

NATIONAL TRANSPORTATION SAFETY BOARD
Engineering & Computer Services Division
Washington, D.C. 20594



SPECIALIST'S FACTUAL REPORT OF INVESTIGATION

Cockpit Voice Recorder

DCA97MA017

by

Vincent M. Giuliani
Electronics Engineer/CVR

Warning

The reader of this report is cautioned that the transcription of a CVR tape is not a precise science but is the best product possible from an NTSB group investigative effort. The transcript, or parts thereof, if taken out of context, could be misleading. The attached CVR transcript should be viewed as an accident 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
Office of Research and Engineering
Washington, D.C. 20594

April 18, 1997

Cockpit Voice Recorder

Group Chairman's Factual Report by Vincent M. Giuliana

A. ACCIDENT

Location: Monroe, Michigan
Date: January 9, 1997
Time: 1554 eastern standard time (EST)
Aircraft: Comair Flight 3272
Embraer EMB-120RT, N265CA
NTSB Number: DCA97MA017

B. GROUP

Chairman: Vincent M. Giuliana
Electronics Engineer/CVR
National Transportation Safety Board

Member: Jeffrey M. Rich
Air Safety Investigator
Federal Aviation Administration

Member: Chuck Jordan
Check Airman, EMB-120
Comair

Member: J.C. Lawson III
Air Line Pilots Association

Member: Mark W. Lowell
Flight Operations
Embraer Aircraft Corporation

C. SUMMARY

This transcript was derived from a Fairchild Cockpit Voice Recorder (CVR) (Model A100A, S/N 61146) removed from the accident aircraft and delivered to the audio laboratory of the National Transportation Safety Board.

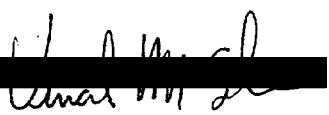
The playback time of the recording was approximately thirty-one minutes and four seconds (31:04). All times incorporated into the transcript are in eastern standard times, correlated with a copy of the Detroit Metro ATCT (Arrival East Position) tape.

D. DETAILS OF INVESTIGATION

The CVR unit recovered from the accident showed evidence of extensive exposure to both fire and smoke but only moderate impact damage. While the entire external cover was discolored and coated with a heavy layer of soot, the majority of the impact damage was limited to the front right corner of the recorder. Although the crash case was observed to be distorted at its front end and the thermal jacket was discolored in several areas, the audio tape was successfully preserved.

The four channels of the CVR contained audio information from the cockpit area microphone (CAM), the captain's position, the first officer's position and the intercom system. The recording was of excellent quality, enhanced by the use of the intra-cockpit intercom system. Although the majority of the crewmember conversation was recorded via the intercom system (as evidenced by the same verbal information on the captain's, first officer's and intercom CVR channels), several verbalizations were only recorded on one CVR channel, consistent with the cockpit being wired with "hot" microphones. During the conversation between the captain and the flight attendant, her voice is identified as HOT-3 because it was most discernible and intelligible on the captain's hot CVR channel rather than the CAM channel.

The transcript begins at 1523:37 as Comair thirty-two seventy-two is in contact with the Indianapolis Air Route Traffic Control Center. According to a subsequent radio call at 1523:49, the aircraft is somewhere below flight level two one zero, about to be instructed to "climb and maintain flight level two one zero".


[REDACTED]
Vincent M. Giuliana JME
Electronic Engineer/CVR

Transcript of a Fairchild cockpit voice recorder (Model A100A, S/N 61146) installed on an Embraer EMB-120RT, N265CA, which was involved in an accident in Monroe, Michigan on January 9, 1997.

LEGEND

CAM	Cockpit area microphone
HOT	Crewmember hot microphone
RDO	Radio transmission from accident aircraft
-1	Voice (or position) identified as Captain
-2	Voice (or position) identified as First Officer
-3	Voice identified as Flight Attendant
-?	Unidentifiable voice
COM	Misc. radio communications or aircraft aural warnings heard on crewmember CVR channels
ZID	Indianapolis Air Route Traffic Control Center
ZOB	Cleveland Air Route Traffic Control Center
DTW	Detroit Metro ATCT
OPS	Airline Operations
CACT50	America West Airlines Flight Fifty
*	Unintelligible word
#	Expletive deleted
...	Pause
()	Questionable text
[]	Editorial insertion
-	Break in continuity

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1523:37 CAM	[start of recording]
1523:37 CAM	[start of transcript]
1523:41 INT-2	he's gotta use the phone.
1523:57 INT-2	twenty-one.
1523:59 INT-1	set once and set twice.
1525:44 CAM	[sound of three tones similar to that of the altitude alerter]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1523:39 RDO-1	thanks.
1523:49 ZID	comair thirty-two seventy-two climb maintain flight level two one zero.
1523:52 RDO-1	flight level two one zero comair thirty-two seventy-two, thank you.
1526:59 ZID	comair ah thirty-two seventy-two any improvements ah with the climb there?

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1528:54 INT-1	well, ready for cruise?
1528:56 INT-2	yup, thanks.
1529:09 CAM	[sound similar to that of slight decrease in propeller rpm frequency]
1529:13 CAM	[sound of several unknown clicks]
1529:52 INT-1	power and NP set, pressurization check, cruise check complete.
1530:52 CAM	[sound of unknown squeaks]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1527:03 RDO-1	comair thirty-two seventy-two affirmative ... it's ah smooth here at two one oh .. we're getting ah occasional light chop at one nine oh cause we were right at the tops.
1527:11 ZID	right at the tops .. appreciate it, thanks.
1531:22 ZID	comair thirty-two seventy-two contact cleveland one two three point niner.
1531:28 RDO-1	one two three point niner comair thirty-two seventy-two, good day.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1535:52 INT-2	yeah there's twelve .. gotta go [sound of human whistle]
1535:57 INT-1	down.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1531:31 ZID	so long.
1531:32 COM	[sound of tone similar to that of frequency change]
1531:34 RDO-1	good afternoon cleveland center, comair thirty-two seventy-two .. flight level two one zero.
1531:39 ZOB	comair thirty-two seventy-two cleveland center, roger.
1533:05 ZOB	comair thirty-two seventy-two how's your ride there?
1533:08 RDO-1	comair thirty-two seventy-two it's smooth.
1535:37 ZOB	comair thirty-two seventy-two descend and maintain one two thousand .. the ah detroit altimeter two nine two one.
1535:44 RDO-1	two nine two one .. descend and maintain one two twelve thousand comair thirty-two seventy-two.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1536:43 INT-2	might get a speed warning here.
1537:04 INT-2	dive, dive.
1537:09 HOT-2	whoop whoop dive [sound of human whistle].

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1536:07 ZOB	comair thirty-seven I'm sorry .. thirty-two seventy-two contact cleveland one two zero point four five.
1536:13 RDO-1	one two zero point four five comair thirty-two seventy-two, good day.
1536:18 ZOB	*
1536:18 COM	[sound of tone similar to frequency change]
1536:46 RDO-1	good afternoon cleveland center comair thirty-two seventy-two .. flight level one nine oh .. descend and maintain one two twelve thousand.
1536:52 ZOB	thirty-two seventy-two cleveland center roger .. no delay down to twelve for traffic.
1536:56 RDO-1	comair thirty-two seventy-two wilco.

INTRA-COCKPIT COMMUNICATIONAIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1538:03 INT	[sound of chime similar to that of flight attendant chime]
1538:07 INT-1	need anything?
1538:08 INT-?	sure don't.
1538:09 INT-2	no thanks.
1538:14 HOT-1	would you be kind enough to get me an ice refresher .. just add some to that.
1538:18 HOT-3	[unintelligible female voice]
1538:18 HOT-2	no thanks .. doing great.
1538:20 HOT-3	are we already on the descent?
1538:21 HOT-1	yes ma'am .. you told them an hour but it's only forty minutes today.
1538:27 HOT-3	(forty minutes).
1538:27 HOT-1	didn't I .. I think I told you forty-five.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1538:30 HOT-3	(oh that's right you did it).
1538:32 HOT-1	I go okay .. well she just knows we're gonna probably have to hold now.
1538:35 HOT-3	[sound of laughter]
1538:55 HOT-1	yeah we're only seventy-five miles out right now.
1538:57 HOT-3	okay great, thanks.
1538:58 HOT-1	so -
1538:58 HOT-3	here's your drink.
1539:00 HOT-1	fifteen ... fifteen minutes about.
1539:03 HOT-3	okay.
1539:04 HOT-1	thank you very much for the ice.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1539:07 ZOB	comair thirty-two seventy-two continue descent to one one thousand then fly heading of ah zero three zero to rejoin the mizar arrival off of detroit.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1539:24 INT-2	okay, there's ah there's eleven and out of detroit we're looking at ah .. two thirty-nine radial.
1540:35 INT-1	so what what do you got set up here?
1540:38 INT-2	I've got detroit.
1540:46 INT-2	let's see which one of those lines we hit first.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1539:14 RDO-1	descend and maintain one one eleven thousand and heading zero three zero to join the arrival comair thirty-two seventy-two.
1540:09 COM	detroit metropolitan airport information hotel .. two zero two six zulu special .. wind zero seven zero at six .. visibility one .. light snow .. six hundred scattered .. ceiling one thousand four hundred broken .. two thousand one hundred overcast .. temperature minus three .. dew point minus four .. altimeter two niner two one .. remarks .. A02 .. tower visibility one and one half .. papa zero zero zero zero .. ILS approach in use runway three right .. departing runway three center .. notices to airmen .. runway two one right, three left closed .. runway two seven left, nine right closed .. runway two seven right, nine left closed .. taxiway yankee eleven closed .. braking action advisories in effect .. (local) de-ice procedure in effect .. gate hold procedure in effect for newark, kennedy, chicago o'hare, philadelphia, st. louis, GRR airports .. advise on initial contact you have information hotel.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1540:48 CAM	[sound of three tones similar to that of the altitude alerter]
1540:49 INT-1	okay.
1541:16 CAM	[sound of audio interrupt similar to that of tape splice]
1542:43 HOT-2	[sound of yawn]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1542:32 COM	[sound of tone similar to that of frequency change]
1542:51 ZOB	comair thirty-two seventy-two detroit one two four point niner seven.
1542:54 RDO-1	one two four point niner seven comair thirty-two seventy-two, good day.
1542:58 COM	[sound of tone similar to that of frequency change]
1543:03 RDO-1	good afternoon detroit approach .. comair thirty-two seventy-two one one eleven thousand hotel.
1543:07 DTW	comair thirty-two seventy-two detroit approach .. depart mizar heading zero five zero vector to ILS runway three right final approach course .. runway three right braking action reported poor by a DC niner.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1544:44 INT-1	I think there's your -
1544:46 INT-2	ah thanks.
1544:48 INT-2	whoops.
1544:49 INT-1	stand by.
1544:50 INT-2	and five miles for ah ... for ah mizar.
1545:53 INT-1	and seven's in the altitude alerter.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1543:16 RDO-1	roger depart mizar heading zero five zero comair thirty-two seventy-two.
1544:11 DTW	comair thirty-two seventy-two maintain one niner zero knots .. if unable advise.
1544:15 RDO-1	roger, one niner zero knots comair thirty-two seventy-two.
1545:46 DTW	comair thirty-two seventy-two descend and maintain seven thousand.
1545:49 RDO-1	seven thousand comair thirty-two seventy-two.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1545:56 INT-2	seven's verified .. there's mizar and we're turning zero five zero.
1547:17 CAM	[sound of three clicks]
1547:20 CAM	[sound of two clicks]
1547:32 INT-2	[sound similar to that of a human sniffle]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1546:12 DTW	comair thirty-two seventy-two turn left heading zero three zero vector for sequencing.
1546:14 RDO-1	zero three zero comair thirty-two seventy-two.
1546:57 DTW	northwest two seventy-two information alpha is current .. winds zero six zero at six .. visibility one and one half .. light snow .. ceiling six hundred broken one thousand one hundred broken .. two thousand one hundred overcast .. altimeter's two niner one niner .. runway three right RVR three thousand five hundred .. braking action reported poor by DC niner.
1547:18 DTW	comair thirty-two seventy-two turn right heading zero five five.
1547:21 RDO-1	zero five five comair thirty-two seventy-two.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1547:47 INT-2	let's run the descent check.
1547:49 INT-1	ice protection?
1547:51 INT-2	windshield, props, standard seven.
1547:53 INT-1	ignition?
1547:54 INT-2	auto.
1547:55 INT-1	pressurization?
1547:55 INT-2	it's ah reset for landing in detroit .. six thirty-nine .. looks good.
1548:01 INT-1	altimeters?
1548:03 INT-2	ah twenty-one.
1548:04 INT-1	set left.
1548:05 INT-2	set right.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
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INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1548:06 INT-1	landing lights?
1548:06 INT-2	landing lights on.
1548:07 INT-1	seatbelt sign?
1548:08 INT-2	on.
1548:09 INT-1	PACKs and bleeds?
1548:10 INT-2	four lows.
1548:11 INT-1	crossfeed?
1548:12 INT-2	crossfeed's off.
1548:12 INT-1	that completes that.
1548:14 INT-2	okay .. a thousand to go .. uhm .. we're going to do an ILS to runway three right .. it'll be a coupled approach .. flaps twenty-five .. frequency is one one one point five .. that's set .. might as well set that in there .. inbound course is zero three five.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
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INTRA-COCKPIT COMMUNICATIONTIME and
SOURCECONTENT

1548:38
CAM [sound of three tones similar to that of the altitude alerter]

1548:43
INT-2 we're gonna intercept the top somewhere ah whatever altitude he gives us .. ah .. twenty-seven hundred's the intercept to the glide slope.

1548:55
CAM [sound similar to increase in engine/prop noise]

1549:13
INT-2 it's ah two hundred foot approach with the decision altitude of eight thirty-three .. you've already got that set in there .. missed approach will be published climb to eleven hundred .. and a climbing right turn to three thousand direct to the ah DM locator outer marker "Spencer" * which is ah two twenty-three that's set .. and hold .. that will be a teardrop entry .. questions, comments.

1549:38
INT-1 no questions .. twenty-one, fourteen, and forty-three are your bugs.

1549:43
INT-2 twenty-one, fourteen, forty-three .. set.

AIR-GROUND COMMUNICATIONTIME and
SOURCECONTENT

1548:47
DTW comair thirty-two seventy-two turn right heading zero seven zero.

1548:50
RDO-1 zero seven zero comair thirty-two seventy-two.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1549:48 INT-1	autofeather?
1549:50 INT-2	armed.
1549:51 INT-1	nav radios.
1549:53 INT-2	nav radios are ah set eleven point five.
1550:11 INT-1	I'll be on two.
1550:11 INT-2	alright.
1550:28 INT-1	nobody likes to answer me .. I'm back.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1549:54 DTW	comair thirty-two seventy-two turn right to a heading of one four zero .. reduce speed to one seven zero.
1549:59 RDO-1	heading one four zero speed one seven zero comair thirty-two seventy-two.
1550:15 RDO-1	good afternoon detroit .. comair thirty-two seventy-two.
1550:28 DTW	comair thirty-two seventy-two contact approach one two five point one five so long.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1550:38 INT-2	maybe you should try being abusive with them.
1550:40 INT-1	huh?
1550:41 INT-2	gotta try being abusive with them.
1550:43 INT-1	that's right.
1550:43 INT-2	answer the phone, dummy.
1550:44 INT-1	yeah.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1550:32 RDO-1	one two five point one five comair thirty-two seventy-two, good day.
1550:36 COM	[sound of tone similar to that of frequency change]
1550:45 RDO-1	good afternoon detroit approach comair thirty-two seventy-two seven thousand.
1550:49 DTW	comair thirty-two seventy-two detroit approach .. reduce speed to one seven zero and maintain six thousand.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1550:57 CAM	[sound of three tones similar to that of the altitude alerter]
1551:00 INT-1	six.
1551:00 INT-2	six thousand.
1551:20 INT-2	wonder what plane he's looking at?
1551:25 INT-1	ah the one ah that's not going one four zero.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1550:54 RDO-1	speed one seven zero .. descend and maintain six thousand comair thirty-two seventy-two.
1551:14 DTW	comair thirty-two seventy-two fly heading one four zero.
1551:17 RDO-1	one four zero comair thirty-two seventy-two.
1551:27 OPS	thirty-two seventy two you calling detroit?
1551:30 RDO-1	yes sir we're in range .. ah positive fuel .. we'll be at the gate in approximately nine minutes and forty-eight seconds.
1551:38 OPS	approximately, huh?

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1551:53 CAM	[sound of three tones similar to that of the altitude alerter]
1552:07 INT-1	took 'em a while but they came back to me.
1552:13 INT-2	that's good news .. no changes while you were away.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1551:39 RDO-1	approx-, of course.
1551:41 OPS	do you guys know if you have any special assistance coming in?
1551:44 RDO-1	I can't recall anyone coming out so I thi- I think we're all good there .. all all we'll need is just fuel.
1551:51 OPS	roger that ah bravo * three.
1551:54 RDO-1	roger that .. and how many do we have going back so I know how many seats to give you?
1551:58 OPS	ah, you're booked to twenty-eight right now.
1552:01 RDO-1	okay that'll be our load then .. we can take them all .. thanks.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1552:20 INT-1	four's in the altitude alert.
1552:23 INT-2	four thousand verified.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1552:13 DTW	comair thirty-two seventy-two descend and maintain four thousand.
1552:16 RDO-1	four thousand comair thirty-two seventy-two.
1553:03 DTW	cactus fifty zero six zero to intercept three right.
1553:05 CACT50	zero six zero okay .. you got any windshear reports on the final?
1553:09 DTW	ah no .. I haven't had anything ah .. just ah slick runways and ah low visibilities.
1553:15 CACT50	okay .. yeah it's two thirty-seven at thirty-two up here.
1553:18 DTW	ah you'll pick up a head wind once you get down ah probably oh two thousand feet or so.
1553:25 DTW	comair thirty-two seventy-two turn right heading one eight zero .. reduce speed to one five zero.

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1553:42 CAM	[sound of three tones similar to that of the altitude alerter]
1553:52 INT-2	this guys got -
1553:53 INT-1	they gotta always tell us twice.
1553:55 INT-2	he's got short term memory disorder I think.
1553:57 INT-1	is that what that is?
1553:58 INT-2	yeah, he's got alzheimer's .. that's what it is.

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1553:29 RDO-1	heading one eight zero .. speed one five zero comair thirty-two seventy-two.
1553:42 DTW	comair thirty-two seventy-two reduce speed to one five zero.
1553:45 RDO-1	speed one five zero comair thirty-two seventy-two.
1553:59 DTW	comair thirty-two seventy-two now turn left heading zero nine zero .. plan a vector across the localizer.
1554:04 RDO-1	heading zero niner zero comair thirty-two seventy-two.

INTRA-COCKPIT COMMUNICATIONAIR-GROUND COMMUNICATIONTIME and
SOURCECONTENT

1554:10.9

CAM [sound of click]

1554:13.2

CAM [sound of faint click]

1554:14.4

CAM [sound of several unidentified thumps fade in and out]

1554:15.9

CAM [sound of several "whirring" noises, similar to that of the elevator trim servo]

1554:16.0

CAM [sound of increase in discrete high frequency noise similar to that of power increase]

1554:17.1

CAM [significant reduction in background ambient noise]

1554:20.8

INT-1 looks like your low speed indicator.

1554:20.9

INT-2 * * .

1554:23.6

INT-1 power.

1554:23.9

CAM [sound similar to that of stickstaker starts]

1554:24.1

INT-2 thanks.

TIME and
SOURCECONTENT

INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1554:24.1 CAM	[sound of three chimes and "auto-pilot" aural warning]
1554:25.9 CAM	[sound similar to that of stickshaker stops]
1554:26.1 INT-2	oh.
1554:26.1 INT-1	oh #.
1554:26.8 CAM	[sound of increase in background noise similar to that of power increase]
1554:29.0 CAM	[sound of GPWS "bank angle" aural warning]
1554:29.1 CAM	[sound of three chimes and "auto-pilot" aural warning]
1554:31.0 CAM	[sound similar to that of stickshaker starts and continues to the end of tape]
1554:33.3 INT-?	[sound of single human breath]
1554:34.3 CAM	[sound of three chimes and "auto-pilot" aural warning]
1554:35.3 CAM	[sound of GPWS "bank angle" aural warning]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
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INTRA-COCKPIT COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
1554:37.1 INT-1	[nonpertinent exclamation]
1554:38.2 CAM	[sound of three chimes and "auto-pilot" aural warning]
1554:39.1 INT-1	[nonpertinent exclamation]
1554:40.1 CAM	[end of tape]

AIR-GROUND COMMUNICATION

<u>TIME and SOURCE</u>	<u>CONTENT</u>
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