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Flight Standardization Board Report

Revision: 3
Date: XX/XX/XXXX

Manufacturer
The Boeing Company

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A22WE	MD-10-10F	MD-10-10F	MD-11
A22WE	MD-10-30F	MD-10-30F	MD-11
A22WE	MD-11	MD-11	MD-11
A22WE	MD-11F	MD-11F	MD-11

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1. RECORD OF REVISIONS

Revision Number	Section(s)	Date
Original	All	05/09/2000
1	Appendix 5	06/03/2009
2	Cover Page, Highlights of Change, Table of Contents, Record of Revisions, 1, 6–10, 12, Appendices 2–5	08/07/2018
3	All	XX/XX/XXXX

2. INTRODUCTION

Aircraft Evaluation Groups (AEG) are responsible for working with aircraft manufacturers and modifiers, during the development and Federal Aviation Administration (FAA) certification of new and modified aircraft to determine:

1) The pilot type rating,
2) Flightcrew member training, checking, and currency requirements, and
3) Operational suitability.

This report lists those determinations for use by:

1) FAA employees who approve training programs,
2) FAA employees and designees who certify airmen, and
3) Aircraft operators and training providers, to assist them in developing their flightcrew member training, checking and currency.

3. HIGHLIGHTS OF CHANGE

This revision converts this document to the new Flight Standardization Board Report (FSBR) format and complies with Section 508. Change bars are not included in this document because the entire report is revised and updated.

4. BACKGROUND

The Transport Aircraft Long Beach AEG formed a Flight Standardization Board (FSB) that evaluated the MD-10 and MD-11 as defined in FAA Type Certificate Data Sheet (TCDS) No. A22WE. The evaluation was conducted using the methods described in FAA Advisory Circular (AC) 120-53B Change 1, Guidance for Conducting and Use of Flight Standardization Board Evaluations.

The MD-10 airplane is a major change to the DC-10 type design and is customized by Boeing Airplane Services (BAS), a division of The Boeing Company (Boeing), for a single operator, and the Federal Express Corporation (FedEx). FedEx Management and Line Pilots were involved in the development and flight testing of the MD-10.

This modification applies new technology and essentially provides for MD-11 and MD-10 flightdeck commonality. This modification converts the DC-10 aircraft from three-crew to two-crew operation. Crew workload studies were accomplished on the MD-11 and were accomplished for the MD-10 differences. The flight controls, control systems, flap/slat handle, and engines of the DC-10 remain unchanged. The MD-10 flightdeck systems replicate many of the MD-11 systems including:

- An Electronic Instrument System (EIS).
- An MD-11 type Autoflight System.
- Automatic System Controllers (excluding the Air System).

Boeing requested the Transport Aircraft Long Beach AEG determine training and type rating requirements using the methods outlined in AC 120-53B. A T2 test (Handling Qualities Comparison), as outlined in AC 120-53B, was conducted to evaluate the effect of the MD-11 Flight Control Computer (FCC) software load 908 in eliminating handling differences with the MD-10 during takeoff and landing phase of flight. A T3 test was conducted to evaluate system differences and validate proposed training and checking. The only training program evaluated was receiving initial and transition training and type rating in the MD-11 with Differences Training to the MD-10, as requested by Boeing and FedEx. Adequate training devices were not available to conduct evaluations of MD-10 initial or transition training and may be evaluated at a later date.

In August 2022, an FSB was convened to determine operational suitability and evaluate training, checking, and currency requirements for the MD-11/MD-11F Flight Management System (FMS) part number 4059050-924 (known as “FMC-924”). This project corrects errors in the software residing in MD-11/MD-11F FMS part number 4059050-923 (known as “FMC-923”). The FMS software part number will change as a result of this project. The hardware, Flight Management Computer (FMC) has no changes and will retain the part number of 4083900-960. The new system part number will be 4059050-924 (known as “FMC-924”).

5. ACRONYMS

- 14 CFR Title 14 of the Code of Federal Regulations
- AC Advisory Circular
- ACS Airman Certification Standards
- ACFT Aircraft
- AD Airworthiness Directive
- AED Aircraft Evaluation Division
- AEG Aircraft Evaluation Group
- AFM Airplane Flight Manual
- AGL Above Ground Level
- AOA Angle of Attack
- APD Aircrew Program Designee
- AQP Advanced Qualification Program
- ASC Automatic System Controller
- ATC Air Traffic Control

- ATP Airline Transport Pilot
- AV Audiovisual Presentation
- BAS Boeing Airplane Services
- CAWS Central Aural Warning System
- CBT Computer-Based Training
- CG Center of Gravity
- CPT Cockpit Procedures Trainer
- DEU Display Electronics Unit
- DU Display Unit
- DT Differences Tables
- EAD Engine and Alert Display
- EFVS Enhanced Flight Vision System
- EIS Electronic Instrument System
- FAA Federal Aviation Administration
- FADEC Full-Authority Digital Electronic Control
- FCC Flight Control Computer
- FCP Flight Control Panel
- FedEx Federal Express
- FF Fuel Flow
- FFS Full Flight Simulator
- FGS Flight Guidance System
- FMA Flight Mode Annunciator
- FMC Flight Management Computer
- FMS Flight Management System
- F/O First Officer
- FPA Flight Path Angle
- FQ Fuel Quantity
- FSB Flight Standardization Board
- FSBR Flight Standardization Board Report
- FSTD Flight Simulation Training Device
- FTD Flight Training Device
- GCP Glareshield Control Panel
- GPS Global Positioning System
- GS Glideslope
- HO Handout
- HUD Head-Up Display
- ICBI Interactive Computer-Based Instruction
- ILS Instrument Landing System
- IMC Instrument Meteorological Conditions
- IRS Inertial Reference System
- LOC Localizer
- LSAS Longitudinal Stability Augmentation System
- MDA Minimum Descent Altitude
- MDR Master Differences Requirements

- MEL Minimum Equipment List
- MFF Mixed Fleet Flying
- NAS National Airspace System
- ND Navigation Display
- NDB Nondirectional Radio Beacon
- NPS Navigation Performance Scales
- NSP National Simulator Program
- ODR Operator Differences Requirements
- OE Operating Experience
- PA Passenger Address
- PF Pilot Flying
- PFD Pilot Flight Display
- PIC Pilot In Command
- PIO Pilot Induced Oscillation
- PM Pilot Monitoring
- PNF Pilot Not Flying
- POI Principal Operations Inspector
- PROF Profile Mode
- PTS Practical Test Standards
- PTT Part Task Trainers
- RA Radar Altimeter
- RCWS Roll Control Wheel Steering
- RF Radius To Fix
- RNP AR Required Navigation Performance Authorization Required
- RTO Rejected Takeoff
- RVR Runway Visual Range
- SD System Display
- STC Supplemental Type Certificate
- SU Stand-Up Instruction
- TC Type Certificate
- TCBI Tutorial Computer-Based Instruction
- TCDS Type Certificate Data Sheet
- TCE Training Center Evaluator
- V_1 Takeoff Decision Speed
- V_2 Takeoff Safety Speed
- VHF Very High Frequency
- VMC Visual Meteorological Conditions
- VMO/MMO Maximum Operating Limit Speed
- VOR Very High Frequency Omni-Directional Range

6. DEFINITIONS

These definitions are for the purposes of this report only.

6.1 Base Aircraft. An aircraft identified for use as a reference to compare differences with another aircraft.

6.2 Current. A crewmember meets all requirements to operate the aircraft under the applicable operating part.

6.3 Differences Tables. Describe the differences between a pair of related aircraft, and the minimum levels operators must use to conduct differences training and checking of flightcrew members. Differences levels range from A to E.

6.4 Master Differences Requirements (MDR). Specifies the minimum levels of training and checking required between a pair of related aircraft, derived from the highest level in the Differences Tables.

6.5 Mixed Fleet Flying (MFF). The operation of a base aircraft and one or more related aircraft for which credit may be taken for training, checking, and currency events.

6.6 Operational Evaluation. The AEG process to determine pilot type rating, minimum flightcrew member training, checking and currency requirements, and unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).

6.7 Operational Suitability. The AEG determination that an aircraft or system may be used in the National Airspace System (NAS) and meets the applicable operational regulations (e.g., Title 14 of the Code of the Federal Regulations (14 CFR) parts 91, 121, 133, and 135).

6.8 Qualified. A flightcrew member holds the appropriate airman certificate and ratings as required by the applicable operating part.

6.9 Related Aircraft. Any two or more aircraft of the same make with either the same or different type certificates (TC) that have been demonstrated and determined by the Administrator to have commonality.

6.10 Seat-Dependent Tasks. Maneuvers or procedures using controls that are accessible or operable from only one flightcrew member seat.

6.11 Special Emphasis Area. A training requirement unique to the aircraft, based on a system, procedure, or maneuver, which requires additional highlighting during training. It may also require additional training time, specialized flight simulation training devices (FSTD) or training equipment.

6.12 Specific Flight Characteristics. A maneuver or procedure with unique handling or performance characteristics that the FSB has determined must be checked.

7. PILOT TYPE RATING

7.1 Type Rating. The Boeing MD-10 and MD-11 type rating designation is MD-11.

7.2 Common Type Ratings. Not applicable.

7.3 Military Equivalent Designations. Military aircraft that qualify for the MD-11 type rating can be found at www.faa.gov under "Licenses & Certificates," "Airmen Certification," "Online Services," "Aircraft Type Rating Designators." This webpage is kept up-to-date and can be found at: https://www.faa.gov/licenses_certificates/airmen_certification/.

8. RELATED AIRCRAFT

8.1 Related Aircraft on Same TCDS. The MD-10 is related to the MD-11.

8.2 Related Aircraft on Different TCDS. Not applicable.

9. PILOT TRAINING

9.1 Airman Experience.

9.1.1 Pilots receiving initial MD-11 training should have previous experience in part 121 air carrier operations, former military, commuter or corporate pilots with turbine powered aircraft experience. Pilots without this experience may require additional training.

9.1.2 Initial or transition training and type rating must be accomplished in the MD-11 before MD-10 difference training, as outlined in Appendix 2, Master Difference Requirements (MDR) Table; Appendix 3, Differences Tables.

9.2 Special Emphasis Areas.

9.2.1 Pilots must receive special emphasis on the following areas during ground training:

9.2.1.1 Takeoff Safety. Because of frequent MD-10 and MD-11 operations at critical weight with runway limited takeoffs, particular emphasis on certain takeoff safety related topics is appropriate during training. This includes emphasis on the following:

a) The meaning and proper use of V_1.

b) The importance of prompt and correct execution of a rejected takeoff (RTO), including the difference in brakes, aircraft with and without autobrakes, and use of full braking capability.

c) The need to minimize exposure to high-speed RTOs for minor difficulties unrelated to the ability of the aircraft to continue a safe takeoff.

d) Proper selection of flap settings and thrust levels for existing conditions and the need to set power before 80 knots.

e) Proper lineup and use of available runway.

f) Correct accountability for contaminated runway and/or reduced braking friction.

g) Consideration of use of reduced V_1 or minimum V_1 when runway in excess of critical field length is available.

h) Flap/slat handle differences.

9.2.1.2 MD-10 and MD-11 Altitude Callouts During Landing.

a) Radar Altimeter (RA) callouts have been found to be beneficial during flare. Accordingly, for those MD-10 and MD-11 aircraft not equipped with automatic voice radar altitude callouts or tones, a crew procedure providing for a "pilot monitoring" (PM) flightcrew member to make callouts during flare is recommended (e.g., callouts for 50 feet, 30 feet, 10 feet radar altitude).

b) For the MD-10 and MD-11, due to the minimum number of landings typically accomplished by each crewmember as a result of long stage lengths, and the need for the PM to monitor other parameters during flare, use of automatic voice callouts (if installed) during flare is certified and appropriate. The procedures of MD-10 and MD-11 operators not electing to use automatic callouts should only be approved if use of an equivalent or better procedure or method is demonstrated.

9.2.1.3 Automatic Landings.

a) If an operator conducts automatic landings in either the MD-10 or MD-11, then appropriate training must occur. This training must be conducted in the MD-10 or MD-11 training device and/or simulator or airplane.

b) However, due to the similarity between autoland systems in the MD-10 and MD-11, autoland training may occur in any MD-10 or MD-11 variant.

9.2.1.4 Hazardous Weather and Winter Operations.

a) Proper precautions and procedures regarding hazardous weather/winter operations which may be unique to MD-10 and MD-11 aircraft should be addressed. For example, topics such as proper use of wing/(MD-11 tail) anti-ice, antiskid braking characteristics when stopping on slippery runways, appropriate autobrake settings or lack of autobrake, hazards associated with rejecting critical weight takeoffs near V_1 on slippery runways, and other such topics are appropriate for emphasis in training programs due to the significant percentage of critical field length takeoffs.

9.2.1.5 Crewmember Emergency Training (§ 121.417).

a) Appropriate emergency training must be given to each crewmember on the location, function, and operation of each item of emergency equipment that is different in each MD-10 and MD-11 variant. Training may be accomplished by pictures or videotape if, prior to line operation, adequate knowledge of equipment use is demonstrated to an authorized representative of the operator for that variant in a static aircraft or approved training device.

b) Where equipment is common, instruction may be adjusted for those crewmembers qualified and current on other MD-10 and MD-11 variants provided records required by § 121.683(a) show that crewmembers meet §§ 121.417 and 121.683(a) requirements. For example, where elements of interior configurations are common, training may be simultaneously credited for variants.

c) For different emergency equipment, doors, slides, slide/rafts, rafts, communications, or other interior configuration elements, even when within the same series (e.g., MD-10-10 and -30), training on emergency equipment for each variant is required in accordance with MDRs.

9.2.1.6 Critical Hydraulic Failure.

a) All MD-10 and MD-11 aircrafts have the #3 hydraulic system modification, which permits limited control in the event of catastrophic tail section hydraulic failure. Crews must demonstrate familiarity with pertinent hydraulic system annunciations and knowledge of backup aircraft control and thrust management for such a hydraulic failure. An approach and landing should be accomplished with this critical hydraulic failure during initial, transition, and upgrade training. For crews currently qualified on one or both of these aircraft, if not already addressed, this issue should be addressed during a suitable recurrent training period on at least a

one-time basis. While demonstration of use of proper procedures and control in this configuration is appropriate, it is not an objective to train to proficiency in landing with this configuration.

9.2.1.7 Takeoff Rotation With Failure of #2 Engine.

a) Due to the location of the #2 engine, in the event of failure of the #2 engine, a pilot will experience very light control forces at rotation. Pilots should be familiar with this characteristic and take precautions not to "prematurely rotate", "over rotate", or let speed subsequently decay below V_2 during initial climb.

9.2.1.8 MD-11 High Altitude Training.

a) Training in high altitude pilot induced oscillation (PIO) and upsets should be accomplished in the simulator. If inadvertently encountering speeds beyond VMO/MMO, the MD-11 Longitudinal Stability Augmentation System (LSAS) speed protection feature may in some instances provide pitch control feedback that can lead to slight PIO during recovery. Crews should be aware of this characteristic and be advised that use of normal overspeed recovery techniques, including thrust reduction and a smooth increase of pitch attitude, are appropriate. The MD-11, due to engine performance, is able to operate at an altitude where the margin is reduced between high-speed and low-speed stalls. Also, the MD-11 during cruise uses tail fuel management to maintain an aft center of gravity (CG) near the limit for fuel efficiency. A high altitude training program and the aero data needed to upgrade the MD-11 training simulators is available from Boeing and should be incorporated into the operator's training program.

9.2.1.9 Rotation, Flare, and Geometry Limits.

a) Due to fuselage geometry, crews must be clearly aware of the attitude at which tail contact can occur, proper rotation and flare technique, and flare and touchdown pitch characteristics of the aircraft with use of various flap, spoiler, reverse thrust, and CG conditions. This should be addressed for normal takeoffs and landings, with a wing or center engine inoperative, and for landing considering use of either auto spoilers or manual spoilers. Emphasis on MD-11 fuselage length should be addressed.

9.2.1.10 Automatic System Controllers (ASC).

a) The MD-11 has four ASCs and the MD-10 has three, with the air controller being manual only. Training must include dispatching with controllers in manual, especially the fuel system controller.

9.2.1.11 Full-Authority Digital Electronic Control (FADEC) versus Non-FADEC Engines.

a) Training must include differences between FADEC and non-FADEC engines, setting takeoff and go-around thrust, autothrottle differences, and emphasis on preventing overboost with both engine types.

9.2.2 Pilots must receive special emphasis on, and perform the following areas during flight training:

9.2.2.1 MD-10 and MD-11 Altitude Callouts During Landing.

a) RA callouts have been found to be beneficial during flare. Accordingly, for those MD-10 and MD-11 aircraft not equipped with automatic voice radar altitude callouts or tones, a crew procedure providing for a PM flightcrew member to make callouts during flare is recommended (e.g., callouts for 50 feet, 30 feet, 10 feet radar altitude).

b) For the MD-10 and MD-11, due to the minimum number of landings typically accomplished by each crewmember as a result of long stage lengths, and the need for the PM to monitor other parameters during flare, use of automatic voice callouts (if installed) during flare is certified and appropriate. The procedures of MD-10 and MD-11 operators not electing to use automatic callouts should only be approved if use of an equivalent or better procedure or method is demonstrated.

9.2.2.2 Automatic Landings.

a) If an operator conducts automatic landings in either the MD-10 or MD-11, then appropriate training must occur. This training must be conducted in the MD-10 or MD-11 training device and/or simulator or airplane.

b) However, due to the similarity between autoland systems in the MD-10 and MD-11, autoland training may occur in any MD-10 or MD-11 variant.

9.3 Specific Flight Characteristics. There are no specific flight characteristics.

9.4 Seat-Dependent Tasks. Pilots must receive training in these seat-dependent tasks (initial, recurrent, upgrade, and transition training):

9.4.1 Rejected Takeoff (Left Seat).

9.4.2 Use of Steering Tiller During Taxi (Left Seat).

9.4.3 Other items which could in certain circumstances have seat dependent elements, and may need to be considered and addressed as determined by each operator and Principal Operations Inspector (POI) on a case-by-case basis, include the following:

a) Crosswind takeoffs and landings.

b) Engine inoperative takeoffs and landings.

c) Emergency communications.

d) Loss of all generators.

e) Loss of all engines.

f) Emergency descent.

g) Operation on emergency power (display unit (DU) display configuration differences).

9.5 Regulatory Training Requirements Which Are Not Applicable to the MD-10 and MD-11. None

9.6 Flight Simulation Training Devices (FSTD).

9.6.1 The FSB has determined the minimum device for differences training from MD-11 to MD-10 is a fully functional Level 4 flight training device (FTD) with the following systems: Overhead Panel (including system controllers and fire loops); Glareshield Control Panel (GCP); center instrument panel; FMS; forward pedestal (including flaps, throttles, and start levers).

9.6.2 When different engine display formats are used, due to operation with different engine types (MD-10-10/GE CF6, MD-10-30/GE-CF6, and MD-10-40/PW JT9 or MD-11 GE CF6 and PW 4460, etc.), crews should be exposed to the alternate engine instrument presentations by some means (i.e., computer-based training (CBT), simulator, photos, drawings) adequate to assure proper display interpretation and use.

9.6.3 The combination of training devices and simulators should adequately address training requirements resulting from differences in optional equipment (e.g., CAWS altitude callouts, hydraulic/pneumatic thrust reverser differences in engine types (FADEC, non FADEC), split cue/integrated cue flight directors, roll control wheel steering (RCWS) use).

9.6.4 Use of FTDs for Certain Check/Evaluation Items. During static operations, certain FAA-approved MD-10 and MD-11 FTDs have identical characteristics to Level C or D simulators; therefore, certain airline transport pilot (ATP), type rating, or proficiency check/evaluation items may be completed in those FTDs.

This is appropriate for items such as preflight FMS initialization or engine start non-normals. Specific checking credit in such instances must be approved by the POI following coordination with the National Simulator Program (NSP). When such credit is approved by the POI, use of this credit for a particular check is at the discretion of the FAA inspector/APD conducting the check.

9.6.5 When variants are flown in mixed fleets, the combination of simulators and training devices used to satisfy MDR and operator differences requirements (ODR) provisions must match specific variants flown by that operator. The acceptability of differences between training devices, simulators, and airplanes operated must be addressed in the training program by the POI.

9.6.6 Requests for training device approval should be made to the POI. If training device characteristics clearly meet established FAA criteria and have been qualified by the NSP, the POI may approve those training devices for that carrier. Where training devices do not clearly satisfy a given level, POIs should request advice from the FSB Chair, NSP, or the Air Transportation Division.

9.7 Training Equipment. There are no specific systems or procedures that are unique to the MD-11 that require specific training equipment.

9.8 Differences Training Between Related Aircraft. Pilots must receive differences training between the MD-10 and MD-11. The level of training is specified in Appendix 3, Differences Tables.

10. PILOT CHECKING

10.1 Landing from a No-Flap or Nonstandard Flap Approach. The probability of flap extension failure on the MD-10 and MD-11 is not extremely remote due to system design. Therefore, demonstration of a no-flap approach and landing during pilot certification is required. During a §§ 61.58 proficiency check, 121.441 proficiency check, 125.287 competency check, this task may be required. Refer to Order 8900.1, Volume 5, Airman Certification, when the test or check is conducted in an aircraft versus an FFS.

10.2 Specific Flight Characteristics. Maneuvers or procedures required to be checked as referenced in the ATP and Type Rating for Airplane Airman Certification Standards (ACS) and/or Appendix F of part 121.

10.2.1 Manual and Automatic Flight.

10.2.1.1 Proficiency with both manual and automatic flight in normal and non-normal situations, including the use of appropriate flight guidance system (FGS) modes.

10.2.2 Unique Features.

10.2.2.1 Proper use or understanding of features not commonly found on other transport aircraft (e.g., “Dial a Flap”, auto slat extend, center landing gear) and MD-10 flap/slat handle.

10.2.3 Unique Flight Characteristics.

10.2.3.1 Proper response to flight characteristics which may be different from other transport aircraft (i.e., proper pitch and lateral control following an engine failure during takeoff, particularly the number #2 engine); proper use of reverse thrust (particularly with an inoperative engine or reverser); suitable planning for and performance of a two engine inoperative landing; and proper taxi technique, such as during turns between narrow taxiways.

10.2.4 Other Characteristics.

10.2.4.1 Timely and correct response to situations that could be experienced with extended range/heavy weight aircraft, such as demonstrating prompt and correct performance of RTOs on critical length runways; maintaining awareness of brake energy and brake temperatures following landings with short turnaround times, (i.e., MD-10 steel brakes versus MD-11 carbon brakes following RTOs or during extended taxi); timely identification of the need for and initiation of fuel dumping; proper enroute fuel monitoring and management on extended range flights; proper performance of extended range/overwater navigation procedures (if applicable); and proper method of disconnecting autopilot (i.e., never apply force to control wheel or column).

10.2.5 FMS/Global Positioning System (GPS) Demonstration of Competency.

10.2.5.1 FMS/GPS checking for the MD-10 and MD-11 should include a demonstration of both normal and non-normal procedures as necessary. Training and checking for clearances not normally given by air traffic control (ATC) should be discouraged for initial and transition training because it detracts from training in more critical areas. Specific items and flight phases to be checked include any applicable initialization, takeoff, departure, cruise, arrival, precision and non-precision approach, missed approach, holding, diversion to an alternate or route change, and pertinent non-normals.

10.2.5.2 For extended range over remote areas or oceanic operations, FMS/GPS use may include emphasis on items such as proper step climb considering enroute winds, engine-out diversion planning, and fuel management.

10.2.5.3 Since navigation must be accomplished through use of the FMS/GPS, a high degree of proficiency with basic FMS/GPS features should be exhibited to initialize or find necessary information to safely accomplish a flight, to properly configure the aircraft (confirm V-speeds, adjust thrust limits, set CG, etc.), and to satisfy commonly accepted ATC clearances without undue delay. However, it is recognized that demonstration of mastery of each and every feature of FMS/GPS, use of the full range of alternative techniques, use of the optimum technique for a particular task, or use of extra/optional features and other such "mastery level" skills common to experienced FMS/GPS users may not necessarily be mature at the time of initial certification of an applicant. The key factor to be evaluated is whether the applicant can safely, confidently, and expeditiously use the FMS/GPS to achieve the desired outcome and assure safe flight without undue errors, delays, distractions, or unsafe results.

10.2.5.4 Proper use of "standby navigation" mode should be demonstrated because use of standby navigation is not normally used in line operations.

10.2.5.5 Proper FMS/GPS use in conjunction with outside visual traffic scan, particularly in terminal areas, should be demonstrated. Prolonged fixation on FMS significantly detracting from outside scan should be avoided.

10.3 Seat-Dependent Tasks. There are no seat-dependent tasks.

10.4 Other Checking Items.

10.4.1 Checklists.

10.4.1.1 Non-normal checklists supplied by the manufacturer are organized using a different method than commonly used for other transport aircraft and part 121 operators; however, the sequence of the manufacturer's checklist actions must not be changed. Thus, applicants should clearly demonstrate the ability to find pertinent items and accurately use MD-10 and MD-11 non-normal checklists in a timely manner, including use and understanding of related synoptic displays and any associated "consequences" messages. It should be noted that the "consequences" display is not an approved means to substitute for the abnormal or emergency checklist requirements of § 121.315.

10.4.2 Automatic Flight System.

10.4.2.1 Crews should have a clear understanding of Flight Control Panel (FCP) use, including confirmation of mode arming and engagement and use of Flight Mode Annunciations (FMA) on the primary flight display (PFD). Crews should be sufficiently familiar with the FCP and FMA to easily and reliably satisfy routine flight path control requirements, comply with typical ATC clearances, and respond to non-normal situations such as engine failure or emergency descent. Crews should not show confusion about which modes are armed or active or how to select the mode desired. Crews should exhibit confidence in actions to take to accomplish a particular maneuver, not be surprised by the aircraft accomplishing a different maneuver than expected, or failing to respond as intended. If the "speed protection" mode, "windshear" mode, or other such situations are encountered, an appropriate crew response should be evident. Crews should be trained to immediately take manual control of the airplane if FCP or FMA confusion occurs.

10.4.3 Engine and Alert Display (EAD) and Systems Displays (SD).

10.4.3.1 Proper use of EAD and SDs should be demonstrated in conjunction with both normal and non-normal procedures. It should be evident that critical information (total fuel, stabilizer position, bleed air pressure for start, etc.) can be easily found when necessary, even for situations in which a display unit (DU) may be inoperative.

10.4.4 Central Aural Warning System (CAWS).

10.4.4.1 Pilots should be sufficiently familiar with aural alert messages and be able to readily distinguish between those messages requiring awareness, attention, or action from messages that do not. For example, some messages are the result of a configuration that the crew is otherwise already aware of, some may result from a known inoperative component (minimum equipment list (MEL) item), and some may be considered advisory only.

10.4.5 Communication Radio Management.

10.4.5.1 Clear understanding of the use of communication radio panels and audio control panels should be demonstrated. FTD and simulator training sessions should incorporate simulated ATC or company radio communications by using the simulator/FTD speakers or headsets. A clear understanding of the use of passenger address

(PA), oxygen mask mic, very high frequency (VHF) #1 radio, and cabin interphone for emergency communications should be evident.

10.4.6 Fuel System.

10.4.6.1 Because of the criticality of fuel computations during extended range/overwater flights, crews should be particularly familiar with the way fuel computations are made by the FMC, in addition to basic fuel quantity indications on the overhead panel and use of the fuel synoptic. The importance of issues, such as entering enroute wind data into the FMC to get a proper destination fuel estimate, the effect of using fuel flow (FF) alone as the basis for FMC calculation of extra fuel rather than the normal "fuel flow plus fuel quantity" (FF+FQ), and proper use of ballast fuel, should be clearly understood.

10.4.6.2 Training and checking with fuel system in manual, especially if MEL dispatch with auto fuel system controller inoperative is planned.

10.5 Flight Simulation Training Devices (FSTD). MD-10 and MD-11 FTDs may be used for certain additional check items for the ATP, type rating, proficiency check, or proficiency evaluation. Devices or simulators are approved by the operators' POIs, consistent with NSP qualification and FSB master requirements.

10.6 Equipment. There are no specific systems or procedures that are unique to the MD-11 that require specific equipment.

10.7 Differences Checking Between Related Aircraft. Pilots must receive differences checking between the MD-10 and MD-11. The level of checking is specified in Appendix 3, Differences Tables. Checks or evaluations specified by parts 61 or 121 appendix F or Advanced Qualification Program (AQP) evaluations apply to MD-10 and MD-11 variants as permitted by MDR and Differences Tables (DT). Part 121 differences checking items within each of the MD-10 and MD-11 types are accomplished as specified by MDR and DT.

10.8 Type Ratings.

10.8.1 Oral Exam.

10.8.1.1 For an MD-11 type rating, the oral portion of a type rating practical test must address the MD-11 aircraft. If the MD-10 is to be flown, differences may be addressed by a check pilot, Training Center Evaluator (TCE), instructor, or FAA inspector.

10.8.2 Pilot Seat to be Used.

10.8.2.1 The practical test for MD-11 ATP or type rating may be demonstrated from either pilot seat with the exception of taxiing tasks, which must be demonstrated from the left pilot seat.

10.8.3 Variant to be Used.

10.8.3.1 Airmen may complete the necessary practical test in any MD-11 variant for issuance of an "MD-11" pilot type rating, with differences training to any MD-10 variant.

10.8.4 Airmen Not Employed Under Part 121.

10.8.4.1 A practical test for an applicant intending to operate under 14 CFR parts 91 or 125 should be conducted in a variant of the same group as that intended to be flown. Where an MD-11 type rating is sought, the test must be conducted using any MD-11 variant, with differences to any MD-10 variant, if the MD-10 is to be flown. The inspector should recommend that at least one of the following provisions be met prior to serving as pilot in command (PIC) of a different variant than the one in which the original test was accomplished.

10.8.4.2 Completion of differences qualification in accordance with or equivalent to that specified for part 121 (e.g., compliance with MDR and DT).

10.8.4.3 Completion of a proficiency check in accordance with part 61, § 61.58 completed in the variant(s) to be flown.

10.8.4.4 Completion of a proficiency check in accordance with or equivalent to that specified by part 121, a check conducted by a US military service, or other equivalent check in an aircraft of the variant group to be flown.

10.8.4.5 Completion of a briefing by the evaluator or inspector to an applicant regarding the desirability of additional differences training prior to flying other MD-10 or MD-11 variants.

10.9 Proficiency Checks/Evaluations.

10.9.1 MD-10 and MD-11 Proficiency Checks.

10.9.1.1 Except as specified in approved DT, proficiency checks/evaluations may be administered in any MD-10 and MD-11 variant group.

10.9.2 Proficiency Checks Addressing Each Variant Flown.

10.9.2.1 When a proficiency check/evaluation addresses qualification in more than one variant, the check may primarily address one variant. However, portions of the check should be accomplished in relevant combinations of training devices, simulators, or aircraft to ensure assessment of competency related to other variant(s) flown.

10.9.3 Substitution of Recurrent Flight Training.

10.9.3.1 Satisfactory completion of a proficiency check may be substituted for recurrent flight training as permitted in § 121.433(c) for either the respective MD-10 or MD-11 types.

10.9.4 Alternating Proficiency Checks.

10.9.4.1 If crews fly MD-10 and MD-11 variants in a mixed fleet, it is desirable, but not mandatory, for proficiency checks to alternate each 6 months for PICs, and annually for First Officers (F/O), unless otherwise authorized by the FAA (i.e., through an exemption which permits annual training/checking in lieu of each 6 months). When alternating checks are accomplished, the differences assessment for other respective MD-10 or MD-11 variants being evaluated may be satisfied by ground training, written questionnaire, oral review, or other method approved by the POI.

10.9.5 Section 61.58 Checks.

10.9.5.1 Proficiency checks, which may be required in accordance with § 61.58 but do not pertain to part 121 operations, should be administered using the same variant or a variant within the same group as the aircraft intended to be flown unless otherwise authorized by the FAA.

10.10 Operating Experience (OE).

10.10.1 The same OE applies to the MD-10 and MD-11. OE for the MD-10 and MD-11 may be accomplished in any MD-10 and MD-11 variant provided MD-11 FCC software load 908 or later is installed. It is recommended that OE be accomplished in the MD-11. If MD-11 FCC software load 908 or later is not installed, OE is required for both MD-10 and MD-11.

10.11 Qualifications of FAA Inspectors, Evaluators, or Check Pilots.

10.11.1 For the purpose of airman certification, FAA inspectors, aircrew program designees (APD), evaluators, or check pilots should have completed appropriate qualification for the respective MD-10 or MD-11 variant(s) to be flown.

11. PILOT CURRENCY

Currency required by § 121.439 is addressed for the MD-10 and MD-11 in the approved DTs. For programs approved through these tables, currency is specified in accordance with MDR.

11.1 Differences Currency Between Related Aircraft. Pilots must receive differences currency between the MD-10 and MD-11as follows:

11.1.1 Currency between MD-10 and MD-11 variant groups is permitted as shown by approved DTs. This is appropriate because handling characteristics of all MD-10s and MD-11s are common, provided MD-11 FCC software load 908 or later software is installed in the MD-11; if FCC software load 908 is not installed, 90-day landing currency is required.

11.1.2 Takeoffs and landings performed in one variant are equivalent to those performed in other variants if knowledge and procedural issues are suitably addressed through appropriate DT provisions.

12. OPERATIONAL SUITABILITY

The MD-10 and MD-11 are operationally suitable for operations under parts 91, 121, and 125. The list of operating rules evaluated is on file at the Transport Aircraft Long Beach AEG.

13. MISCELLANEOUS

13.1 Flightcrew Rest Facilities (Part 117)/Flightcrew Sleeping Quarters (Part 121, Subpart R). None

13.2 Forward Observer Seat. The MD-10 and MD- 11 center/right forward observer seat is designated as the Administrator's seat, for meeting the requirements of § 121.581(a). Other cockpit observer seats (left) may be used by FAA inspectors at their discretion, such as when observing check airmen in the performance of their duties.

13.3 Aircraft Approach Category. The MD-10 and MD-11 are considered a Category D aircraft for "straight-in approach" weather minima. Certain MD-10-10s may be considered Category C if at their maximum certificated landing weight 1.3 V_{SO} is less than 141 knots (see the pertinent Airplane Flight Manual (AFM) and § 97.3(b)). The MD-10 and MD-11 are considered approach Category D aircraft for "circling approach" weather minima unless otherwise permitted or required by applicable operations specifications.

13.4 Emergency Evacuation.

13.2.1 Emergency Evacuation - MD-10. An emergency evacuation demonstration in accordance with § 121.291 was successfully completed for the DC-10, including configurations, flight attendants, and passenger capacities listed on

TCDS No. A22WE. Maximum passenger capacity is 380. This also applies to the MD-10. However, a partial emergency evacuation demonstration is required for each new passenger MD-10 operator.

13.2.2 Emergency Evacuation - MD-11. An emergency evacuation demonstration in accordance with § 121.291 was successfully completed for the MD-11, including configurations, flight attendants, and passenger capacities listed on TCDS No. A22WE. Maximum passenger capacity is 410. A partial emergency evacuation demonstration, however, is required for each new MD-11 operator.

13.5 Normal Landing Flaps. The MD-10 and MD-11 normal "final flap setting" per § 91.126(c) are either "flaps 35" or "flaps 50".

13.6 Minimum Altitude for Use of Autopilot (14 CFR Part 121, § 121.579).

13.6.1 For the MD-10 and MD-11, unless a higher value is otherwise specified by the FAA (e.g. by AFM), Airworthiness Directive (AD), Service Bulletin), the minimum altitude for engagement of the autopilot for MD-10 and MD-11 aircraft, under part 121 operations, is 200 feet above ground level (AGL) in "takeoff", "level change", "vertical speed", and "altitude hold" mode. "PROF" mode may be used in accordance with AFM constraints for minimum engagement altitude.

13.6.2 For autopilot precision approach, dual land, single land, or go around, autopilot minimum use height is as specified by the AFM for the respective mode (i.e., autopilot may usually remain engaged through completion of landing rollout). For nonprecision approach, the autopilot minimum use altitude is 50 feet below published minimum descent altitude (MDA) when using "level change", "vertical speed", "flight path angle (FPA)", or "altitude hold" modes.

13.7 No-Flap Approach. Training and checking requirements include:

13.7.1 Training for and demonstration of approaches with no slats and normal flaps, no flaps and normal slats, and no slats or flaps is appropriate for the MD-10 and MD-11 aircraft. Training for go-around flap differences is appropriate. (i.e., MD-10 is 22° and MD-11 is 28°).

13.7.2 Credit for demonstration of a "no-flap/no-slat" approach in either a MD-10 or MD-11 aircraft is permitted for the other respective type if approved by the POI.

13.8 MD-10 and MD-11 Common Landing Credit. The MD-11 must have FCC software load 908 or later to receive landing credit or 90-day landing currency is required. The FCC software load 908 package for the MD-11 improves landing qualities and enhances tail strike prevention. These handling quality improvements are transparent to the crew.

13.9 Use of MD-10 and MD-11 "MAP" Mode During Instrument Approaches. It is appropriate that crews monitor pertinent raw data navigation information during instrument approaches using the navigation display (ND) "MAP" mode. Raw data localizer (LOC) and glideslope (GS) information on the primary PFD, and very high frequency omni-directional range (VOR), or Nondirectional Radio Beacon (NDB) information on the ND, should be monitored to ensure consistency with ND map information. Some operators consider it good operating practice to have one pilot monitor the pertinent ND "APPR" or "VOR" display mode to validate information shown by the map display. Exclusive use of the "MAP" mode by both pilots during an instrument approach without some means of crosscheck (i.e., monitoring PFD LOC and GS data), is not appropriate. This is due to the potential for error associated with unreliable navigation signals, delays in updating following "IRS only" operations, FMS map drift, facility outages, or other such factors.

13.10 Section 121.291 Ditching Demonstration – MD-10.

13.10.1 Due to the similarity of doors, slides/rafts, and procedures, credit for a DC-10 full scale ditching demonstration is permitted for the MD-10. Accordingly, use of a "partial ditching demonstration" is permitted for the MD-10 in accordance with Order 8900.1, Volume 3, Chapter 30, Section 6.

13.11 Proving Tests, § 121.163.

13.11.1 MD-10.

13.11.1.1 Proving tests in accordance with § 121.163(c) are appropriate in accordance with Order 8900.1, Volume 3, Chapter 29, Section 3. Credit in the form of proving test time reductions may be given for previous DC 10 and MD-11 experience for that operator when such previous experience is directly applicable.

13.11.2 MD-11.

13.11.2.1 Initial part 121 proving runs in accordance with provisions of § 121.163(a) have been completed by the initial part 121 operator of the MD-11. Subsequent proving tests in accordance with § 121.163(b) are appropriate in accordance with Order 8900.1, Volume 3, Chapter 29, Section 3. Credit in the form of proving run time reductions may be given for previous DC-10 experience for that operator when such previous experience is directly applicable.

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	• Operating manual revision (handout (HO)) • Flightcrew operating bulletin (HO)	• Crew has already demonstrated understanding on base aircraft (e.g., updated version of engine). • Minor or no procedural changes required. • No safety impact if information is not reviewed or is forgotten (e.g., different engine vibration damping mount). • Once called to attention of crew, the difference is self-evident.
B	Aided Instruction	• Audiovisual presentation (AV) • Tutorial computer-based instruction (TCBI) • Stand-up instruction (SU)	• Systems are functionally similar. • Crew understanding required. • Issues need emphasis. • Standard methods of presentation required.
C	Systems Devices	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Training can only be accomplished through systems training devices. • Training objectives focus on mastering individual systems, procedures, or tasks versus highly integrated flight operations or “real-time” operations. • Training devices are required to assure attainment or retention of crew skills to accomplish more complex tasks usually related to aircraft systems.
D	Maneuvers Devices	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Training can only be accomplished in flight maneuver devices in a real-time environment. • Training requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	Level C/D FFS or Aircraft	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	• Motion, visual, control-loading, audio, and specific environmental conditions are required. • Significant full-task differences that require a high fidelity environment. • Usually correlates with significant differences in handling qualities.

Checking Differences Legend

Differences Level	Checking Method Examples	Conditions
A	None	None
B	• Oral or written exam • Tutorial computer-based instruction (TCBI) self-test	Individual systems or related groups of systems.
C	• Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4-5)	• Checking can only be accomplished using systems devices. • Checking objectives focus on mastering individual systems, procedures, or tasks.
D	• Level 6 or 7 flight training device (FTD 6-7) • Level A or B full flight simulator (FFS A-B)	• Checking can only be accomplished in flight maneuver devices in a real-time environment. • Checking requires mastery of interrelated skills versus individual skills. • Motion, visual, control-loading, and specific environmental conditions may be required.
E	• Level C or D full flight simulator (FFS C-D) • Aircraft (ACFT)	Significant full-task differences that require a high fidelity environment.

APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

These are the minimum levels of training and checking required, derived from the highest level in the Differences Tables in Appendix 3. Differences levels are arranged as training/checking.

To Related Aircraft ↓	From Base Aircraft →	MD-11
MD-10		C*/B

Notes:

1. C* means MD-10 initial differences training only. Recurrent training should be accomplished at Level B/B/B in conjunction with a full 14 CFR part 61 or 121 check.
2. Requirements for particular MD-10 and MD-11 variants are shown in Appendix 1. These provisions apply when differences between variants exist which affect crew knowledge, skills, or abilities (e.g., Level A or greater differences). Credit for certain maneuvers is permitted between MD-10 and MD-11 aircraft, as specified. This is appropriate since similar handling qualities and other common characteristics, such as cockpit visibility, may permit certain credit for training, checking, and currency (e.g., stalls and steep turns).

APPENDIX 3. DIFFERENCES TABLES

This Design Differences Table, from the MD-11 to the MD-10, was proposed by The Boeing Company and validated by the FSB. It lists the minimum differences levels operators must use to conduct differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: MD-11 TO RELATED AIRCRAFT: MD-10	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	Airplane Configuration	Dimensions Landing Gear	No	Yes	A Paper	A
	Panel Layout	Switches/Gages (Adds and Deletes) Switch Changes Switch Relocation	No	Yes	C FTD	B
	Weights	Changes Related to Series	No	No	A Paper	A
	Powerplant	General Electric CF-6	No	No	B CBT	B
	ATA 21 Air Conditioning	Air System Change: Trim Air Switch, Pack Switch, Bleed Air Switches Delete: System Select Sw	No	Yes	C FTD	B
	ATA 21 Air Conditioning	Pressurization Delete: Ditching Switch	No	Yes	C FTD	B
	ATA 22 Autoflight	Autothrottles ADIRU	No	Yes	C FTD	B
	ATA 23 Communications	Onboard Maintenance Terminal Enhances FPWS	No	Yes	B CBT	B

FROM BASE AIRCRAFT: MD-11 TO RELATED AIRCRAFT: MD-10	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 26 Fire Protection	Engine and APU Test	No	Yes	B CBT	B
	ATA 27 Flight Controls	Flap/Slat Handle Operations Spoiler Operation Speedbrake Operations (No Interconnect with Flaps)	No	Yes	C FTD	B
	ATA 27 Flight Controls	Flap and Slats Description Limitations	No	Yes	B CBT	A
	ATA 27 Flight Controls	Delete: LSAS, Aileron Droop, Deflected Ailerons	No	Yes	A Paper	A
	ATA 28 Fuel	System Operation Manual	No	Yes	B CBT	B
	ATA 28 Fuel	Delete: Tail Fuel System, C.G. Control	No	Yes	A Paper	A
	ATA 30 Ice and Rain Protection	Engine Anti-Ice System Operation	No	Yes	B CBT	B
	ATA 30 Ice and Rain Protection	Delete: Tail Deice Ice Detection System	No	Yes	A Paper	A
	ATA 31 Instruments	Delete: Static Air Selector	No	Yes	A Paper	A
	ATA 32 Landing Gear	Landing Gear Series Unique (-10/-30) Turning Radius Delete: Tire Pressure	No	Yes	A Paper	A

FROM BASE AIRCRAFT: MD-11 TO RELATED AIRCRAFT: MD-10	DESIGN	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
	ATA 32 Landing Gear	Brakes Autobrakes Antiskid Brake Pressure Gauges Brake Temp (Series 30)	No	Yes	B CBT	B
	ATA 34 Navigation	ADIRU TCAS Predictive Windshear	No	No	B CBT	B
	ATA 36 Pneumatic	Delete System Controller Manual Operation	No	Yes	B CBT	B
	ATA 49 Airborne Auxiliary Power	System Operation	No	Yes	C FTD	B
	ATA 52 Doors	Lower Cargo Doors Operation and Inspection	No	Yes	A Paper	A
	ATA 52 Doors	Delete: Auto-Cargo Door Test	No	Yes	A Paper	A
	ATA 72 Turbine/Turboprop Engine	Engine Start Controls Fuel Levers Thrust Reverser Lockout Limitations	No	Yes	C FTD	B
	ATA 72 Turbine/Turboprop Engine	Delete: FADEC, Overboost Bar	No	Yes	C FTD	A

Landing Currency Credit Permitted by Differences Tables.

Credit for takeoff and landing maneuvers are permitted between MD-10 and MD-11 aircraft as specified in DTs. When approved by the FAA, an operator may have its pilots satisfy the requirement for three takeoffs and landings in the previous 90 days (§ 121.439) by accomplishing those takeoffs and landings in either the MD-10, the MD-11, or by any combination of three takeoffs and landings in an MD-10 or MD-11. The MD-11 must have FCC software load 908 or later to receive this credit.

APPENDIX 4 HEAD-UP DISPLAY (HUD)

The subject of this report is the installation, by the Supplemental Type Certificate (STC), of two follow-on systems that were not part of the original type design of the MD-10/MD-11 aircraft; a Honeywell Head-Up Display (HUD) and Kollsman Enhanced Flight Visual System (EFVS).

The MD-10/MD-11 Flight Standardization Board (FSB) participated in evaluation of Federal Express flightcrew ground, simulator, and flight training program for the HUD/EFVS using Federal Express MD-10 aircraft in Memphis, Tennessee. The ground training consisted of four hours of classroom instruction, two hours of HUD/EFVS DVD training, four hours of simulator training and four hours of training in the aircraft. Each FSB member performed three takeoff guidance takeoffs, flew three HUD approaches using CAT I, CAT II, and CAT III procedures, during day, Visual Meteorological Conditions (VMC) and simulated Instrument Meteorological Conditions (IMC). The FSB also evaluated Federal Express proposed MD-10/MD-11 Airplane Flight Manual (AFM) Supplement for HUD Operations and Federal Express proposed CAT II/III appendix to the MD-10/MD-11 AFM Supplement for Category II Operations. The FSB found the HUD/EVS operationally acceptable for all phases of flight and for U.S CAT I, CAT II, and CAT III operations.

The HUD/EVS crewmember training requirements consists of those related to initial and recurrent ground and flight training. Unless covered concurrently during an initial or transition type rating course, a prerequisite to beginning this course of training is prior training, qualification and currency in the MD-10/MD-11 aircraft. The program focuses primarily upon training events flown in the left seat by the pilot in command (PIC) in 14 CFR part121 operations. Flight crewmember training must include a review of 14 CFR § 91.175 and a review of the STC AFM Supplement for the MD-10/MD-11 aircraft installed HUD/EVS system.

Flight crewmember training must be accomplished using a Level C simulator, with a daylight visual display, or a Level D simulator that has been approved by the National Simulator Program for EFVS, or the aircraft. The FSB has determined that each pilot in command of an aircraft equipped with HUD/ EFVS should receive a minimum of 4 hours of ground school training followed by a minimum of 4 hours of simulator training (minimum of two hours in the left seat) of a Level C simulator, with a daylight visual display, or Level D simulator. A MD-10/MD-11 equipped HUD/EFVS aircraft may also be used in lieu of a simulator for training. In-flight training should consist of a minimum of 4 hours of flying in the left seat of the HUD/EFVS System equipped aircraft. The flight portion of the training should consist of a minimum of two (2) takeoffs using takeoff guidance, two (2) day and two (2) night approaches with and without vertical guidance. A person who progresses successfully through flight training, is recommended by an instructor, and successfully completes the appropriate HUD/EFVS proficiency check by a person authorized by the Administrator, need not complete the recommended 4 hours of flight training.

For airline operators, initial training should be conducted in accordance with the applicable provisions of 14 CFR §§ 121.415, 121.419, 121.424, 121.427, AC 120-28C, and the airline operation specifications. It is recommended that the initial ground training program include the following:

1. Classroom instruction covering HUD/EFVS operational concepts, crew duties and responsibilities and operational procedures including preflight, normal and non- normal pilot activities. For operators wishing credit for low visibility operations predicated on use of HUD/EFVS, information should be provided on the operation characteristics, capabilities, and limitations of the ground facilities (surface movement guidance control system) and airborne CAT III system. Airline policies and procedures concerning low visibility operations should include a reporting process, MEL issues, operation following a missed approach, IOE and currency requirements.

2. Classroom instruction on the HUD/EFVS symbology and it's inter-relationship with airplane aerodynamics, internal factors and environmental conditions.

3. A HUD/EFVS pilot training manual or equivalent material in the Operations Manual which explains all modes of operation, the use of various HUD/EFVS controls, clear description of HUD/EFVS symbology including limit condition and failures, and incorporating a crew procedures guide clearly delineating pilot flying (PF) and pilot not flying (PNF) duties, responsibilities and procedural call-outs and responses during all phases of flight during which HUD/EFVS operations are anticipated. Emphasis on the availability and limitations of visual cures encountered on approach both before and after DH. This would include:
    - Procedures for unexpected deterioration of conditions to less than minimum RVR encountered during approach, flare and rollout.
    - Demonstration of expected visual references with weather at minimum conditions.
    - Expected sequence of visual cues during an approach in which visibility is at or above landing minima.

4. A video tape/DVD demonstrating all modes of HUD/EFVS operation with sound. For operators wishing credit for low visibility operations predicated on use of the HUD/EFVS, this should include narrative descriptions and several low weather approach demonstrations with procedural call-outs and responses. All critical procedural callout possibilities should be covered.

5. If the HUD is used as a CAT II landing system, emphasis on the need for rigorous crew discipline, coordination, and adherence to procedural guidelines.

6. Special Emphasis Ground Training:
    a) Crew coordination
    b) Crew briefing and callouts
    c) Duties of flying and non-flying pilots
    d) Transition from EFVS imagery to non-EFVS, visual conditions. Maximum use of videotapes of actual EFVS approaches as seen through the combiner should be used.
    e) Visual anomalies such as "noise" parallax, and "blooming".
    f) Importance of cross checking the HUD instrument presentations against the EFVS visual scene presentation to enable the pilot to recognize malfunctions of the ground

based ILS equipment and improper presentation of elements in the visual scene during the approach.
   g) HUD Takeoff guidance modes of operation.
   h) Proper utilization of the Flare CUE.
   i) HUD/EFVS emergency operations.
   j) Importance of ensuring descent on an obstacle-free glide path when operating below the MDA during non-precision approaches.
   k) Angle-of-Attack (AOA) Indicator purpose/use.
   l) Multifunction Control Display Unit (MCDU) interface/operation.
   m) Use of Aircraft Braking Scale.

7. Special Emphasis Flight/Simulator Training:
   a) Transition from EFVS imagery to non-EFVS, visual conditions and runway acquisition.
   b) Crew briefings and callouts including annunciation of published minima and operation below DA (H) or MDA (H).
   c) Importance of the "design eye position" in acquiring the proper EFVS image.
   d) Use of the HUD/EFVS Control Wheel Switch.
   e) Precision and non-precision instrument approaches in both day and night conditions.
   f) Use of caged and un-caged modes in crosswind conditions.
   g) EFVS repeater (if installed) – Imagery quality and crew coordination.
   h) Proper utilization of the Flare Cue.
   i) HUD Takeoff Guidance modes of operation.
   j) HUD/EFVS emergency operations.
   k) TCAS resolution advisory.
   l) Recovery from unusual attitudes.
   m) Use of the flare symbol as a cue (not guidance).
   n) Use of AOA during wind-shear recovery.
   o) Use of Aircraft Braking Scale during rejected takeoff/landing.

8. Checking. Checking requires a proficiency check conducted in a Level C simulator with a daylight visual display or in a Level D simulator that has been approved by the National Simulator Program for EFVS or on an EFVS aircraft. The proficiency check will include at least one instrument approach to published minimums and landing utilizing the EFVS. This check can be accomplished concurrently with a proficiency check or competency check in accordance with 14 CFR §§ 61.57, 61.58, 121.441, 121.913, and 121.915.

9. Currency. If § 61.57(c) is being used for currency, at least one of the 6 required instrument approaches must be accomplished using the EFVS to published minimums.

   NOTE: The EFVS is certified for use as an aid during all phases of flight: taxi, take-off, climb, cruise, descent, and landing.

APPENDIX 5. ENHANCED FLIGHT VISION SYSTEM (EFVS) OPERATIONS

Refer to 14 CFR part 61, § 61.66 and the current edition of AC 90-106, Enhanced Flight Vision Systems, for training, recent flight experience, and proficiency requirements for EFVS operations. Refer to the current edition of AC 90-106 and 14 CFR part 91, § 91.1065(g) or part 121, § 121.441(e) as applicable for EFVS task requirements during part 91 subpart K (part 91K) or part 121 competency checks. The FSB has determined the EFVS is operationally suitable for use during EFVS operations under § 91.176(a) or (b). An operational suitability determination does not constitute an operational authorization.

APPENDIX 6. MD-11/-11F Flight Management Computer (FMC) P/N 4059050-924 & RNAV RNP AR Approaches

1. BACKGROUND

In August 2022, an FSB was convened to determine operational suitability and evaluate training, checking, and currency requirements for the MD-11/MD-11F Flight Management System (FMS) part number 4059050-924 (known as "FMC-924"). This project corrects errors in the software residing in MD-11/MD-11F Flight Management System (FMS) part number 4059050-923 (known as "FMC-923"). The FMS software part number will change as a result of this project. The hardware, Flight Management Computer (FMC) has no changes and will retain the part number of 4083900-960. The new system part number will be 4059050-924 (known as "FMC-924").

Also included with this project is testing of MD-11/MD-11F Electronic Instrument System (EIS) interface to support FMC Navigation Performance Scales (NPS) related functions. MD-11/MD-11F EIS (Display Electronics Unit (DEU) part number's 4059011-911, 4059011-912 & 4059011-913) requires no Hardware, Software, or part number changes for this certification.

FMC-924 provides optional Required Navigation Performance Authorization Required (RNP AR) approach capability with the NPS feature on the Primary Flight Display (PFD) and the following requirements and FMS OPC options enabled:

Requirements for conducting RNP AR approaches.

1. Minimum systems configuration:
   - 922 FMS or later (Qty 2 FMCs)
   - DEU-913 (Qty 2)
   - GPS (Qty 2)
   - IRUs (Qty 2)
2. FMS OPC options must be ENABLED:
   - RNP
   - GNS
   - GCP Fly Away
   - NPS
   - Expanded Bank Angle Limit
3. ON APPROACH mode is TRUE

A complete and detailed description of the respective FMS OPC options may be found in the MD-11/MD-11F Aircraft Operating Manual (AOM) and the MD-11/MD-11F Flightcrew Training Bulletin.

2. PILOT TYPE RATING

Not applicable.

3. RELATED AIRCRAFT

Not applicable.

4. PILOT TRAINING

4.1 Experience/Prerequisite. The pilot flying (PF) must be qualified and current on the MD-11/MD-11F aircraft. The PM must be:

a) A qualified and current MD-11/MD-11F aircraft pilot.

4.2 Special Emphasis Areas.

4.2.1 Pilots must receive special emphasis training in the following areas during ground training:

a) If initiating a go-around during or shortly after the Radius To Fix (RF) leg, the flightcrew must be aware of the importance of maintaining the published path as closely as possible. Operators must develop specific procedures to ensure maintenance of the RNP AR ground track in the MD-11/MD-11F aircraft when utilizing TOGA, Altitude Hold, Vertical Speed, or Level Change upon initiation of a go-around.

4.2.2 Pilots must receive special emphasis training in the following areas during flight training:

a) If initiating a go-around during or shortly after the RF leg, the flightcrew must be aware of the importance of maintaining the published path as closely as possible. Operators must develop specific procedures to ensure maintenance of the RNP AR ground track in the MD-11/MD-11F aircraft when utilizing TOGA, Altitude Hold, Vertical Speed, or Level Change upon initiation of a go-around.

4.3 Ground Training. The RNP AR ground training is defined in AC 90-101A, Approval Guidance for Required Navigation Performance (RNP) Procedures with Authorization Required (AR), Appendix 4, Operational Considerations, and Appendix 5, Training (as amended). Training must be accomplished during initial, recurrent, transition, or upgrade training prior to conducting RNP AR approaches.

4.4 Flight Training. The RNP AR flight training is defined in AC 90-101A, Appendix 4, Operational Considerations, and Appendix 5, Training (as amended). Training must be accomplished during initial, recurrent, transition, or upgrade training prior to conducting RNP AR approaches.

5. PILOT CHECKING

Not applicable.

6. PILOT CURRENCY

Not applicable.

7. OPERATIONAL SUITABILITY

The FSB has determined that the MD-11/MD-11F Flight Management System (FMS) part number 4059050-924 (known as “FMC-924”) and the RNP AR approach capability installed in the MD-11/MD-11F aircraft is operationally suitable under14 CFR parts 91, 121, and 125.

An operational suitability determination and completion of RNP AR training and checking does not constitute an operational authorization. Operators should reference the current edition of AC 90-101A for RNP AR application preparation and processing.