NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, DC 20594

October 17, 2013

Cockpit Voice Recorder

Specialist's Factual Report
By Bill Tuccio, Ph.D.

1. EVENT

Location:	Jamestown, New York
Date:	June 20, 2013
Aircraft:	Israel Aircraft Industries Gulfstream 200, N500AG
Operator:	Taughannock Aviation
NTSB Number:	ERA13IA294

2. GROUP

A group was not convened.

3. SUMMARY

On June 20, 2013, about 1410 eastern daylight time (EDT), an Israel Aircraft Industries Gulfstream 200, N500AG, overran the paved portion of the runway during landing at the Chautauqua County/Jamestown Airport (JHW), Jamestown, New York. The two airline transport pilots, two Federal Aviation Administration (FAA) inspectors, and the aircraft operator's chief pilot were not injured. The airplane sustained minor damage to the trailing edge of the left wing flap. The airplane was registered to a private individual and operated by Taughannock Aviation under the provision of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed and an instrument flight rules flight plan had been filed for the instructional flight that originated from the Greater Rochester International Airport (ROC), Rochester, New York. A solid-state cockpit voice recorder (CVR) was sent to the National Transportation Safety Board's Audio Laboratory for readout.

4. DETAILS OF INVESTIGATION

The NTSB Vehicle Recorder Division's Audio Laboratory received the following CVR:

Recorder Manufacturer/Model: **Universal CVR-120**
Recorder Serial Number: **1731**

4.1. Recorder Description

Per federal regulation 14 CFR 135.151, multiengine, turbine powered aircraft operating under 14 CFR Part 135, manufactured prior to April 7, 2010, must be equipped with a CVR that records a minimum of the last 30 minutes of aircraft operation; 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 or 2 hours of CVR operation, depending on the CVR model. This model CVR, the Universal CVR-120, is a solid-state CVR that records 2 hours of digital cockpit audio. Specifically, it contains a 2-channel recording of the last 2 hours of operation and separately contains a 4-channel recording of the last 30 minutes of operation. The 2-hour portion of the recording is comprised of one channel of audio information from the cockpit area microphone (CAM) and one channel that combines three audio sources: the captain's audio panel information, the first officer's audio panel information, and the observer pilot's audio panel information. The 30-minute portion of the recording contains four channels of audio data: one channel for the captain's audio panel information, one panel for the first officer's audio panel information, one channel for the third crewmember's audio panel information, and one channel for the CAM audio information.

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 audio information from the captain's and first officer's audio panels. The quality of these two channels was excellent.[1] One channel contained the cockpit area microphone (CAM) audio information. The quality of this channel was good. The fourth channel contained audio information from an unverified source. The quality of this channel was excellent.

4.4. Timing and Correlation

The times for the incident flight from ROC to JHW are expressed as local time of the incident (EDT). Times for the flight prior to the incident flight are

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

expressed as CVR Elapsed Time (time from the start of the recording) from the 2-hour recording.

For the incident flight, timing of the summary was aligned with the time of aircraft touchdown at JHW as provided by the Investigator-in-Charge (IIC) as 1410:00 EDT. This IIC provided touchdown time was aligned with a sound similar to touchdown recorded on the 30-minute portion of the CVR at 0043:57.6 CVR Elapsed Time. Accordingly, for the incident flight, 1326:02.4 was added to CVR Elapsed Time from the 30-minute recording to convert to EDT.

4.5. Summary of Recording Contents

In agreement with the Investigator-In-Charge, a CVR group did not convene and only this summary report was prepared. This report summarizes the two flights recorded on the CVR. The first flight was from Ithaca, New York to ROC. The second flight was the incident flight and operated from ROC to JHW. Both flights had a jumpseat crewmember performing functions related to future 14 CFR 135 operations.

When the recording began at 0000 CVR Elapsed Time, the aircraft was on the ground at Ithaca, New York with the engines off; the captain and first officer were briefing the jumpseat crewmember on cockpit procedures.

The flight departed from Ithaca about 0029 CVR Elapsed Time and touched down at Rochester at about 0050 CVR Elapsed Time.

Following a power cycle to the CVR, the CVR recording resumed at about 0102 CVR Elapsed Time, corresponding to a local time of 1306 EDT.

At about 1310 EDT, the captain received the IFR clearance to JHW. The captain and first officer then discussed the flight to JHW, including: the winds at JHW being from 270 at 6 knots, favoring runway 25; the short distance of the flight; and the width of the runway at JHW. The crew then briefed the jumpseat crewmember on cockpit procedures.

After performing checklists and crew briefings, the aircraft departed ROC runway 22 at about 1344 EDT.

At about 1352 EDT, the captain called for the descent checklist. The first officer responded by stating two speeds, 133 and 143 knots. The captain asked the first officer to set the captain's speed bugs. After about 10 seconds, the first officer noted he would write the speeds down, and then spoke in a soft voice, "one thirty three."

The aircraft touched down on runway 25 at JHW at about 1410:00 EDT and came to a stop beyond the end of the runway at about 1410:33 EDT. The crew then shut down the aircraft as they discussed evacuation. The recording ended at about 1412 EDT.

Table 1 presents a partial transcript of the first flight from Ithaca to ROC; Table 2 presents a partial transcript of the second, incident flight from ROC to JHW. Tables 1 and 2 provide partial transcripts from the time the landing gear was extended through the landing roll out. Tables 1 and 2 focus on intra-cockpit discourse and omit background sounds such as non-pertinent air traffic control calls and high tone beeps recorded during both flights. When discourse is

paraphrased, it is enclosed in brackets (i.e., “[text]”). Attachment II contains a legend for the partial transcripts.

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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.

Attachment II

Partial Transcript Legend

CAM	Cockpit area microphone voice or sound source
INT	Flight crew audio panel voice or sound source
RDO	Radio transmissions from N500AG
ATC	Radio transmission from air traffic control
EGPWS	Voice from electronic ground proximity warning system
-CA	Voice identified as the captain
-FO	Voice identified as the first officer
( )	Questionable insertion
[ ]	Editorial insertion and/or paraphrasing
@	Non-pertinent word or proper name

Table 1. Partial transcript of the first flight from Ithaca to ROC.

Time[a]	Source	Text
0047:02	INT-CA	let's go gear down. before landing checklist please.
0047:05	INT-FO	speed is check. gear down.
0047:15	INT-FO	three down and locked.
0047:17	INT-CA	gear down and three green I confirm.
0047:21	INT-CA	ahh full flaps.
0047:24	INT-FO	thrust reversers.
0047:25	INT-CA	full flaps.
0047:26	INT-CA	flaps forty.
0047:26	INT-FO	there on.
0047:26	INT-FO	full flaps. flaps forty.
0047:28	INT-FO	ground air brakes they are on.
0047:30	INT-CA	I confirm.
0047:30	INT-FO	landing gear is down and lock. hydraulic pressures are checked.
0047:34	INT-FO	here's doing the anti-skid.
0047:41	INT-FO	(slats to flaps).
0047:43	INT-CA	they're set for landing.
0047:45	INT-FO	autopilot. then yaw damper to go.
0047:48	INT	[Captain corrects first officer related to checklist protocol. Captain then corrects first officer related to standard altitude callouts.]
(PORTION OMITTED FOR THIS REPORT)		
0049:21	INT-CA	autopilot's off. before landing checklist complete. [sound of cavalry charge, similar to autopilot disconnect]
0049:23	INT-FO	autopilot's off. before landing checklist is complete.
0049:43	INT-FO	you are ref plus ten [EGPWS voice says "one hundred"] stabilize. to the left of the runway a little bit.
0049:50	EPGWS	fifty.
0049:52	EGPWS	thirty.
0049:53	EGPWS	twenty.
0049:55	EGPWS	ten.
0050:00	CAM	[sound of rumbling, similar to touchdown]
0050:01	INT-CA	your tops.
0050:02	INT-FO	my tops. air brakes are deployed.
0050:04	INT	[sound of chime]
0050:05	INT-FO	thrust reversers are deployed.
0050:08	INT-FO	one hundred.
0050:13	INT	[sound of chime]
0050:14	INT-FO	ninety knots.
0050:15	RDO	[ATC provides runway exit instructions to N500AG. FO acknowledges runway exit instructions.]
0050:30	RDO	[ATC provides update on runway exit instructions. FO acknowledges.]

Time[a]	Source	Text
0050:52	INT-CA	clear left.
0050:52	INT-FO	clear on the right.
0050:55	INT-CA	after landing checklist. when you get a chance.

Note: [(a)] CVR Elapsed Time

Table 2. Partial transcript of the incident flight from ROC to JHW.

Time[b]	Source	Text
1406:36.6	INT-CA	gear down. before landing checklist.
1406:38.1	INT-FO	airspeed is check. gear coming down.
1406:39.9	ATC	[ATC asks 30AG report cancellation of IFR on this frequency. Change to advisory frequency approved.]
1406:50.0	RDO-FO	[Responds aircraft will report cancellation on "this" frequency.]
1406:54.2	INT-FO	want to canc--
1406:54.4	INT-CA	flaps forty.
1406:55.4	INT-FO	flaps forty.
1406:56.9	INT-FO	speed is checked. you want to cancel now?
1406:59.1	INT-CA	yeah go ahead.
1407:00.7	INT-FO	flaps forty.
1407:02.3	INT-FO	three down and lock.
1407:03.2	INT-CA	I confirm.
1407:05.1	RDO-FO	[Calls Erie approach and cancels IFR. Erie confirms.]
1407:23.3	INT-CA	good job @[first officer].
1407:28.2	RDO-FO	[Calls CTAF, 5 mile final runway 25 Jamestown.]
1407:40.2	INT-FO	alright so we got ahhh....thrust reversers..they are armed.
1407:46.9	INT-FO	ground air brakes are on.
1407:48.4	INT-CA	I verify.
1407:48.9	INT-FO	landing gear is down and locked. three greens.
1407:51.4	INT-SIC	anti-skid.
1407:53.2	INT-PIC	let's go ahead and cycle that.
1407:54.7	INT-FO	okay.
1407:57.8	INT-FO	okay (go ahead).
1407:58.6	INT-CA	alright.
1407:59.1	INT-FO	it’s ahh on...slats and flaps.
1408:01.6	INT-CA	alright slats flaps to go...
1408:02.8	INT-FO	set for landing.
1408:03.5	INT-CA	...autopilot to go. yaw damper to go.
1408:04.4	INT-FO	autopilot. yaw damper to go.
(PORTION OMITTED FOR THIS REPORT)		
1409:23.2	INT-CA	autopilot is away. before landing checklist complete. [sound of cavalry charge, similar to autopilot disconnect]
1409:25.6	INT-FO	autopilot’s off.
1409:26.9	INT-CA	all lights on.
1409:28.6	INT-FO	autopilot’s off. all lights are on. runway’s clear.
1409:31.9	INT-CA	before landing checklist complete.
1409:33.0	INT-FO	before landing checklist complete. and you’re ref plus ten.
1409:37.5	INT-CA	correcting.
1409:40.5	INT-CA	everybody sitting down?
1409:41.9	INT-FO	everybody's sitting down. everybody's ready.

Time[b]	Source	Text
1409:44.5	INT-FO	runway's clear. ref plus fifteen. don't let it increase. it's a short runway.
1409:47.1	INT-CA	ahh great. correcting.
1409:49.7	EGPWS	one hundred.
1409:51.6	EGPWS	fifty.
1409:52.8	EGPWS	thirty.
1409:53.8	EGPWS	twenty.
1409:55.3	EGPWS	ten.
1410:00.0	CAM	[sound of rumbling, similar to touchdown] [note: another touchdown may have occurred prior to this, but it is not distinct.]
1410:00.6	INT-CA	your tops.
1410:01.2	INT-FO	my topssss.
1410:02.4	INT-FO	one twenty.
1410:04.1	INT-FO	one fifteen two thousand remaining.
1410:06.7	INT-FO	more brakes.
1410:08.0	INT-FO	one hundred.
1410:09.6	INT-FO	a little bit to the right.
1410:10.7	INT-FO	ninety knots. one thousand remaining.
1410:13.3	INT-FO	eighty knots.
1410:15.4	INT-FO	seventy knots.
1410:17.7	INT-FO	sixty knots.
1410:21.0	CAM	[sound of increased rumbling]
1410:23.8	INT	awww shoot.

Note: [(b)] EDT