NATIONAL TRANSPORTATION SAFETY BOARD
Vehicle Recorder Division
Washington, D.C. 20594

September 25, 2012

On Board Video Recording

Group Chairman's Factual Report -ADDENDUM
by Douglass P. Brazy

NTSB Accident Number
DCA11MA076

1. EVENT SUMMARY

Location:	Roswell, New Mexico
Date:	April 02, 2011
Aircraft:	Gulfstream Aerospace Corporation GVI (G650)
Registration:	N652GD
Operator:	Gulfstream Aerospace Corporation
NTSB Number:	DCA11MA076

2. DETAILS OF INVESTIGATION

This document is an Addendum to the On-Board Video Recording Factual Report, available separately in the NTSB Public Docket for this investigation. Refer to that report for a legend, list of acronyms, etc. as well as more details about the cockpit video recordings.

2.1. Item(s) Received

In July 2012, the NTSB Operational Factors Chairman requested additional DVD copies of cockpit video recordings from GAC, specifically from flight tests #091, 129, 130, and 131.

2.2. Description of Additional Information

The following additional information was noted from these recordings:

Flight 129 (Performance: Field: Takeoff OEI/Rotation Rate – Stab Trim Development, March 11, 2011)

While preparing for test card 3, the GAC G650 Project Pilot (P-3) questioned the speeds provided by the Lead Flight Test Engineer (FTE-1). P-3 noted that the speeds for a flaps 10 takeoff were lower than those for the previous flaps 20 takeoff, which was the opposite of what he had expected them to be. P-3 stated "why are these so much lower than our flaps twenty (speeds)…. they shouldn't be lower." FTE-1 initially responded that he was looking at the wrong chart, and thanked P-3 for "catching that." After reviewing the charts again, FTE-1 noted that he was previously looking at a 4000 foot chart and should have been looking at a 3600 foot chart.[1] However, after consulting the correct chart, the speeds remained the same ($\mathbf{V_1}$ = 119 knots, $\mathbf{V_R}$ = 121 knots and $\mathbf{V_2}$ = 130 knots, for 81,000 lbs and Flaps 10).

P-3 then commented, "well why wouldn't I takeoff at flaps 10 all the time…" and FTE-1 responded "yeah, I don't know." FTE-1 then indicated he would try and "figure out what's going on with these speeds." As he discussed this, he mentioned that these were the "new speeds that they sent" and he did some comparisons to speed values from "the old chart." He noted that the $\mathbf{V_1}$ speed had changed due to a new minimum control speed. He also noted that the $\mathbf{V_2}$ speed for 81,000 pounds and Flaps 20 was 127 knots (but he did not specify which chart he was reading from).

[1] These are charts for different pressure altitudes.

FTE-1 also stated that "before," the $\mathbf{V_R}$ speed for 81000 pounds and flaps 10 "was" 120 knots, and "now we are at 121… so that seems like that checks, I guess." P-3 then responded, "Okay…. sure doesn't seem right…" and FTE-1 added "it seems counterintuitive to me." FTE-1 and P-3 noted that the $\mathbf{V_2}$ speed however, actually was higher for flaps 10, than it was for their previous flaps 20 test run, but only by 2 knots.

FTE-1 then asked the telemetry trailer staff to confirm the speeds for 81,000 pounds, he corrected the actual weight to 81,600 pounds, and commented that weight difference should account for about a 1 knot speed difference (FTE-1 repeated the speeds of $\mathbf{V_1}$ = 119 knots, $\mathbf{V_R}$ = 121 knots and $\mathbf{V_2}$ = 130 knots).

The telemetry trailer staff responded that Flight Sciences is "not exactly sure whats goin on with the speeds, they'd have to go back to base, but uh, they're sayin it's probably due to the stall speeds." The telemetry trailer staff further elaborated that "they're thinkin that the stall speed changes - is the reason why the uh, the ten degree flaps is different."

After some discussion, FTE-1 concluded that the $\mathbf{V_2}$ speed was within one knot of what it was "before" and that it was just $\mathbf{V_1}$ that had "moved around a little." FTE-1 concluded "I think we're okay" and P-3 responded "okay."

After flying test card 3A, the telemetry trailer staff radioed "we got an answer on those speeds for flaps ten….. they said that on flaps ten, the balanced field length is unbalanced up to $\mathbf{V_1}$ equals $\mathbf{V_R}$ so the $\mathbf{V_{SR}}$ (stall reference speed) at (flaps) twenty is lower than at flaps ten." The right seat pilot (P-2) commented to P-3 "it was the other way around, wasn't it? ...I thought the ten was lower than the twenty." FTE-1 commented "yeah I didn't give you a balanced field length, but they did say it isn't balanced it's just longest of the" (sentence not completed by FTE-1). FTE-1 then added "If the $\mathbf{V_{SE}}$ speeds are lower, then I guess that's all."[2] There was no further discussion of the flaps 10 versus flaps 20 speeds at this time.

[2] $\mathbf{V_{SE}}$ is the recommended speed for single engine climb in the enroute (clean) configuration. FTE-1 may have been referring to $\mathbf{V_{SR}}$ and may have misspoken, $\mathbf{V_{SE}}$ here.

Flight 131 (Performance: Field: Takeoff OEI, March 13, 2011)

While preparing for test card 4B (which was a flaps 10 test run preceded by a flaps 20 run on test card 3), FTE-1 provided the flaps 10 speeds of $\mathbf{V_1}$ = 120 knots, $\mathbf{V_R}$ = 122 knots and $\mathbf{V_2}$ = 131 knots (weight was not verbalized). The GAC Senior Flight Test Pilot (P-4) commented, "really, we rotate at less speed?" FTE-1 responded, "yeah, you get more speed gain so you're getting – instead of four knots speed gain with the higher flaps, we're rotating earlier." P-4 said: "you're kiddin me, really?.... so you rotate – no kidding – rotate uh, two knots earlier?"[3] FTE-1 replied "yeah, that's what I'm comin up with here, on my look up." The telemetry trailer staff voluntarily radioed "I confirm your numbers…." P-4 commented that the speeds did not make sense to him, but he seemed satisfied that FTE-1 and the telemetry trailer staff had looked up the numbers properly.

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[3] The previous test run was performed at Flaps 20, and the speeds used were $\mathbf{V_1}$ = 122 knots, $\mathbf{V_R}$ = 124 knots and $\mathbf{V_2}$ = 128 knots, the weight was not verbalized at the time.