

Attachment 14

to Operational Factors / Human Performance Group Factual Report

DCA11IA047

FAA RESPONSE LETTER 11.522



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Accident Investigation and Prevention

800 Independence Avenue SW
Washington DC 20591

SEP 14 2011

David Helson
National Transportation Safety Board (NTSB)
490 L'Enfant Plaza East, SW
Washington, DC 20594

Dear Mr. Helson:

The Federal Aviation Administration (FAA) Flight Standards Service is providing the following information in response to your accident investigation information support request 11.522 pertaining to the incident involving Southwest Airlines flight 1919 that occurred on April 26, 2011, at the Chicago Midway International Airport, Chicago, Illinois. Specifically you asked:

NTSB Request 11.522:

Documents related to approval of Southwest Airlines training program regarding the FSB report which specifies master training, checking, and currency requirements applicable for crews operating B737 model aircraft and any/all exemptions, deviations, and waivers granted for Southwest Airlines for training in the B737 model aircraft; including but not limited to Initial, Transition, Recurrent, Upgrade, Differences, Requalification, and Special Training.


FAA Response:

The Southwest Airlines Certificate Management Office (SWA CMO) received NTSB Request 11.522. In order to clarify what items were required by the NTSB the Principal Operations Inspector (POI) called David Helson, AS-30 to discuss the request. During that discussion, it was determined that the NTSB was specifically requesting information/documentation relating to the T3 test requested by Southwest Airlines during 2009 and later administered by the Aircraft Evaluation Group (AEG). During 2009, Southwest Airlines requested a T3 test be conducted to validate their proposal to modify the Master Differences Requirements (MDR) table from D/C/C to C/B/B where the "from" aircraft is a B-737-700 and the "to" aircraft is a B-737-300, 500 (Copy of request letter attached to this memorandum). Based upon the request, the SWA CMO

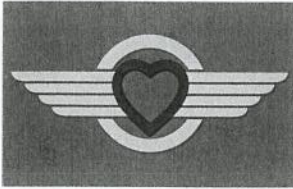
POI replied to Southwest Airlines (SWA CMO response enclosed) concurring with their proposal to conduct the requested test, noting that a representative of the AEG would be conducting the testing. The requested T3 test was subsequently conducted by the AEG, with both SWA CMO partial program managers participating. Based upon favorable test results, the AEG revised the B-737 FSB to satisfy Southwest Airlines request. If required, specific documentation relating to the outcome of this testing would need to be requested from the AEG. No exemptions, deviations or waivers were issued in regards to this subject. The only training related exemption that has been granted to Southwest Airlines is exemption 4416N, 14 CFR part 61.157 & 121.424 Allows for the use of an approved advanced pictorial to conduct training on interior and exterior preflight inspections.

If you require additional information, please contact Ms. Kimberly Burch, Accident Investigation Division, 202-493-4812.

Sincerely,


Robert Drake
Acting Manager, Accident Investigation Division

Enclosures



Greg Crum
Vice President Director of Operations
Operations Coordination Center

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2009 FEB 24 A 11: 58

February 23, 2009

VIA EMAIL AND CERTIFIED MAIL 7008 0150 0000 9921 0224

Mr. Donald T. Braun
Supervisory Principal Operations Inspector
Southwest Airlines Certificate Management Office
Federal Aviation Administration
Freeport Office Center III
8700 Freeport Parkway, Suite 250
Irving, TX 75063

RE: B737-700 MDR Requirements

Dear Inspector Braun:

Southwest Airlines is requesting a T3 test be conducted to validate our proposal to modify the MDR requirements from D/C/C to C/B/B.

Background

On January 15, 2009, a meeting was held at the FAA Seattle Aircraft Evaluation Group (SEA AEG) offices with the following attendees:

Michael Garrett, Asst. Manager – Operations (SEA AEG)
Joe Marott, Director Flight Operations Training Center (Southwest Airlines)
David Newton, RNP Team Lead (Southwest Airlines)

The subject of the meeting was to discuss the Training/Checking/Currency requirements shown in the MDR Table of the B737FSB Report, Revision 10. Specifically, the MDR requirements from a B737-700 base airplane to a B737-700 variant airplane when the differences variant is in the PFD/ND configuration.

Discussion

Southwest suggested that the MDR Table PFD/ND levels of D/C/C were unusually high for the combination of B737-600, 700, 800, 900 base to variant airplanes, especially when compared to the B737-300, 400, 500 base to variant case.

The MDR Table requires C/B/B levels when comparing a B737-300, 400, 500 (Non-EFIS) airplane to a B737-300, 400, 500 (EFIS) configured airplane. These Training/Checking/Currency levels seem reasonable when one considers that there exists an aircraft display system difference, controls differences, flight instrument format differences, engine instrument format differences, and the addition of a navigational map display with its associated new symbols. In addition, crews can be tasked to operate the EFIS equipped variant airplane down to CAT III minima while utilizing the EFIS instrumentation.

Southwest believes that the MDR Table should require no greater than C/B/B levels for the B737-600, 700, 800, 900 (EFIS/MAP) base airplane to B737-600, 700, 800, 900 (PFD/ND) variant airplane combination. When comparing this base to variant aircraft configuration, we find the aircraft display system is identical, the EFIS controls are identical, the navigational map display and its symbols are identical (except for map size), and the flight director guidance remains as a single-cue. The basic differences are only found in the flight and instrument format. It is important to note that all Southwest Pilots are trained in the operation of the HGS system, which is a PFD format. Southwest Captains regularly hand-fly the HGS system in flight operations down to CAT II and CAT III minima and conduct HGS 300 RVR takeoffs. Therefore, the DU - PFD/ND displays themselves would be utilized in conditions no lower than CAT I.

Research revealed that the FSB had not previously tested the B737-600, 700, 800, 900 base airplane to B737-600, 700, 800, 900 variant airplane combination and that the PFD/ND - D/C/C designation in the MDR Table was a placeholder until a test requirement was considered necessary.

Mr. Garrett suggested that Southwest consider proposing a T3 test-only program to validate a lower Training/Checking/Currency requirement for consideration by the FAA AEG and submit the proposal to the Southwest CMO.

T1 Testing:

Southwest believes that the T1 testing can be waived as the Training level is likely to exceed level B.

T2 Testing:

Southwest believes that T2 testing can be waived because the PFD/ND configuration differences will not cause aircraft handling qualities to change.

T4 Testing:

Southwest believes that T4 testing can be waived because the instrument format differences between EFIS/MAP to PFD/ND do not create any procedural or maneuver differences between the aircraft.

PFD/ND T3 Test Proposal

Test Subjects:

Southwest Airlines proposes to schedule three sets of currently qualified Southwest Captain/First Officer crews. One of these sets of crews could be Southwest CMO Inspectors who have completed our Initial and Upgrade training.

Test Process:

The Test Subjects will complete the following PFD/ND training curriculum segments.

Ground Training..... (Self-Paced CBT Training)

Module 1: PFD/ND Overview

EFIS/MAP to PFD/ND Introduction

Module 2: Primary Flight Display (PFD)

- Attitude
- Bank Angle
- Slip & Skid
- Excessive Bank Angle
- Pitch Limit
- Steering Indications
- Flight Mode Annunciator (FMA)
- AFDS Modes
- Airspeed Tape
- Selected Airspeed
- Airspeed Trend Vector
- Takeoff Reference Speeds
- Flap Maneuvering Speeds
- Approach Reference Speeds
- Max & Min Airspeeds
- Barometric Altitude
- METERS Switch
- MCP Selected Altitude
- Landing Altitude Reference Bar
- Baro Reference Selector
- Baro Standard Switch
- Below Transition Altitude
- Above Transition Flight Level
- Vertical Speed
- Selected Vertical Speed
- TCAS RAs
- FPV & FPA
- Radio Altitude
- ILS Indications
- ILS Tuning Disagree
- Marker Beacon
- Glide Slope Scale
- Excessive G/S Deviation
- Localizer Scale
- Expanded LOC Scale
- Excessive LOC Deviation
- Rising Runway

- Approach Minimums
- Baro Minimums
- Radio Minimums
- Minimums Selector
- Minimums Reset
- HDG/TRK Reference Switch
- Time Critical Warnings
- Failure Flags
- Blank or Dashes
- Typical PFD Displays
- Climb PFD
- Cruise PFD
- Descent PFD
- Approach PFD
- Approach PFD – Baro Set
- Landing PFD
- Examination

Module 3: Navigation Display (ND)

- Modes
- MAP Display
- MAP Switches
- Radar & TCAS
- Radar Display
- TCAS Symbols
- VOR & APP Modes
- VOR & APP 2 Modes
- PLN Mode
- Heading Sources
- Failure Flags
- Dashes
- EXCESS DATA Message
- Examination

Module 4: Engine Displays

- Lower DU Display Overview
- Upper Display Overview
- EEC Panel – REVERSER Lights
- N1 Limit Mode of CLB
- Reduced Takeoff Thrust Limit
- N1 Limits
- A/T LIM Message
- N1 Display
- N1 Command Sector Arc
- N1 Reference Bug
- N1 SET Function
- N1 SET Dashes

- N1 SET BOTH Function
- Max Operating N1
- REV
- TAI
- EGT Display
- EGT Indications
- ENG FAIL Message
- Secondary Engine Indications
- N2 Display
- N2 Indications
- Fuel Flow Display
- Fuel Used
- Oil Pressure Display
- Low Oil Pressure
- Oil Temperature
- Oil Quantity
- Engine Vibration
- Compact Display Mode
- Examination

Ground Training..... (Instructor-Led CBT Training)

Module 1: Introduction

- PFD/ND Review
- Operation of the AeroSim desk-top trainer

Module 2: PFD/ND Integration with FMS & MCP

- Simulated flight scenarios using the AeroSim trainer

Module 3: Freeplay

- Student freeplay use of the AeroSim trainer
- Review and Q & A's

Flight Training..... (Full Flight Simulator)

- Briefing
- Preflight
- Takeoff
- Engine Failure at V1
- Steep Turns
- Stalls
- Configuration Changes
- Single Engine ILS Approach
- Missed Approach
- ILS Approach
- Landing
- Debriefing

After the successful conclusion of the training, the crews will be given a non-jeopardy partial Proficiency Check that is only being accomplished for the purpose of validating the proposed PFD/ND Training/Checking/Currency levels. Each partial Proficiency Check will be conducted by a Southwest Airlines Check Pilot. FAA AEG representative(s) will observe one or more of the partial Proficiency Checks in order to determine the outcome of the test and to validate/establish the appropriate Training/Checking/Currency levels.

Partial Proficiency Check..... (Full Flight Simulator)

- Briefing
- Preflight
- Takeoff
- Engine Failure at V1
- Steep Turns
- Stalls
- Configuration Changes
- Single Engine ILS Approach
- Missed Approach
- ILS Approach
- Landing
- Debriefing

Closing

Southwest is confident that the training program outlined above will allow our crews to achieve the high level of knowledge and operational competence that both we and the FAA desire. We are also confident that the proposed C/B/B training, checking, and currency levels are more than adequate to achieve an equivalent level of safety when compared to the untested MDR D/C/C levels.

Thank you for your consideration in this matter.

Sincerely,



for Greg Crum
VP, Director of Operations

MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

AIRPLANE TYPE RATING: B737		FROM AIRPLANE				
	B737 BASIC B737-100/200 (SP77)	B737-200 ADV	B737-300,400,500 (NON-EFIS)	B737-300,400,500 (EFIS)	B737- 600,700,800,900	
T O	B737 BASIC B737-100/200 (SP77)	B/A/B (2) NAV - B/B/C (6) PMS - C/B/C	C*/C*/D	C*/C*/D	D/D/D	
A I R	B737-200 ADV	A/A/A (1) PDCS - C/B/C (2) NAV - B/B/C (4) AFCS - C/B/C (6) PMS - C/B/C	C*/C*/D (1) PDCS - B/B/C (2) NAV - B/B/C (5) LIMITED FMS- C/B/C	C*/C*/D (1) PDCS - B/B/C (2) NAV - B/B/C	D/D/D (1) PDCS - B/B/C (2) NAV - B/B/C	
P L A N E	B737-300,400,500 (NON-EFIS)	C*/C*/D (5) LIMITED FMS - C/B/C	A/A/A (7) CROSS MODEL - A/A/B	C/B/B	(8) C/B/B	
	B737-300,400,500 (EFIS)	(3)C*/C*/D (5) LIMITED FMS - C/B/C	(3) C/B/B	A/A/A (7) CROSS MODEL - A/A/B	(8) C/B/B (9) PFD/ND - D/C/C	
	B737-600,700,800,900	D/D/D	(8) C/B/B (9) PFD/ND - D/C/C	(8) C/B/B (9) PFD/ND - D/C/C	A/A/A (8) PFD/ND - C/B/B (11)EDFCS - C/C/C	

Notes:

C* - Level C training or checking which at least requires use of specific level C training devices with detailed characteristics specified in the FSB report.

- (1) Installation of Performance Data Computer System (PDCS) requires additional training and currency.
- (2) Installation of INS requires additional training, checking and currency.
- (3) Systems device required for EFIS
- (4) Installation of AFCS requires additional training, checking and currency.
- (5) If the FMS on the 737-300/400/500 airplane retains only partial functions (such as SWA config.) training, checking and currency levels may be reduced.
- (6) Installation of Performance Management System (PMS) requires additional training and currency.
- (7) Cross model differences between the respective 737-300, 400 and 500 models require higher level (B) currency.
- (8) C level training requirement may be satisfied by interactive CBT.
- (9) Systems device required for training to/from PFD/ND.
- (10) Training for Integrated Standby Flying Display may be satisfied with "A" level training.
- (11) EDFCS (Enhanced Digital Flight Control System) Fail Operational Autoland requires additional training, checking, and currency.
- (12) Universal Avionics Flat Panel Display/FMS installations (STC ST03355AT/ST03356AT) into -300 series is equivalent to differences between -300/-400/-500 to -600/-700/-800/-900.
- (13) Universal Avionics Flight Management System installations (STC's ST03362AT) into -200 series is equivalent to differences between that variant to -300 Non-EFIS.

MASTER DIFFERENCE REQUIREMENTS (MDR) TABLE

AIRPLANE TYPE RATING: B737		FROM AIRPLANE				
		B737BASIC B737-100/200 (SP77)	B737-200 ADV	B737-300,400,500 (NON-EFIS)	B737-300,400,500 (EFIS)	B737- 600,700,800,900
T O	B737 BASIC B737-100/200 (SP77)	A/A/A (2) NAV - B/B/C (6) PMS - C/B/C	B/A/B (2) NAV - B/B/C (6) PMS - C/B/C	C*/C*/D	C*/C*/D	D/D/D
A I R	B737-200 ADV	B/A/B (1) PDCS - C/B/C (2) NAV - B/B/C (4) AFCS - C/B/C (6) PMS - C/B/C	A/A/A (1) PDCS - C/B/C (2) NAV - B/B/C (4) AFCS - C/B/C (6) PMS - C/B/C	C*/C*/D (1) PDCS - B/B/C (2) NAV - B/B/C (5) LIMITED FMS- C/B/C	C*/C*/D (1) PDCS - B/B/C (2) NAV - B/B/C	D/D/D (1) PDCS - B/B/C (2) NAV - B/B/C
P L A N E	B737-300,400,500 (NON-EFIS)	C*/C*/D (5) LIMITED FMS - C/B/C	C*/C*/D (5) LIMITED FMS - C/B/C	A/A/A (7) CROSS SERIES - A/A/B	C/B/B	(8) C/B/B
	B737-300,400,500 (EFIS)	(3)C*/C*/D (5) LIMITED FMS - C/B/C	(3)C*/C*/D (5) LIMITED FMS - C/B/C	(3) C/B/B	A/A/A (7) CROSS SERIES - A/A/B	(8) C/B/B (9) PFD/ND - D/C/C
	B737-600,700,800,900	D/D/D	D/D/D	(8) C/B/B (9) PFD/ND - D/C/C	(8) C/B/B (9) PFD/ND - D/C/C	A/A/A (8) EFIS to PFD/ND - C/B/A* (9) PFD/ND to EFIS - D/C/C (11)EDFCS - C/C/C

737-700 EFIS/MAP/HGS TO 737-700 PFD/ND/HGS OPERATOR DIFFERENCES REQUIREMENTS TABLE

SYSTEMS OPERATOR DIFFERENCES REQUIREMENTS TABLE									
DIFFERENCE AIRCRAFT: B737-700W BASE AIRCRAFT: B737-700W APPROVED BY (POI): _____									
COMPLIANCE METHOD									
TRAINING									
DESIGN FEATURE	REMARKS	FLT CHAR	PROC CHNG	LVL A	LVL B	LVL C	LVL D	FLT CHK	CHKG/CURR
31 FLIGHT INSTRUMENTS	PFD/ND DISPLAY - FMA DIFFERENCES - AFDS STATUS ANNUNCIATOR - VERTICAL SPEED DISPLAY - AIRSPEED BUGS AND FLAP MANEUVERING SPEEDS - COMPASS ROSE - PITCH LIMIT INDICATOR - AIRSPEED TREND VECTOR - MINIMUM AND MAXIMUM SPEEDS - LANDING ALTITUDE REFERENCE BAR - ALTIMETER SETTING - LOC AND GS DEVIATION - MISSED APPROACH ALTITUDE - GROUNDSPD DISPLAY - RADIO ALTITUDE DISPLAY - TCAS RESOLUTION ADVISORIES - TIME CRITICAL WARNINGS - APPROACH REFERENCE AREA - MARKER BEACON INDICATION - SYSTEM FAILURES AND FLAGS - NO "COMPACT DISPLAY" (DU SWITCHING ONLY AND LOSS OF MAP DISPLAY)	NONE	NONE	A	B	C	D	B	B

GC/mr

Enclosure -- MDR Table to reflect C/B/B levels with
MDR Table associated notes
-- ODR Table to reflect C/B/B levels
-- Copy of SEA AEG Email of 2/19/09

cc: Gordon Taylor, FAA APOI/ATOS
Paul Kriner, FAA APOI
Mike Van de Ven, EVP & Chief Operating Officer
Greg Wells, Sr. VP Operations
Captain Chuck Magill, VP Flight Ops
Captain Jeff Martin, Sr. Dir. Flight Ops
Captain Bob Torti, Sr. Dir Flight Training
Captain C. David Newton, RNP Team Lead
Tim Logan, Sr. Dir Operational Safety
Jim Stieve, Sr. Mgr Oper Cert & Compliance



U.S. Department
of Transportation

**Federal Aviation
Administration**

Southwest Airlines Certificate Management Office
Freeport Office Center III
8700 Freeport Parkway, Suite 250
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Telephone: 214-277-0200
Fax: 214-277-0290
File No: 8400-A

March 19, 2009

Captain Gregory N. Crum
Vice President, Director of Operations
Southwest Airlines Co.
P.O. Box 36611
Dallas, Texas 75235-1611


Dear Captain Crum:

This is in response to your letter dated February 23, 2009, in which you requested concurrence from the Principal Operations Inspector (POI) for your proposal to conduct testing to support a revision to the B-737 Flight Standardization Board (FSB) Master Differences Requirement (MDR) Table. This proposed testing would be conducted by a representative of the Aircraft Evaluation Group (AEG) and would support Southwest Airlines Co. (SWA) future differences training under their Required Navigation Performance (RNP) initiative.

Accordingly, this letter documents my concurrence with Southwest Airlines' proposal to conduct T-3 Testing, in accordance with Advisory Circular 120.53A. Additionally, in support of this testing, it is requested that SWA Certificate Management Office (SWA CMO) employee, Inspector Gary Parks, be included as a training/testing candidate. Inspector Parks meets the qualifications criteria of having been previously trained under Southwest Airlines' Approved B-737 Initial and Recurrent Training Programs.

Please contact Inspector Mike Garrett, AEG, directly at 424-917-6621 to coordinate the details for the proposed training/testing. Your SWA CMO point of contact for this initiative will be Inspector Jerry Griewahn at 214-277-0266.

Sincerely,


Donald T. Braun
Principal Operations Inspector

cc: Mr. Greg Wells, Senior Vice President, Operations
Mr. Daryl Krause, Senior Vice President, Customer Services
Captain Chuck Magill, Vice President, Flight Operations
Captain Jeff Martin, Senior Director of Flight Operations
Mr. Tim Logan, Senior Director, Operational Safety
Mr. Jim Stieve, Senior Manager, Certification and Regulatory Compliance

and is not accomplished during each proficiency training or proficiency check, but is still important to occasionally practice or demonstrate, the FSB may establish a currency requirement. When designated by the FSB, these currency requirements identify each abnormal/nonnormal/emergency maneuver or procedure, the currency level applicable, and an applicable time period or any other necessary/appropriate constraints.

(10) **Difference Level Summary.** Difference levels are summarized in Figure 2 below for training, checking, and currency. Complete descriptions of difference levels for training, checking and currency are given above.

FIGURE 2. DIFFERENCE LEVEL TABLE

DIFFERENCE LEVEL	TRAINING	CHECKING	CURRENCY
A	Self instruction	Not applicable (or integrated with next proficiency check)	Not applicable
B	Aided instruction	Task or system check	Self review
C	Systems devices	Partial check using Device	Designated system
D	Maneuver devices*	Partial proficiency check using device*	Designed maneuver(s)
E	Simulator C/D or aircraft #	Proficiency check using simulator C/D Or aircraft*	Designed maneuver(s) except takeoff and landings

= New pilot type rating is normally assigned

* = FFS or aircraft may be used to accomplish specific maneuvers

g. Operating Experience (OE) for Aircraft.

(1) **Application of OE.** Requirements for OE are consistent with provisions for OE specified under 14 CFR.

(2) **Credits or Constraints.** OE must meet the applicable requirements of the CFR part under which operations are conducted, except that credit for applicable OE in other related aircraft may be permitted. When approved by the FAA, OE associated with differences may be accomplished as part of or in conjunction with line oriented simulation (LOS).

h. Supervised Line Flying (SLF). Experience associated with the introduction of equipment or procedures requiring post qualification skill enhancement during which a pilot occupies a specific pilot position and performs particular assigned duties for that pilot position under the supervision of a pilot instructor or check airman qualified for the operator. One or more of the reasons described below may apply:

(1) Introduction of new systems (e.g., Automatic Dependent Surveillance Broadcast (ADS-B), runway area advisory system (RAAS), etc).