source
HOT	Flight crew audio panel voice or sound source
PA	Public address system announcement
INT	Crew intercom audio
ZKC	Radio transmission from Kansas City Center controller
ZAU	Radio transmission from Chicago Center controller
ATIS	South Bend Regional Airport Automated Terminal Information System recording
TCAS	Traffic Collision Avoidance System sound source
APP	Radio transmission from South Bend Approach controller
-1	Voice identified as the captain
-2	Voice identified as the first officer
-?	Voice unidentified
-A	First identified facility controller
-B	Second identified facility controller
-C	Third identified facility controller
*****	Unintelligible word
#	Expletive
@	Non-pertinent word
( )	Questionable insertion
[ ]	Editorial insertion

Note 1: Times are expressed in Eastern Daylight Time.

Note 2: Generally, only radio transmissions to and from the incident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1545:30.8 **START OF RECORDING** **START OF TRANSCRIPT**			
1545:31.2 **HOT-1**	we don't need the fuel to the top but that'll let us have stronger winds than forecast and still have plenty of fuel to get on the ground.		
1545:37.9 **HOT-2**	right.		
1545:46.2 **HOT-1**	and then if I want that to go away what would I push? if I want this to go away what would I push?		
1545:51.8 **HOT-2**	back over here?		
1545:52.9 **HOT-1**	if I want this screen to change back to where we can look at our route.		
1545:58.5 **HOT-2**	well here? or here?		
1546:00.7 **HOT-1**	no. here.		
1546:01.5 **HOT-2**	oh memory.		
1546:02.5 **HOT-1**	mem two.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1546:04.1 **HOT-1**	okay. alright.		
1546:07.9 **HOT-2**	a lot of stuff to learn.		
1546:09.0 **HOT-1**	strong winds.		
1546:10.1 **HOT-2**	yeah.		
1546:10.7 **HOT-1**	but five hundred fourteen.		
1546:13.1 **HOT-2**	life is good.		
1546:14.4 **HOT-1**	it's a wonderful thing. then uh the corollary to that is on the way back uh we'll be getting hit for about ninety knots so the four twenty seven will be three twenty seven.		
		1546:22.4 **ZKC**	november six delta kilo contact Kansas City Center one three three point two two.
		1546:27.4 **RDO-1**	thirty three twenty two for six delta kilo. so long.
		1546:55.8 **RDO-1**	center Premier jet two six delta kilo. four one zero.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1547:19.8 **HOT-1**	'kay we're monitoring this also and when it gets to about a hundred and twenty that's when we can bring up ATIS and uh find out uh what what— what their landing winds and stuff like that.		
1547:29.2 **HOT-2**	yeah.		
		1547:42.6 **RDO-1**	Kansas City Center Premier jet two six delta kilo. four one zero.
		1547:47.8 **ZKC**	Premier uh two six delta kilo Kansas City Center roger.
1547:56.8 **HOT-1**	our check in with them is always the same. uh if we're in a climb we tell him what our current altitude is and where we're comin' to.		
1548:03.8 **HOT-2**	right.		
1548:04.7 **HOT-1**	and uh anytime we're above eighteen uh we're either flight level four one zero or just four one zero. they're okay with either one.		
1548:15.9 **HOT-1**	and then um the only other thing that we might have is if they have a routing for us- uh a change in in course and they'll say uh 'we have— we have an amendment to your flight plan. advise when ready to copy.' and then they start talking like a machine gun.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1548:31.4 **HOT-2**	yeah. I know.		
1548:32.5 **HOT-1**	and that's where I bring out the Ipad and um they're gonna always at this altitude— they're gonna always give me uh uh intersections at the high— high charts so uh * radar— this is looking at a VFR map of of what we're doing because I've got it set up for VFR but then I would— I would change it to IFR high because that's what we're actually navigating with right now.		
1549:02.4 **HOT-2**	right.		
1549:03.1 **HOT-1**	so in a minute our airplane's gonna come up and it's gonna be right about here. and then uh from that I'll be able to see by chart all the waypoints they w— they would give me.		
1549:13.8 **HOT-2**	right.		
1549:14.2 **HOT-1**	uh so I'll take and read back to them what they have and before I start programming I'll find it on here and I'll start talking and I can literally do a find right here and it'll show me that waypoint right here.		
1549:26.1 **HOT-2**	right.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1549:26.7 **HOT-1**	so it's way better and this is every chart in America and it up— updates it every twenty eight days but it's pushing a button and it downloads the entire United States. all the charts for VFR IFR low IFR high and all I— ILS landing charts. uh downloads them in about thirty minutes every month.		
1549:30.3 **HOT-2**	right.		
1550:20.3 **HOT-1**	our fuel burn's really good. we haven't gotten our trim out of whack. you can fly for fifty hours and never get out of trim there but every once in a while uh it tells us that we're getting ready to come— come up with a change now it's effective the * we picked up the new leg and we're gonna slightly turn on the flight plan.		
1550:41.3 **HOT-2**	alright.		
1550:41.7 **HOT-1**	and then our airspeed will pick up when we do— our ground speed will uh because now we've got a little more favorable wind.		
1550:54.9 **HOT-1**	and I'm still inside of my okay range on uh landing weight.		
1551:03.6 **HOT-1**	this plane was actually engineered for uh fourteen and a half thousand pound weight.		
1551:09.2 **HOT-2**	yeah you mentioned that.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1551:10.2 **HOT-1**	uh so my rule of thumb is I don't— I— I don't have any problem with thirteen and a half thousand but it's still uh— and the landing gear was actually engineered for a thirteen thousand pound landing weight.		
1551:26.6 **HOT-2**	right.		
1551:26.9 **HOT-1**	so even though the book is that I don't uh I don't pay a whole lot of attention to it.		
1552:02.3 **HOT-1**	when we come back we'll still have that overcast layer so we'll have to fly the ILS into one left comin' in to Riverside.		
1552:14.0 **HOT-1**	and they'll probably have us expecting a VFR arrival.		
		1552:17.3 **ZKC**	november two six delta kilo contact Chicago Center one three four point zero two.
		1552:22.1 **RDO-1**	thirty four zero two. two six delta kilo.
1552:30.4 **HOT-1**	I just pause long enough to make sure they're not working somebody else.		
		1552:33.6 **RDO-1**	Chicago Center Premier jet two six delta kilo four one zero.
		1552:37.1 **ZAU-A**	november two six delta kilo Chicago Center. descend and maintain flight level two four zero.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1552:41.7 **RDO-1**	down now to two four zero. six delta kilo.
1552:44.4 **HOT-1**	so we got to dial that in. this one you need a lot more fuel...and do you remember from your IFR days uh what's the minimum descent altitude you have to maintain?		
1552:58.4 **HOT-2**	say again?		
1552:58.9 **HOT-1**	if they give you an assigned descent how fast do you have to come down?		
1553:03.0 **HOT-2**	uh let's see. how fast?		
1553:05.3 **HOT-1**	uh uh yeah how many feet a minute do they expect you to do?		
1553:10.6 **HOT-2**	mmm don't remember.		
1553:11.7 **HOT-1**	have to come down at least a thousand a minute so let's kick in vertical speed.		
1553:19.3 **HOT-1**	you have to push in on the— yup and then dial us down. and we want to dial down to about a thousand feet a minute because we don't want to come down a lot faster than what we have to.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1553:29.1 **HOT-1**	and now we're gonna watch the speed. and and what you've got is uh uh pitch...power...speed. we've pitched down so now we've got to manage power to keep the speed in line. so we're gonna watch the speed climb and uh as it— as it continues to gain right there we'll continue to gain a little speed so we just have to be able to keep it from going in to uh the red.		
1553:58.0 **HOT-1**	and right now if we— if we were shootin' for our waypoint at uh thirty miles out we'd be comin' down at two thousand feet a minute.		
1554:05.6 **HOT-2**	right.		
1554:08.8 **HOT-1**	uh so we can go ahead and pitch down and let's get the um the cyan arrow to be inside of the magenta circle. and we do that by nosing down a little bit more uh to get that to be inside of there. you get—		
		1554:22.0 **ZAU-A**	two six delta kilo turn ten degrees to your left for traffic. what'll that make your heading be?
1554:26.2 **HOT-2**	how much?		
		1554:27.2 **RDO-1**	ten to the left will take us to zero four six.
		1554:29.9 **ZAU-A**	alright zero forty five please. then a forty five heading.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1554:32.4 **RDO-1**	we'll catch forty five. six delta kilo.
1554:34.7 **HOT-1**	so we want fifteen to the left on our heading so I'm gonna come here since we were flying a little off of that and now let's engage heading the the button— there you go. so we went off of FMS and we've gone to heading we have to verify that. and we want to keep our descent going so let's go ahead and come down a little bit more on our nose and we're watching our speed and we're getting ready to go in to an area so you can see where it's trending right now it's where it's going to be so that's where we got to bring it back because in six seconds it's gonna be going too fast. so let's bury the magenta by pulling it back so the magenta goes out of sight.		
1555:11.1 **HOT-1**	and we're good. so uh we're not quite in to the magenta so let's go ahead and come down in to the magenta circle. just another couple clicks that's a hundred foot every click you make.		
1555:21.1 **HOT-2**	alright.		
1555:22.0 **HOT-1**	and we're up more speed so we got to get our power back. gettin' ready to start beeping at us. got to bring it back.		
1555:26.5 **HOT**	[sound similar to overspeed warning lasting 13.5 seconds]		
1555:31.0 **HOT-2**	just pull it way back?		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1555:32.3 **HOT-1**	well just get it out of the line. and we got to get it so that it trends— there you go. there you go. now give it— it ends. there you go.		
1555:43.4 **HOT-1**	and now we're in there so let's go ahead and bring it— let's bury it coming back up the magenta line. bring it back so that it's buried and out of sight and that'll hold our speed.		
1555:52.4 **HOT-1**	good.		
1555:54.7 **HOT-2**	I just hate chasin' the darn thing.		
1555:57.7 **HOT-1**	huh how many hours you got flying this jet?		
1556:00.6 **HOT-2**	well I know but I'm just saying it's just you know it's just uncomfortable…cre— creates an alarm in the back. throttle up throttle down.		
1556:17.6 **HOT-1**	and we're watching— we're tracking off of here. uh so this is no longer gonna be a valid one.		
1556:24.2 **HOT-2**	right.		
1556:24.5 **HOT-1**	uh for us. 'cause when we come back on we'll come back on at a different angle away from it.		
1556:28.7 **HOT-2**	right.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1556:29.3 **HOT-1**	uh so we'll have to reset it again. and we'll do that by selecting it. put it into here. put it back up. and it'll draw a new line at a new angle from present position to thirty miles out what would it be? and that way it'll calculate a new top of descent based on how far we've come off course.		
1556:45.0 **HOT-2**	okay.		
1556:53.6 **HOT-1**	and we're happy to chase it up now.		
1557:01.5 **HOT-2**	go up?		
1557:02.2 **HOT-1**	yup we want to chase the red line.		
1557:09.8 **HOT-1**	and then as he's bringing us down in to the clouds it's plenty cold so uh once we get in to the clouds we'll go ahead and bring on our engine heat...uh not our wings but our engine. when we get to clouds when we get to the clouds.		
1557:23.6 **HOT-2**	okay…okay okay.		
1557:28.6 **HOT-2**	so pull back?		
1557:29.5 **HOT-1**	little bit. little bit. keep working it back 'cause that tells you where you're gonna be in six seconds. so right now you're gonna be at the line in six seconds so you want to continue to trend back. so yeah. so just take two seventy or something like that.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1557:52.5 **HOT-1**	just keep us out of the red.		
		1558:00.2 **ATIS**	* information charlie...South Bend information charlie one niner five four observation. wind—
		1558:08.1 **ZAU-A**	november six delta kilo uh cleared direct to uh South Bend.
		1558:11.9 **RDO-1**	direct South Bend now. six delta kilo.
1558:14.3 **HOT-1**	so th— I'm gonna se— we're gonna select that. goes on to the scratchpad and we bring it in again and we execute it and watch this change a little and our line's gonna move on there a little.		
1558:25.7 **HOT-2**	right.		
1558:26.0 **HOT-1**	our line moved over?		
1558:26.8 **HOT-2**	right.		
1558:27.0 **HOT-1**	now we want to nav to it so let's go ahead and select nav and th— and then verify we got FMS that goes solid green. we have to keep watching until we're on to solid green then it's gonna begin the turn and take us back and then that line's gonna center up.		
1558:40.3 **HOT-2**	sure.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1558:41.7 **HOT-1**	and we've got more speed we can add now because we're about twenty five knots slow for where we could be.		
1558:47.2 **HOT-2**	right.		
1558:48.0 **HOT-1**	we're still fast. Mach seven three. four twenty two through the air. five ten across the ground but we got an— another twenty to give.		
1559:00.7 **HOT-1**	this is where we're kind of looking. this shows that we're nose down and in fact we're in a descent. it shows we're in a right turn and in fact that right wing is lower than the horizon.		
1559:09.3 **HOT-2**	right.		
1559:09.8 **HOT-1**	so it's just verifying that everything's happening the way we expect it to happen and we verify that our backup source is mirroring what what we're supposed to do.		
		1559:24.4 **ATIS**	...in use. contact ground for pushback one two one point seven. clearance delivery one two one point niner. advise on initial contact you have information charlie...South Bend information charlie one niner five four observation. wind one two zero at one zero gust one five. visibility one zero. few clouds at three thousand seven hundred. temperature two. dewpoint minus eight. altimeter three zero one five. visual approach runway niner right in use. contact ground for pushback one two one point seven. clearance delivery one two one point niner. advise on initial contact you have information charlie.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1559:42.1 **HOT-2**	you're in the— you want to get the engine heat?		
		1600:01.2 **ZAU-A**	november six delta kilo contact Chicago Center one two zero point one two.
		1600:06.3 **RDO-1**	one two zero one two. six delta kilo.
1600:17.0 **HOT-1**	push in on it. sync it.		
1600:19.5 **HOT-1**	good.		
1600:24.9 **HOT-2**	did you hit the...on the ice protection?		
1600:29.5 **HOT-1**	uh we're gonna wait— we'll— we'll get an ice light up here probably.		
1600:34.2 **HOT-2**	okay. pull back on the power?		
		1600:46.7 **RDO-1**	Chicago good afternoon. Premier jet two six delta kilo. twenty seven five for two four zero.
		1601:11.0 **RDO-1**	Chicago Center Premier jet two six delta kilo. two seven zero for two four zero.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1601:16.4 **ZAU-B**	uh Premier two six del— uh delta kilo Chicago Center roger.
1601:30.1 **HOT-1**	okay I'm gonna go ahead and promote...uh I'll wait just a minute but they'll likely—		
		1601:34.6 **ZAU-B**	november two six delta kilo descend and maintain flight level two zero zero.
		1601:37.7 **RDO-1**	two zero zero now. six delta kilo.
1601:43.1 **HOT-1**	uh that's still— we're still right on that so everything's good. we'll just keep it going.		
1601:50.8 **HOT-1**	and we got a little speed to gain if you want to gain a little speed.		
1602:09.5 **HOT-1**	you can see the clouds are getting a lot thinner.		
1602:11.1 **HOT-2**	right.		
1602:13.4 **HOT-1**	and I— I got ATIS uh just a minute ago jumped over and got ATIS. uh winds are one twenty at ten. uh gusts to fifteen.		
1602:25.5 **HOT-2**	right.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1602:25.8 **HOT-1**	uh so that's a thirty knot component to us at ten knots. and thirty knots has got an effective of about uh thirty five percent so that's gonna give us about a uh about a eight knot— seven to eight knots to our right. we'll have a crab just a little bit comin' in to it. we'll come out of the crab with a low right wing and a left rudder just when we land.		
1602:59.5 **HOT-1**	and now for our purposes I've gone to our approach and landing speeds. uh we're at eight hundred feet so we'll callin' that a thousand. uh we've got a speed right now— our speed is— our— our temperature is zero. is freezing there. and our weight is gonna be eleven five so our ref speed is one seventeen.		
1603:18.4 **HOT-2**	right. okay.		
		1603:22.0 **ZAU-B**	november two six delta kilo descend and maintain one seven thousand. expedite your descent through uh eighteen for traffic.
		1603:28.4 **RDO-1**	we'll hurry down through eighteen to seventeen now six delta kilo.
1603:36.9 **HOT-1**	now I've got pitch so I'm gonna be ready for power.		
1603:41.8 **HOT-1**	and I've set my ref speed now. one seventeen.		
1603:50.7 **HOT-1**	watch your speed.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1604:05.6 **HOT-1**	very good very good. great speed management.		
1604:08.0 **HOT-2**	huh?		
1604:28.0 **HOT-1**	okay what I'm— what I'm thinking is that I'm gonna have to transition from ten to twenty six hundred in thirty miles.		
1604:35.4 **HOT-2**	right.		
1604:36.0 **HOT-1**	uh because that's the distance that we'll basically be covering so uh I want to keep that in mind. they're gonna uh not give me total flexibility on it uh but I've still got to keep in mind that's what I'm trying to manage to and the only thing that I can do at that time is speed and at ten thousand I'm maxed at two fifty on my speed. though what I can do is if they're holding me up holding me up I can bring spe— speed back a little and then I also have my speed brakes that'll let me descend at an even faster pace.		
1605:03.5 **HOT-2**	right.		
1605:07.6 **HOT**	[sound similar to altitude alert]		
1605:09.0 **HOT-1**	thousand away.		
1605:11.0 **HOT-1**	okay now we can come nose back up.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1605:13.0 **TCAS**	traffic traffic.		
		1605:14.5 **ZAU-B**	november two six delta kilo thanks for your help. you've got traffic eleven oh clock and 'bout two miles. outbound Challenger at one six thousand.
		1605:22.3 **RDO-1**	got that traffic. six delta kilo.
1605:28.5 **HOT-1**	and let's go to the stop.		
1605:32.6 **HOT-2**	okay.		
1605:33.6 **HOT-1**	to the click. MCT.		
1605:39.1 **HOT-1**	good.		
1605:42.2 **HOT-1**	now they've not given us an altitude— altimeter. so I'm gonna use three zero one five uh for my altimeter. once they descended me below eighteen they needed to give me an altitude but they didn't.		
1605:51.8 **HOT**	[sound similar to altitude alert]		
1605:59.9 **HOT-1**	and you want to pick up that altimeter also. three zero one five.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1606:04.1 **HOT-2**	uh three one *.		
1606:04.9 **HOT-1**	there you go.		
1606:14.0 **HOT**	[sound similar to overspeed warning lasting 11.4 seconds]		
1606:19.5 **HOT-1**	that's what a check pilot will do is he'll give you three things to do.		
1606:22.8 **HOT-2**	right.		
1606:23.1 **HOT-1**	when he knows you're trending in the wrong direction.		
1606:31.9 **HOT-1**	your throttles.		
1606:34.9 **HOT-1**	yeah we need to keep our descent going but he hasn't given it to—.		
		1606:37.1 **ZAU-B**	november two six delta kilo contact Chicago Center one two seven point eight.
		1606:40.5 **RDO-1**	twenty seven eight. six delta kilo.
		1606:45.0 **ZAU-C**	november two six delta kilo Chicago.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1606:47.0 **RDO-1**	two six delta kilo's with you.
		1606:48.5 **ZAU-C**	two six delta kilo descend and maintain one one thousand eleven thousand no delay down. the O'Hare altimeter—make it South Bend altimeter three zero one five.
		1606:54.5 **RDO-1**	eleven thousand three zero one five. six delta kilo.
1606:58.6 **HOT-1**	eleven thousand.		
1607:01.2 **HOT-1**	now we want to stay inside the magenta circle.		
1607:06.6 **HOT-1**	and we're still above uh uh ten thousand so in theory we can stay above there but we don't mind trending a little backwards on our speed. we want to trend backwards on our speed. backwards on our speed.		
1607:22.3 **HOT-2**	right.		
1607:22.8 **HOT-1**	you got to bury it.		
		1607:23.3 **ZAU-C**	six delta kilo how's your ride conditions been?
		1607:25.7 **RDO-1**	uh smooth all the way.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1607:52.3 **HOT-1**	and let's keep about two hundred ninety knots.		
1608:07.3 **HOT-2**	okay where is it?		
1608:08.9 **HOT-1**	two ninety would be more power.		
1608:13.2 **HOT-1**	magenta line is trending to a lower speed. And we want to arrest it. two eighty's fine. two eighty's fine.		
1608:24.8 **HOT-1**	and these right now are –ish we can do whatever we want.		
1608:26.9 **HOT-2**	right.		
1608:34.9 **HOT-1**	okay we currently have discontinuity from our current navigation waypoint to another one so I'm gonna go ahead and promote this by selecting it.		
1608:40.2 **HOT-2**	right.		
		1608:44.1 **ZAU-C**	november two six delta kilo turn fifteen left vectors for spacing.
		1608:48.1 **RDO-1**	fifteen left now. six delta kilo.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1608:50.0 **HOT-1**	so we're at sixty one so I want to take my heading uh from sixty one to forty five— forty six and we're gonna go to the heading mode. so we've gone to heading mode so it's gonna turn to the left.		
1609:02.2 **HOT-2**	right.		
1609:11.2 **HOT-1**	okay and now I'm gonna promote PRAIR uh to there because we're never going to come back over to this line.		
1609:17.6 **HOT-2**	right.		
1609:18.1 **HOT-1**	so I'm gonna go ahead and promote it. got it up and we'll execute it.		
1609:30.9 **HOT-1**	and he's really got us navigating almost direct to PRAIR anyhow.		
1609:51.8 **HOT**	[sound similar to altitude alert]		
1609:56.4 **HOT-1**	this is showing us our next altitude since we've taken the ten away. our next altitude is twenty six hundred. so it's calculating what we need to do to be at twenty six hundred at PRAIR which is where that is.		
		1609:57.8 **ZAU-C**	november six delta kilo cleared direct GIPPR.

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1610:10.9 **ZAU-C**	november two six delta kilo cleared direct South Bend Airport. contact Sound Bend Approach control one two five point seven five.
		1610:16.4 **RDO-1**	twenty five seventy five. direct to South Bend now six delta kilo.
		1610:32.0 **RDO-1**	South Bend Approach Premier jet two six delta kilo eleven thousand.
		1610:35.6 **APP**	Premier jet two six delta kilo South Bend Approach uh proceed direct to KNUTE. the outer marker for runway niner right and I'll have uh lower clearing traffic uh for the visual approach niner right.
		1610:44.6 **RDO-1**	direct to KNUTE for zero nine right. six delta kilo.
1610:49.3 **HOT-1**	promote KNUTE.		
1610:53.3 **HOT-1**	that's what we're gonna navigate to now. now we're cleared to navigate to it so it's gonna take—.		
		1610:58.1 **APP**	Premier two six delta kilo traffic crossing twelve oh clock and seven miles now westbound Southwest Boeing seven thirty seven just starting out of ten thousand for lower.
1611:01.9 **HOT-2**	I got 'em front on the nose below.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1611:05.4 **RDO-1**	got the traffic. six delta kilo.
		1611:07.2 **APP**	roger.
1611:12.1 **HOT-1**	okay KNUTE and then the runway. and twenty six hundred is our altitude so uh that'll be the next thing we take and magenta is continuing to show us what it's going to take to get down to twenty six hundred at KNUTE.		
1611:25.6 **HOT-1**	and we're currently five minutes from KNUTE. so from eleven to twenty six hundred we know we're gonna need twenty two hundred feet a minute to get there and it's climbing. now our ILS just came active. that's what that's showing with our inbound course of zero nine four and uh by loading the one oh nine three we're good and—.		
		1611:44.6 **APP**	Premier six delta kilo descend and maintain one zero thousand.
		1611:48.1 **RDO-1**	one zero thousand now. six delta kilo.
1611:49.6 **HOT**	[sound similar to altitude alert]		
1611:54.7 **HOT-1**	and now we've got to hit two fifty. can't— can't exceed two fifty.		
1612:03.2 **HOT**	[sound similar to altitude alert]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1612:27.8 **HOT-1**	now when we go level it's gonna lose speed.		
1612:30.0 **HOT-2**	right.		
1612:37.4 **HOT-1**	and we're okay if it trends to two forty. we're at— we're okay. we can just arrest it somewhere in the two thirty two forty range. no big deal.		
1612:53.2 **HOT-1**	since they're giving us tower we're gonna go ahead and put it in that'll be the next one we get.		
		1613:06.5 **APP**	november six delta kilo descend and maintain three thousand.
		1613:08.8 **RDO-1**	three thousand now. six delta kilo.
1613:12.4 **CAM**	[sound similar to altitude preselector]		
1613:16.0 **HOT-1**	let's power back. let's bring it back to uh— let's trend towards uh two twenty two ten.		
1613:24.5 **HOT-2**	okay.		
1613:28.0 **HOT-1**	and we'll have to come way out of it to do that.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1613:30.4 **CAM**	[sound similar to decrease in engine rpm]		
1613:35.7 **HOT-1**	okay we got a ten thousand foot checklist. seatbelts...recognition lights...ice protection is off...pressurization set for landing at eight hundred...heat and defrost is off...altimeters are set three zero one five. we've got our ref speed set. bringing up seatbelts.		
1613:53.4 **HOT**	[sound similar to seatbelt sign chime]		
1613:55.2 **HOT-1**	seats...fuel balance is good...landing lights are coming up...recognition through ten thousand...cabin signs are on...ignitions...engine sync comes off.		
1614:09.8 **HOT-1**	and next stop's gonna be flaps.		
1614:13.6 **HOT-1**	we gotta get—.		
1614:15.5 **HOT-1**	just pull— pull the power out.		
1614:17.6 **HOT-2**	just pull it on down?		
1614:18.8 **HOT-1**	yeah. let's— let's get back to two hundred.		
1614:20.7 **CAM**	[sound similar to decrease in engine rpm]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1614:25.7 **CAM**	[sound of two clicks]		
1614:27.4 **HOT**	[sound similar to power interruption]		
1614:27.5 **HOT**	[sound similar to autopilot disconnect]		
1614:28.3 **CAM**	[sound of two tones on HOT microphones]		
1614:28.7 **HOT-1**	uh-oh.		
1614:31.0 **HOT-2**	what?		
1614:33.0 **HOT**	[sound similar to landing gear warning horn lasting 3.5 seconds]		
1614:34.8 **HOT-1**	you went back behind the stops and we lost power.		
1614:42.6 **CAM**	[sound of four clicks]		
1614:43.2 **HOT-1**	okay let's see here.		
1614:47.4 **HOT-1**	boost pumps are on.		
1614:53.1 **HOT-1**	okay we are dead stick.		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
1614:55.8 **HOT**	[sound similar to landing gear warning horn lasting 10.9 seconds]		
1615:00.3 **HOT-1**	we have no—.		
		1615:00.8 **APP**	Premier six delta kilo turn five degrees left vector for runway niner right and call the airport in sight twelve to twelve thirty one three miles.
1615:02.2 **CAM**	[sound similar to starter/generator spooling up. see Specialist's Sound Spectrum Study for further details]		
		1615:07.7 **RDO-1**	uh...South Bend we have an emergency two six delta kilo. dead engines dead stick no power.
	[Power interruption from 1615:18.6 to 1615:26.6]		
1615:26.8 **HOT**	[sound of 0.6 second tone on each hot microphone channel]		
		1615:29.9 **APP**	two six delta kilo say intentions.
		1615:31.3 **RDO-1**	uh we've lost all power and we have no hydraulics.
1615:32.4 **HOT**	[sound similar to altitude alert]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1615:37.6 **APP**	november six delta kilo. roger. we'll have the equipment standing by. uh is your aircraft uh controllable?
		1615:42.3 **RDO-1**	uh barely controllable.
		1615:47.4 **APP**	november six delta kilo. all runways available at South Bend. wind one three zero at one zero.
1615:50.8 **CAM**	[sound of four clicks]		
		1615:53.0 **RDO-1**	uh we have no navigation. if you could give us a vector please.
		1615:56.9 **RDO-1**	we have no heading either. which— you're gonna have to tell us which way to fly.
		1615:59.7 **APP**	you're looking right at South Bend Airport. twelve oh clock and niner miles.
1616:09.1 **HOT-2**	there's the airport.		
1616:11.1 **HOT-1**	where? okay.		
1616:12.4 **HOT**	[sound similar to landing gear warning horn lasting until the end of the recording]		

Time and Source	Intra-Aircraft Communication	Time and Source	Over-the-Air Communication
		1616:12.8 **APP**	november six delta kilo turn left ten degrees.
		1616:15.9 **RDO-1**	two six delta kilo turning left.

1616:31.5
END OF TRANSCRIPT
END OF RECORDING