NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

Factual Report – Maintenance

NTSB No: DCA19MA143

May 11, 2020

A. ACCIDENT

Operator:	Miami Air International
Location:	Jacksonville, FL
Date:	May 3, 2019
Time:	2149 Eastern Daylight Time
Aircraft:	Boeing 737-81Q (S/N:30618), Registration N732MA

B. GROUP

Group Chairman:	Pocholo Cruz National Transportation Safety Board Washington, D.C.
Member:	Juan Garcia Federal Aviation Administration Miramar, FL
Member:	Dan Marcotte The Boeing Company Long Beach, CA
Member:	Alex Horta Miami Air International Miami, FL
Member:	Arturo Silva International Brotherhood of Teamsters Miami, FL

C. SUMMARY

On May 3, 2019, at 2142 eastern daylight time, Miami Air International flight 293, a Boeing 737-81Q registration N732MA, was landing on runway 10 at Jacksonville Naval Air Station, Jacksonville, Florida, when it departed the end of the runway, contacted a stone embankment, and came to rest in shallow water in St. Johns River. The 2 pilots, 4 flight attendants, 1 mechanic, and 136 passengers were not seriously injured. The airplane was substantially damaged. Flight 293 was a non-scheduled passenger flight from Leeward Point Field, Naval Station Guantanamo Bay, Cuba, operating under the provisions of 14 Code of Federal Regulations Part 121 Supplemental. Instrument meteorological conditions prevailed at the time of the accident, and rain was occurring during the landing.

D. DETAILS OF INVESTIGATION

1.0 Air Carrier Certificates

Miami Air International (MAI) Inc., was located at 5000 N.W. 36 Street, Suite 307 Miami, Florida 33122. A Part 121 operations certificate number, MYWA994S, was originally issued to MAI by the Federal Aviation Administration's (FAA) Flight Standards District Office - Southern Region, on October 11, 1991.

2.0 Operations Specifications (OpSpecs)[1]

The MAI Maintenance and Weighing Operations Specifications approved by the FAA were reviewed:

(a) Section D072 of the OpSpecs authorized MAI to maintain its aircraft using a Continuous Airworthiness Maintenance Program (CAMP). Each aircraft and its component parts, accessories, and appliances are to be maintained in an airworthy condition in accordance with applicable Federal Aviation Regulations (FAR) and standards prescribed and approved by the FAA administrator. For B737-81Q aircraft, the aircraft authorized CAMP can be found in General Maintenance Chapter 1, MAISY-GMM-0J-10-00-05A-BC01-A.

(b) Section D076 of the OpSpecs authorized MAI to escalate scheduled maintenance intervals, on a short-term basis, for check packages, check package individual line items, or component time-change /task intervals. Scheduled maintenance tasks are authorized a maximum extension of 10 percent, not to exceed 500 hours time in service.

(c) Section D083 of the OpSpecs authorized MAI is authorized to use a borrowed part (overhauled) from another operator when time-in-service of the available part exceeds the certificate holder's overhaul time limit.

(d) Section D084 of the OpSpecs authorized MAI to conduct ferry flights using a special flight permit with continuous authorization in accordance with the limitations and the provisions of the OpSpecs.

[1] Operations Specifications contains the authorizations, limitations, and certain procedures under which each kind of operation is to be conducted by the certificate holder.

(e) Section D085 of the OpSpecs showed MAI has a total of 6[2] B737-800 aircraft in the fleet.

(f) Section D086 of the OpSpecs authorized MAI to have a maintenance program for two engine airplanes used in extended range operation of 180 minutes for the B737-800 Fleet. MAI was to continually access the propulsion and airframe system reliability within the extended range fleet in accordance with MAI Extended-range Twin-engine Operational Performance Standards (ETOPS) Manual, Program 3, dated June 18, 2018.

(g) Section D089 of the OpSpecs authorized MAI to use the Time Limitations specified in the B737-800 NG CAMP Rev36, dated February 5, 2019.

(h) Section D091 of the OpSpecs authorized MAI to make arrangements with other maintenance providers to accomplish maintenance, preventive maintenance, or alterations for the certificate holder. The MAI authorizing document is the Approved Vendor's Report – GMM/Chapter 4/MAISY-GMM-0J-04-00-B4A-AHOV-A.

(i) Section D092 of the OpSpecs authorized MAI for Operations in Designated Reduced Vertical Separation Minimum (RVSM) which included aircraft N732MA.

(j) Section D095 of the OpSpecs authorized MAI to use an FAA approved Minimum Equipment List (MEL) for each fleet type listed in the OpSpecs.

(k) Section D097 of the OpSpecs authorized the MAI to incorporate policies and procedures into their maintenance and or inspection programs for compliance with the Aging Aircraft Program rules including, Supplemental Inspections, Fuel Tank System Maintenance Program, Electrical Wiring Interconnection Systems (EWIS), Repair Assessment for Pressurized Fuselages and Flammability Reduction Means for its fleet of airplanes.

(l) Section D105 of the OpSpecs authorized MAI was to have a Maintenance Program in place to ensure that all maintenance on Emergency Evacuation Systems (EES) is performed in accordance with the MAI CAMP and its manuals.

(m) Section E096 of the OpSpecs authorized MAI for a Weight and Balance Program. MAI was to use individual aircraft weights outlined in the MAI Weight and Balance Manual. Each B737-800 aircraft was weighed at a 36-month interval.

3.0 Type Certificate Data Sheet

The Type Certificate Data Sheet (A16WE) prescribes conditions and limitations under which the product for which the Type Certificate (TC) was issued meets the airworthiness requirements of the Federal Aviation Regulations. According to the document, The Boeing Company is the holder of the TC.

[2] Includes aircraft N732MA.

4.0 Aircraft Information

N732MA Serial Number 30618 was manufactured and issued an airworthiness certificate by The Boeing Company on April 26, 2001. The airplane was leased to MAI from the owner (CIT Aerospace LLC) on December 2000 which placed the aircraft on the operating certificate on April 26, 2001. The airplane had accumulated 38,928.57 total flight hours with 15,610 total flight cycles at the time of the accident on May 3, 2019.

On occasion the airplane was wet leased[3] (July 2018 – September 2018) and sent overseas. MAI maintained and had operational control of the airplane while flying outside the United States.

The airplane was equipped with two CFM engines and a Honeywell Auxiliary Power Unit (APU). The engines and APU had accumulated the following operating times at the time of the accident:

Engine and APU Information

	No.1 Engine	**No.2 Engine**	**APU**
Manufacturer	CFM	CFM	Honeywell
Part Number	CFM56-7B26E	CFM56-7B26E	3800702-1
Manufacture Date (installed new date)	03/23/2017	01/26/2016	03/15/2001
Date Installed	04/26/2019	04/26/2019	12/20/2016
Serial Number	039156	863823	P-5932
Time Since Restore (Engine /APU hours)	3,737:27	6,554:27	4,058:22
Total Cycles Since Restore (Engine/APU cycles)	3,771	6,311	2,881
Engine Total Time Hours	3,737:27	6,554:27	30,863.6
Engine Total Cycles	3,771	6,311	22,183
Location of Engine/APU Installation	MAI Hangar, Miami, FL	MAI Hangar, Miami, FL	MAI Hangar, Miami, FL
Total Time of Airframe at engine/APU installation (hours)	38,971:30	38,971:30	34,226:48
Total Cycles of Airframe at engine/APU installation	15,602	15,602	13,762

[3] 14 CFR Part 110, 100.2 and Part 119, 119.53, a wet lease is a commercial arrangement whereby an aircraft owner leases both the aircraft and at least one crewmember to another entity for exclusive use for a specified or a defined number of flights. A wet lease does not include a code sharing arrangement.

5.0 Continuous Airworthiness Maintenance Program (CAMP)

The MAI 737 CAMP provides for a complete inspection of the aircraft. The program is derived from the Boeing Maintenance Planning Document (MPD) and is supplemented with additional manuals and documents in the MAI Technical Library as outlined in the General Maintenance Manual (GMM). The specific program documents are:

(a) Boeing 737 Maintenance Planning Document (D6-82981-MRBR)

(b) General Electric Engine Shop Manual (CFMI P/N CFMI-TP.SM.5)

A summary of the basic inspections contained in the CAMP are listed below:

Pre-Flight / Transit Check

The Pre-Flight/Transit Check (PT) is the most frequent scheduled maintenance check. The interval for this check is three (3) calendar days. This check requires minor maintenance/servicing and is intended to assure continuous serviceability. It is basically a "walk-around" check of the aircraft interior and exterior for obvious defects. At non-maintenance stations, a trained flight crewmember's preflight check will be considered the equivalent of a "Transit" check.

Pre- Departure Service Check – ETOPS

Pre-Departure Service Check (PDSC) is accomplished prior to any ETOPS flight leg. The inspection and maintenance accomplished in this check is focused on ETOPS sensitive items on the aircraft. It may not be completed any more than three hours prior to departure. It must also be released by a person qualified for ETOPS Release in addition to Airworthiness Release. A Pre-Flight / Transit Check is required in addition to the PDSC if the calendar time limit will expire prior to arrival at the ETOPS destination.

Phase Check

Phase Checks are scheduled for accomplishment every 750 Hours, 400 Cycles or 90 Days, whichever occurs first. Issued at every phase check is a Pre-Flight/Transit Check that is to be accomplished at the end of the Phase Check to ensure final security of the aircraft. A Phase Check consists of task cards that will become due prior to the next Phase Check. Some task cards may be performed early to accommodate future maintenance planning.

Aircraft Maintenance Program

The following outline the MPD programs for the aircraft maintenance program. Each program has operating rules specified that are applicable to the maintenance scheduled.

(a) System Maintenance Program

Systems inspections are accomplished at the intervals specified in Section 6.0 of Boeing document D6-82981. Systems maintenance and inspection in this section is more detailed than the zonal tasks found in section 2.0 of the MPD. Systems task often require removal and test of components off the aircraft or operational or functional test of an entire system.

(b) Structural Maintenance Program

Structural inspections are accomplished at the intervals specified in Section 8.0 of Boeing document, D6-82981. Structural inspection are in greater detail than those found in the zonal program and concentrate on finding corrosion, stress, fatigue and minor accidental damage to the structure of the aircraft.

(c) Zonal Inspection Program

Zonal inspections are accomplished at intervals specified in Section 7.0 of Boeing document, D6-82981. The zonal component of the program provides a physical check of the general condition and security of attachment of the accessible systems and structures in the defined zone. These inspections are typically of a general visual intensity.

(d) Corrosion Prevention and Corrosion Control

Corrosion Prevention and Control Program (CPCP) tasks are incorporated into the Structural Inspection Program defined in Boeing Document D6-82981, Section 8. Thus, there is not a separate CPCP program. Initial thresholds and repeat inspection intervals are specified for the related tasks in Section 8 of document D6-82981.

(e) Airworthiness Limitation

Two classes of items are defined in this section. Structural Inspections designed to reveal fatigue damage as the aircraft ages and Structural Life Limited Components. Section 9 of Boeing document D6-38278-CMR establishes the initial threshold for structural inspections and Structural Safe Life Parts.

(f) Certification Maintenance Requirements

Certification Maintenance Requirements (CMR) are maintenance actions established during aircraft certification that fall outside the Maintenance Steering Group / Maintenance Review Board process. These items may be generated during the aircraft certification or result in the de-escalation of existing Maintenance Review Board driven maintenance activity to ensure the desired margin of safety. CMR tasks are controlled by the Task Card index in the 737-NG CAMP.

(g) Airworthiness Directive

Compliance with Airworthiness Directives is the responsibility of the Quality Control Department. The Purchasing and Inventory Department is responsible for the provision of all required parts, materials and outside services for AD accomplishment. An Aircraft Airworthiness Directives Status Report is prepared in TRAX for each individual aircraft in the Miami Air fleet. The Aircraft Airworthiness Directives Status Report provides historical records of the AD inspection or termination. All repetitive AD inspections are incorporated into the CAMP for compliance.

(h) Engines

The Engine Condition Monitoring (ECM) Program is utilized to determine engine performance parameters. Analysis of the ECM data results in recommendations and alerts for investigation and troubleshooting by maintenance personnel when necessary to restore engine performance.

Life Limited Parts are replaced in accordance with the time limits established in the General Electric Engine Shop Manual. Internal engine inspections are tracked on the engines assigned disk sheet. These inspections will typically be assigned to the phase check proceeding the expiration of the inspection threshold, but not later than the established threshold.

(i) Aircraft Components

Aircraft and Engine components are listed as PN Engineering Controls (PN ECs) in the Boeing B737 CAMP Manual. The PN EC provides operating times and limitations for components and is arranged in ATA Chapter sequence. A description of the part is given along with the related PN EC, the type of task performed and the maintenance concept used in controlling the life of the part.

(j) Auxiliary Power Unit

APU routine maintenance tasks have been assigned to phase checks. Tasks will be assigned to the phase check that proceeds reaching the threshold for each respective task.

(k) Landing Gear

Landing gear is a hard time life limited component. The integrated Corrosion Prevention and Control Program (CPCP) requires disassembly and inspection of the gear assemblies. These inspections occur at 10-year intervals and will consist of overhaul at an appropriately rated facility.

Maintenance Checks

The following is the history of N732MA that lists the most recent check completed:

Check Type	Date	Location	Total Time	Total Cycles
Pre-Flight / Transit Check	5/1/2019	Miami	38,917	15,602
PDSC	3/12/2019	Shannon, Ireland	38,841	15,570
Phase Check	5/1/2019	Miami	38,917	15,602

A sampling of the last Phase Check tasks was reviewed by the Maintenance Group. All Work Order Release Forms and Inspection Compliance Reports had not been reviewed and accepted by Planning Department and Technical Records management representatives at the time of review. According to the Miami Air GMM, the departments has 7-10 days to review and accept the package.

(a) Phase 75ADD-ONS T/C, W/O 260895
(b) Phase CW AD 20126-18-01-0, W/O 32619
(c) CW AD 2011-27-03 LUB, W/O 23041
(d) CW AD 2017-14-13, W/O 23042
(e) CW AD 2016-18-15-02, W/O 23044
(f) CW L/H ENG CHIP DET, W/O 23767
(g) EC 737-31-1650, W/O 24015
(h) RH ENG BORO SCOPE, W/O 22808
(i) RR Slide, S/N BNG2559, W/O 23193
(j) CMUS Software Upgrade, W/O 24375
(k) ACAES to CMU, W/O 24278
(l) CVR System Datalink Records Deactivation, W/O 24279
(m) W/O E/C Called On Tally not completed.

6.0 Aging Aircraft Inspection

N732MA had not reached the Aging Aircraft Inspection threshold (19th year) at the time of the accident.

7.0 Continuing Analysis and Surveillance System (CASS)[4]

To comply with requirements of 14 CFR Part 121.373, MAI has an accepted CASS program. CASS is a continuous, system safety-based, closed loop cycle of surveillance, data collection and analysis, corrective action, and monitoring to continually evaluate the performance and effectiveness of the maintenance program for its fleet of airplanes.

General Maintenance Manual Chapter 14 contains Miami Air's CASS Program and details:

(a) CASS Board Structure
(b) CASS Program Responsibility and Authority for Each Board Member
(c) CASS Board Meeting Requirements
(d) CASS Daily Maintenance Conference Agenda
(e) CASS Board Emergency Action Requirements
(f) CASS Board Action Item Documentation and Review

General Maintenance Manual Chapter 14 directs maintenance program audits be performed to ensure that maintenance is being performed in accordance with Miami Air's CAMP procedures. Internal audits and audits of Miami Air's agencies occur on a continuous basis. Fifteen areas of minimum surveillance are detailed. The CASS Board reviews the audit schedule, provided by the

[4] As established by 14 CFR Part 121.373, each certificate holder shall establish and maintain a system for the continuing analysis and surveillance of the performance and effectiveness of its inspection program and the program covering other maintenance, preventative maintenance and alterations and for the correction of any deficiency in those programs, regardless of whether those programs are carried out by the certificate holder or by another person.

Safety Department, to ensure it meets established guidelines. The CASS Board analyzes acceptability of conditions and determines the need for corrective actions. The auditor who performed the audit conducts a risk assessment of Class, I, II, III audit findings. Definitions of Class, I, II, III findings are provided in the document. Upon evaluation of the comprehensive fix, the determination for an additional follow up is made by Quality Assurance Department and Safety Department. If a systematic discrepancy is noted, an investigation of the comprehensive fix is conducted using Miami Air's Safety Management System Manual.

General Maintenance Manual Chapter 14 directs data be collected relative to individual program elements, including maintenance programs, aircraft systems and components (including engines), and in-service pilot reports and flight delays. The data is analyzed and the results for the individual program elements are compared to alert levels. When an alert is triggered, the program requires associated risks be determined and analyzed. An appropriate corrective action plan is developed and implemented. Following completion of a corrective action plan, follow-up activities are implemented to determine the effectiveness of the corrective action plan. If a systematic discrepancy is noted, an investigation is conducted using Miami Air's Safety Management System Manual to properly address root cause(s). General Maintenance Manual Chapter 14 provides a maintenance interval adjustments and process change system.

CASS reports containing data for September 2018 through April 2019 were reviewed. The review validated the existence of a managed CASS program. The reports were reviewed for Alerts, Items of Concerns, Comments and Observations associated with N732MA and the following noted.

(a) September-October 2018 Report

Alert – Fuel Pump and Zone Temp Control and Indication

Concerns, Comments and Observations – None for N732MA

(b) November-December 2018 Report

Alert – VHF Communication System and Common Display System

Concerns, Comments and Observations – None for N732MA

(c) January 2019 Report

Alert – Thrust Reverser System, Common Display System, VHF Communication System and Ice and Rain Protection

Concerns, Comments and Observations - Concern form 01292019-01 open for #1 Thrust Reverser chronic discrepancy

(d) February 2019 Report

Alerts - None for N732MA

Concerns, Comments and Observations - Concern form 01292019-01 open for #1 Thrust Reverser chronic discrepancy – Pending a follow up

(e) March - April 2019 Report

Alerts - None for N732MA

Concerns, Comments and Observations – None for N732MA

The CASS Board Action Item section of General Maintenance Manual Chapter 14 directs TRAX be used by the CASS Board to document and mandate actions to be taken to ensure the procedures set forth in the Miami Air CAMP are being followed and they are effectively ensuring that aircraft are being returned to service in an airworthy condition.

8.0 Minimum Equipment List (MEL)[5]

MAI was authorized to use an approved MEL on its airplanes per its OpSpecs. MEL items associated with N732MA were reviewed from November 11, 2018 to May 3, 2019. At the time of the accident, there were seven OPEN MEL items.

Date Opened	Control Item Number	Defect
4/30/2019	11694	WIFI INOP – Unable to reach server page
5/1/2019	11697	Due to #1 and #2 Engine change ETOPS verification flight to be accomplished
5/2/2019	11698	SAT COMM fault light Illuminated
5/3/2019	11700	#1 Engine Reverser Light Illuminated
5/3/2019	11701	Right Air Conditioning Pack INOP
5/3/2019	11702	A/C downgraded to Non ETOPS
5/3/2019	11703	No Duct Pressure Indication Both Engines Running

All OPEN MEL's were being tracked per MAI FAA approved MEL procedures dated May 15, 2018.

9.0 Supplemental Type Certificates (STC)[6]

Supplemental Type Certificates (STCs), supplied by air carrier, were reviewed. A total of 16 STCs were documented and installed. One of the 16 STC ST04215AT (Deviation -SATLink Installation) had been installed on the previous Phase Check (May 1, 2019) and had not been put on the list of STCs. There were no STCs relating to the Thrust Reverser System, Autobrake/ Antiskid System and Spoiler/Speedbrake System.

10.0 Airworthiness Directives (AD)[7] and Service Bulletins (SB)

MAI provided Aircraft, Powerplant and APU AD reports for aircraft N732MA for review. The AD reports contained the applicable Service Bulletins. A review of Airworthiness Directive status

[5] The FAA approved Minimum Equipment List contains a list of equipment and instruments that may be inoperative on a specific aircraft for continuing flight beyond a terminal point.
[6] The FAA issues Supplement Type Certificates, which authorize a major change or alteration to an aircraft, engine or component that has been built under an approved Type Certificate.
[7] Airworthiness Directive (AD) is a regulatory notice sent out by the FAA informing the operator of an action that must be taken for the aircraft to maintain its airworthiness status.

lists for the airplane, powerplants and appliances were conducted. The Maintenance Group did not find any discrepancies during the review of the listing.

11.0 Aircraft Flight Logs

On scene investigators were not able to locate the maintenance logbook on the airplane. Miami Air stated that the pilot had taken the logbook with him during the evacuation and eventually provided the logbook to investigators on scene. Aircraft Flight Logs were reviewed from January 2019 thru May 2019 with additional Aircraft Flight Logs reviewed as necessary. Items noted below.

Date	Station	Discrepancy	Action
5/3/2019	NIP	#1 Eng Reverser Light Illum	Deferred per MEL 78-01-03
5/3/2019	NIP	Right Air Conditioning Pack Inop	Deferred per MEL 21-01-01-06
5/3/2019	NIP	No Duct Pressure Indication Both Engines Running	Deferred per MEL 36-05-02
5/2/2019	MIA	Right Bleed Off on Takeoff. Reset Came On Again	Troubleshot per FIM 36-10 Task 801. Replaced Right Hand Bleed Precooler Control Valve Sensor. Replace Right Bleed 450° Thermostat as a Precaution
5/1/2019	MIA	Right Bleed Trip Light Illuminated – Reset Illuminated Again	Replaced Right Hand Bleed Precooler Control Valve
3/19/2019	DAY	#1 Eng Reverser Light Stayed On	Deferred per MEL 78-01-03
3/11/2019	PSM	Left Reverser Would Not Deploy On Landing – Reverser Light (L) on Overhead Panel Illuminated	Performed BIT Test Cleared Left Reverser Per Boeing AMM FIM 78-31 Task 801
2/13/2019	LAN	#1 TR Will Not Deploy	Deferred per MEL 78-01-03
2/4/2019	MEM	#1 Engine TR Light On	Deferred per MEL 78-01-03
1/26/2019	NBW	#1 Reverser Light Illuminated	Performed BIT Test on No.#1 Reverser. Cleared Reverser Light Ops Check Good IAW Boeing MM/FIM 78-31 Task 801
1/15/2019	NBW	#1 Thrust Reverser Failed To Deploy	Deferred per MEL 78-01-03

12.0 Weight and Balance Summary

MAI uses a weight and balance program to ensure compliance with applicable airworthiness requirements and aircraft operation limitations. MAI weighs all aircraft on scheduled basis (every 36 calendar months) to ensure accuracy of published basic operating weight data.

The last weight and balance for N732MA was performed on December 10, 2018, at PEMCO World Air Service in Tampa, FL

Basic Operating Weight: 43,222 KG

Arm: 661.2 inches

Moment: 28587462.38 KG-inches

13.0 Service Difficulty Reports (SDR)[8] and Mechanical Interruption Summary Report (MISR)[9]

The Maintenance Records Group reviewed the Service Difficulty Reports for the accident aircraft from December 10, 2010 to May 1, 2019. There were 31 SDR's and 15 MISR on file. There were no recent issues reported on the Thrust Reverser System, Spoiler/Speedbrake System and Antiskid/Autobrake System.

14.0 Major Repairs and Alterations

Major repairs and alterations were documented and reviewed. Five major repairs and one alteration were accomplished on N732MA. All five major repairs were structural in nature and the alteration was for the installation of a Nitrogen Generation System (Inert Gas System) per MAI Task Cards and Boeing Service Bulletins (737-47-1002 Rev 2 and 737-47-1003 Rev 2).

15.0 Time Limit Components

The maintenance group reviewed the Time Limit Component reports for the airframe and APU components. Engine Time Limit Component data had not been entered into their tracking system since the airplane just came out of a Phase Check prior to the accident.

The review included time limited rotable components installed on N732MA. MAI utilizes TRAX system for the tracking of components. Components are tracked by the manufacturer part number and serial number. Components can be tracked by flight hours, flight cycles, calendar date or any combination of flight hours, flight cycles and date.

16.0 Vendors

The Maintenance Group reviewed the Approved Vendor List provided by MAI. The vendors, agencies and / or contractors selected to perform the maintenance, were audited by the Quality Assurance Department to ensure the maintenance practices and standards are continuously being maintained and enforced. All vendor audit schedules are tracked in TRAX. The Quality Assurance Department monitored audit schedules and submitted an audit schedule forecast for incorporation into the monthly CASS Report.

Maintenance Repair Organization (MRO) and Repair and Overhaul Vendor (ROV) Essential AND Non-Essential Maintenance Providers were audited every 24 months.

17.0 Method of Record Keeping

MAI utilizes a series of personal computers in a Windows environment for the storage and retrieval of its recorded data. All data is stored on a hard drive and backup copies of all

[8] As required under 14 CFR 121.703, each scheduled operator is to report the occurrence or detection of each failure, malfunction or defect concerning (a) fires during flight, (b) false fire warning during flight, (c) engine exhaust system that causes damage during flight, (e) an aircraft component that causes accumulation or circulation of smoke, vapor, or toxic or noxious fumes during flight, (f) engine shutdown during flight, (g) a propeller feathering, (h) aircraft structure requiring major repairs, (i) cracks, corrosion, (j) other safety critical issues as stated in the FAR part. These occurrences must be reported within 72 hours of the event.

[9] Each scheduled operator is required under 14 CFR Part 121.705 to submit a summary of any (a) interruption to flight, (b) unscheduled change of aircraft en route, or unscheduled stop or diversion from a route caused by known or suspected mechanical difficulties or malfunctions that are not required to be reported as service difficulty reports.

data are maintained. Engine data is recorded into GE Diagnostic's web-based software program.

Software Programs and the TRAX Maintenance & Engineering Software program are presently utilized for data entry, storage and retrieval. All required aircraft records are scanned by the Records Department prior to being archived. MAI servers are backed up daily and the data is stored remotely from the primary data source. MAI maintains all required aircraft records in an environment protected from fire and other potential hazards. Active aircraft records are stored in locked fireproof cabinets or in the storeroom. Records storeroom is also equipped with fire extinguisher and fire-retardant sprinklers. Two years of aircraft records are maintained in the Records Department and the rest are archived in a secure storage facility, Iron Mountain.

18.0 Flight Recorder Parameter Verification

The flight recorder parameter verification at MAI is performed every 7,500 flight hours or two years. The review process verifies that each parameter is being recorded correctly and if not, corrective action is taken. The parameter verification reviews both the FAA mandatory parameters and non-mandatory parameters.

The flight recorder or PCMCIA Media cards are shipped to an approved vendor (Aviation Safety Resource Services, Inc., Miami Spring, FL) for data analysis. The vendor forwards the results of the data analysis to the Manager of Quality Assurance. If all parameters are found to be in limits, no further action is required. If any parameter is listed as suspect a maintenance item, a concern form is generated for repairs.

The last data download for N732MA was March 27, 2019. The reports indicated below required FDR parameters could not be positively verified as being operative. The operator had received the reports but had yet to review them per their standard process to confirm the report's analysis.

(a) HF 1 & 2
(b) VHF #2
(c) Marker Beacon
(d) Roll Trim, Rudder Trim and Yaw Trim
(e) Thrust Rev #1

19.0 Manuals

MAI utilizes Boeing's OEM produced manuals to maintain the fleet of aircraft which are accessed via MyBoeing Fleet. In addition, the following manuals are utilized.

(a) General Maintenance Manual (GMM) – This manual is designed to give instruction, policy and procedures regarding the day-to-day job functions, and the completion of routine/non-routine work. It also provides the following:
    (1) A detail description of the Maintenance, Quality Assurance and Quality Control department's duties and responsibilities.
    (2) A description of the job responsibilities, by title, for the aforementioned departments.
    (3) The detailed procedures for compliance with code of federal regulations as required in the areas of airworthiness release, tool and equipment

calibration, maintenance analysis and surveillance, required inspection items, required reports, shift or work interruption records, aircraft/engine/component and appliance records retention, deferred maintenance item procedures, maintenance alerts, etc.

(4) CASS Program – Monitors effectiveness of the MAI maintenance program.

(b) Continuous Airworthiness Maintenance Program (CAMP) Manual – The manual provides the maintenance program and task cards for the MAI fleet of airplanes.

(c) Minimum Equipment List and Configuration Deviation List – The manual allows MAI to dispatch aircraft with equipment items listed in the FAA Approved MEL inoperative.

(d) Approved Vendor List – The list provides a list of vendors allowed to provide maintenance and services to MAI.

(e) Weight and Balance Manual – The manual provides process and procedures for weighing MAI aircraft.

(f) ETOPS Manual – The manual is to identify the supplementary maintenance program requirements and organization responsibilities for ETOPS at MAI. It defines the general maintenance practices and procedures for ETOPS.

(g) Manufacturer Manuals – Boeing Manuals, CFM Manuals, Component Manuals from various manufacturers.

20.0 #1 Thrust Reverser System Information - Maintenance Program and Writeups

The Maintenance Group reviewed the maintenance program and discrepancy writeups associated with the airplane's #1 Thrust Reverser.

Maintenance Program:

Boeing MPD Number	Task Description	Interval	Repeat Interval	Miami Air MPD Task Card Number	Date Accomplished
78-050-01	Visually check the left engine T/R's fan duct walls	15000 FH	15000 FH	78-050-01-01	04/16/2017
78-050-02	Visually check the right engine T/R's fan duct walls	15000 FH	15000 FH	78-050-02-01	04/16/2017
78-060-01	Detailed inspection of the left engine thrust reverser drag link spherical bearings.	12000 FH	12000 FH	78-060-01-01	04/16/2017
78-060-02	Detailed inspection of the right engine thrust reverser drag link spherical bearings.	12000 FH	12000 FH	78-060-02-01	04/16/2017
78-070-01	Visually check the left engine blocker doors.	12000 FH	12000 FH	78-070-01-01	04/16/2017
78-070-02	Visually check the right engine blocker doors.	12000 FH	12000 FH	78-070-02-01	04/16/2017
78-080-01	Visually check the left engine bullnose seal and retainer.	15000 FH	15000 FH	78-080-01-01	04/16/2017

78-080-02	Visually check the right engine bullnose seal and retainer	15000 FH	15000 FH	78-080-02-01	04/16/2017
78-100-01	Detailed inspection of the left engine T/R fire seal.	7500 FH	7500 FH	78-100-01-01	04/16/2017
78-100-02	Detailed inspection of the right engine T/R fire seal.	7500 FH	7500 FH	78-100-02-01	04/16/2017
78-110-01	Perform an operational check of the left engine T/R sync lock. SPECIAL NOTE: CMR task (78-CMR-01) interval for this task is 5000 FH. See MPD Section 9.	5000 FH	5000 FH	78-110-01-01	03/30/2019 Accomplished at Last Phase Previous on 04/16/2017
78-110-02	Perform an operational check of the right engine T/R sync lock. SPECIAL NOTE: CMR task (78-CMR-01) interval for this task is 5000 FH. See MPD Section 9.	5000 FH	5000 FH	78-110-02-01	03/30/2019 Accomplished at Last Phase Previous on 04/16/2017
78-120-01	Perform operational check (bite) on the left engine EAU.	3600 FH	3600 FH	78-120-01-01	09/29/2018
78-120-02	Perform operational check (bite) on the right engine EAU.	3600 FH	3600 FH	78-120-02-01	09/29/2018
78-130-01	Perform an operational check of the left engine "reverser" light indication system.	15000 FH	15000 FH	78-130-01-01	04/16/2017
78-130-02	Perform an operational check of the right engine "reverser" light indication system.	15000 FH	15000 FH	78-130-01-01	04/16/2017

The Maintenance Group reviewed the following discrepancies associated with the #1 Thrust Reverser System. Miami Air was actively tracking and working the intermittent #1 Engine Thrust Reverser issue prior to the accident but had not yet determined a definitive fix.

Date	Control Item Number	Writeup
5/3/2019	11700	#1 Engine Reverser Light Illuminated
3/27/2019	Phase Check, Doc. No. 260896 item 37	EAU faulting many switches & Iso Valve Solenoid. Accomplished wiring checks through arm and throttle switches per AMM 78-34-11. All circuits found OK. Reset EAU and cycled T/R. OPS check OK. Indicator Good. This clears DMI #11659. Placard Removed
3/19/2019	Doc. No. 260879	DMI 11659 - #1 ENG Reverser Light Stayed On
3/11/2019	Doc. No. 253914	#1 Reverser would not deploy on landing – reverser light (L) on overhead panel illuminated – issue cleared
2/18/2019	Doc. No. 253885	Transfer from DMI 11623. Issue found/cleared. Found no power at arm sol. M1173 found fault at TB3201.
2/13/2019	Doc. No. 253878	#1 TR will not Deploy – Issued DMI 11623

2/12/2019	Log page 254011	#1 Eng. T/R Light on DMI 11611. Replaced Latch & Sync lock time delay relays, accomplished several reverse cycles all normal clears DMI 11611
2/4/2019	Doc. No. 254011	#1 Eng. T/R Light on. Issued DMI 11611.
1/19/2019	Doc. No. 259965	Transfer from DMI 11598 #1 Eng. T/R failed to deploy. Removed and replace #1 Eng. T/R control Module – Issued cleared.
1/17/2019	Doc. No. 259960	DMI 11598, #1 Eng. T/R failed to deploy. T/S as per FIM 78-34-00. Bite of EAU shows many SOTW's deploy faults. Cleared & cycles T/R many times w/no faults unable to duplicate at this time. Suspect Auto throttle switch. Pack or ISO valve. No time to T/S. DMI 11598 Remains, open.
1/15/2019	Doc. No. 259956	#1 Eng. T/R Failed to Deploy. Issued DMI 11598.
1/14/2019	Doc. No. 259954	Transfer from DMI 11597. Found #1 T/R DIR CONT. Valve Elect. Conn. Contaminated with fluid, cleaned as per SMPM 20-60-01. Reactivated T/R accomplished gen visual of T/R components found of- issued cleared
1/13/2019	Doc. No. 259952	#1 Eng. T/R Lever Jammed in Reverse Thrust. Issued DMI 11597.
1/6/2019	Doc. No. 260921	Transfer from DMI 11590. Bite & Reset #1 T/R Eng. Accessory Unit, no faults stored cycled T/R several times indication and operation normal. DMI Cleared.
1/5/2019	Doc. No. 260919	1# Reverser Light Came on When Stowed - DMI issued 11590.
1/4/2019	Doc. No. 260917	#1 REV Light on in Flight

21.0 Doors/Escape Slide/Life Raft Information – Maintenance Program and Writeups

The Maintenance Group reviewed the maintenance program and discrepancy writeups associated with the airplane's Doors/Escape Slides/Lift Rafts.

Main Entry Door Maintenance Program:

MPD Number	Task Description	Interval	Repeat Interval	Miami Air MPD Number	Date Accomplished
52-010-00	Lubricate the entry and service door handle, latch mechanisms and the torque tube handle box bearings (all four doors) and the fwd entry door stop rods.	2 YR	2 YR	52-010-00	-01, 02, 03,04 04/16/2017
52-020-00	Lubricate the entry and service door guide plate and arm assemblies, torque tube bushings, the upper and lower hinge arms, gate hinges and the body torque tube for the forward entry door only	1 YR	1 YR	52-020-00	-01, 02, 03,04 12/11/2018
52-030-00	Inspect (detailed) the forward entry door centering guide stud and nylon track pads for condition	3 YR	3 YR	52-030-00	04/16/2017

52-040-00	Inspect (Detailed) the aft entry and the aft and fwd service door centering guide bearings (3 doors only) for condition.	3 YR	3 YR	52-040-00	-01, 02, 03 04/16/2017
52-050-00	Inspect (General Visual) the entry and service door pressure seal (all 4 doors) and the forward entry door flapper seal for degradation	6000 FH	6000 FH	52-050-00	-01, 02, 03,04 04/16/2017
52-200-00	Operationally check the door sensors (Proximity or Mechanical switches as applicable) for the passenger cabin entry/ service, E/ E access, automatic overwing exit doors, forward access, cargo and Airstair doors as applicable. ACCESS NOTE: Access panels 832 and 842 are applicable to 737- 800 and 737-900 only.	5000 FH	5000 FH	52-200-00	-01, 02 10/05/2016

Escape Slide Maintenance Program:

MPD Number	Task Description	Interval	Repeat Interval	Miami Air Task Card	Date Accomplished
25-220-00	Operational check of the entry and service door mounted emergency escape slide deployment system (on airplane). SPECIAL NOTE: Applicable to 737-800BCF if installed. INTERVAL NOTE: Each operator is to perform an operational check of its Boeing 737NG entry and service door slide system to ensure its airline specific slide maintenance program is adequate. Each check from the operator's fleet shall include a minimum of one operational check of an installed slide from the left or right side at each door position, during each 6 year period. Checks shall alternate between the left and right door position. The total set would be 2 door minimum every 6 years.	3 YR	3 YR	25-220-00	09/29/2018

25-240-00	Restore the emergency escape slides on all four entry and service doors at the manufacturer's recommended interval. SPECIAL NOTE: Applicable to 737-800BCF if installed. INTERVAL NOTE: Vendor Rec	3 YR	3 YR	25-240-00	-01 09/19/2018 -02, 04 02/04/2019 -03 04/25/2019

Life Raft Maintenance Program:

MPD Number	Task Description	Interval	Repeat Interval	Miami Air MPD Number	Date Accomplished
52-300-00	Restore the life rafts (If installed) at the manufacturer's recommended interval.	3 Year	3 Year	25-300-00	S/N – L5176 09/17/2018 S/N – 5500A 09/17/2018 S/N – 5625A 02/04/2019 S/N – 5651A 09/19/2018

Logbook entries associated with Doors, Slides and Rafts from September 16, 2018 through May 03, 2019 are noted below. All life rafts and slides were replaced during that time frame.

Date	Logbook Page	Item Info/Discrepancy	Corrective Action
4/25/2019	253700	W/O# 23193 Out of phase maintenance Restore emergency escape slide at the manufacture's recommended interval	Removed and Replaced L2 Escape Slide P/N 5A3307-7, S/N BNG4305
02/05/19	254014	W/O# 23224 Out of phase maintenance. Remove and replace FWD life raft	Removed and Replaced FWD life raft P/N D23940-117, S/N 5625A
02/04/19	254015	W/O# 23506 Out of phase maintenance Restore emergency escape slide at the manufacture's recommended interval	Removed and Replaced R1 Escape Slide P/N 5A3307-7, S/N BNG2562
02/04/19	254014	W/O# 23192 Out of phase maintenance. Restore emergency escape slide at the manufacture's recommended interval	Removed and Replaced R2 Escape Slide P/N 5A3307-7, S/N BNG1781
12/13/18	258920	L1 Entry escape slide mounting bolt loose	Removed and Replaced L1 Entry escape slide mounting bolt
09/20/18	258543	W/O# 23329 Out of phase maintenance. Remove and replace RHOH life raft	Removed and Replaced RHOH life raft P/N D23940-117, S/N 5651A
09/16/18	258543	W/O# 23221Out of phase maintenance. Remove and replace LHOH life raft	Removed and Replaced. LHOH life raft P/N D23940-117, S/N 5500A
09/16/18	258541	W/O# 23222 Out of phase maintenance. Remove and replace AFT life raft	Removed and Replaced AFT life raft P/N D23940-117, S/N 5176A
09/16/18	258540	W/O# 22814 Slide sampling R1	Sampling R1 Escape Slide P/N 5A3307-7, S/N BNG7777

09/16/18	258540	W/O# 23191 Out of phase maintenance. Restore emergency escape slide at the manufacture's recommended interval	Removed and Replaced L1 Escape Slide P/N 5A3307-7, S/N BNG2056
09/16/18	258539	W/O# 22009 Swap L1 door escape slide BNG2480 for R1 door escape slide BNG7777	Swapped L1 door escape slide BNG2480 for R1 door escape slide BNG7777

22.0 Speedbrake and Ground Spoiler System Information - Maintenance Program and Writeups

The Maintenance Group reviewed the maintenance program and discrepancy writeups associated with the airplane's Speedbrake and Ground Spoiler System. There were no Flight Control System discrepancies for 2019 for airplane N732MA.

Speedbrake and Ground Spoiler Maintenance Program:

MPD Number	Task Description	Interval	Repeat Interval	Miami Air MPD Number	Date Accomplished
27-013-01	Perform a general visual inspection of the left wing aileron mechanical components from the aileron PCU's to the aileron and the flight spoiler mechanical control path.	8000 FH	8000 FH	27-013-01	12/09/2015
27-013-02	Perform a general visual inspection of the right wing aileron mechanical components from the aileron PCU's to the aileron and the flight spoiler mechanical control path.	8000 FH	8000 FH	27-013-02	12/09/2015
27-121-00	Perform a general visual inspection of the forward stabilizer trim mechanism and speedbrake lever assembly and auto speedbrake electric actuator, actuator rod end, and forward attachment point.	15000 FH	15000 FH	27-121-00	09/29/2018
27-182-00	Lubricate the spoiler mixer.	4000 FH	4000 FH	27-182-00	12/11/2018
27-182-01	Lubricate the left wing spoiler mechanical control path.	4000 FH	4000 FH	27-182-01	12/11/2018
27-182-02	Lubricate the right wing spoiler mechanical control path.	4000 FH	4000 FH	27-182-02	12/11/2018
27-184-00	Functionally check the torque of the spoiler ratio changer no-back assembly.	22400 FH	22400 FH	27-184-00	05/10/2011
27-186-00	Lubricate the speedbrake lever no-back brake.	6000 FH	6000 FH	27-186-00	04/16/2017
27-187-00	Operationally Check the Speedbrake Handle Stop	6000 FH	6000 FH	27-187-00	N/A to N732MA

	AIRPLANE NOTE: Applicable to 900ER and airplanes with Short Field Performance Package (if installed).				
27-188-00	Operationally check the speedbrake refused takeoff (RTO) system.	15000 FH	15000 FH	27-188-00	09/29/2018
27-190-00	Operationally check the speedbrakes extended light.	11000 FH	11000 FH	27-190-00	09/29/2018
27-192-01	Perform an operational check of each left wing flight spoiler actuator override quandrant.	25000 FH	25000 FH	27-192-01	04/28/2009
27-192-02	Perform an operational check of each right wing flight spoiler actuator override quandrant.	25000 FH	25000 FH	27-192-02	04/28/2009
27-194-00	Operationally check the spoiler mixer centering mechanism. SPECIAL NOTE: CMR (27-CMR-04) interval for this task is 20,000 FH. See MPD Section 9.	20,000 FH	20,000 FH	27-194-00	04/15/2015
27-215-01	Perform a general visual inspection of the left wing spoiler actuators.	6000 FH	6000 FH	27-215-01	04/16/2017
27-215-02	Perform a general visual inspection of the left wing spoiler actuators.	6000 FH	6000 FH	27-215-02	04/16/2017
27-215-03	Perform a general visual inspection of the spoiler mechanical control path.	5000 FH	5000 FH	27-215-03	10/05/2016
27-226-00	Perform a detail visual inspection of all exposed portions of the flight control cable runs. INTERVAL NOTE: Whichever occurs first.	4000 FC 24 MO NOTE	4000 FC 24 MO NOTE	27-226-00	-01, 02, 03,04 04/16/2017
27-228-00	Perform a detail visual inspection of all internal portions of the flight control cable runs. INTERVAL NOTE: Whichever occurs first.	6600 FC 3 YR NOTE	6600 FC 3 YR NOTE	27-228-00	-01, 02, 03, 04, 05, 06, 07, 08 04/08/2016
27-230-00	Perform a detail visual inspection of all flight control cables that are over the center wing section B.S. 540 to B.S. 663.75 and cables within pilot's control quadrant. INTERVAL NOTE: Whichever occurs first.	36000 FC 12 YR NOTE	36000 FC 12 YR NOTE	27-230-00	05/09/2013

27-235-00	Functionally check flight control cable tension. INTERVAL NOTE: Whichever comes first.	6600 FC 3 YR NOTE	6600 FC 3 YR NOTE	27-235-00	12/11/2018

23.0 Antiskid and Autobrake - Maintenance Program and Writeups

A review of the Maintenance log pages from May 2018 through May 2019 did not reveal any issues with the antiskid or autobrake systems.

24.0 Brake – Maintenance Program and Writeups

A review of the Maintenance Program and Discrepancy logs did not reveal any issues with the brake system of the airplane.

MPD Number	Task Description	Interval	Repeat Interval	Miami Air MPD Number	Date Accomplished
32-250-00	Perform a detail visual inspection of the forward and aft brake control linkages and cable quadrants.	6600 FC	6600 FC	32-250-00	5/10/2011
32-260-00	Perform a detail visual inspection of the brake metering valves.	8000 FC	8000 FC	32-260-00	4/16/2017
32-270-01	General visual inspection (GVI) the left brake wear pins for minimum extension.	50 FC	50 FC	32-270-01	3/23/2019
32-270-02	General visual inspection (GVI) the right brake wear pins for minimum extension.	50 FC	50 FC	32-270-02	3/23/2019
32-290-00	Perform an operational check of the alternate brake system and alternate brake selector valve.	15000 FC	15000 FC	32-290-00	5/16/2018
32-300-00	Check brake accumulator precharge pressure, service as required.	1200 FH	1200 FH	32-300-00	11/20/2018
32-310-00	Operationally check the brake accumulator	12500 FC	12500 FC	32-310-00	5/10/2011

	isolation valve.				
32-330-00	Perform a detail visual inspection of the parking brake mechanical control path.	8000 FC	8000 FC	32-330-00	5/10/2011
32-340-00	Perform a functional bleed down check of the parking brake system and brake accumulator precharge pressure.	4000 FC	4000 FC	32-340-00	4/8/2016

25.0 Cockpit Voice Recorder Information/Maintenance

The last CVR operational test was performed by maintenance during last pre-flight transit check on May 1, 2019.

Per MAI's Aircraft Operations Manual-1, the CVR is tested by the flight crew prior to the first flight of the day or prior to flight following a flight crew change.

During the last phase check, a workorder to install CVR data link recording capability was completed. The CVR data link recording capability was deactivated before the airplane left the phase check, to await approval of the STC associated with the workorder. The deactivation of data link recording capability does not affect the CVR's basic functionality.

26.0 American Southeast Inflatables (ASI)

The Airplanes FWD LH (S/N BNG2056; Manufacture Date: 9/2000), FWD RH (S/N BNG2562; Manufacture Date: 2/2001) and AFT RH (S/N BNG1781; Manufacture Date: 6/2000) Door Slides were examined by the Manufacturer.

All Three Door Slides were manufactured as P/N 5A3307-3 and had been converted to P/N5A3307-7 per Goodrich Service Bulletin 5A3307-25339 (converts the -3 slide to -5 slide) and Service Bulletin 5A3307-25-389 (converts the -5 slide to a -7 slide) during its service life. According to Overhaul records S/N BNG2056 was overhauled on 6/2018 and both S/N BNG2562 and S/N BNG1781 were overhauled on 1/2019 by American Southeast Inflatables.

The AFT LH Door Slide was examined on-scene by the Survival Factors Group but was not taken to Goodrich for further examination.

American Southeast Inflatables Repair Station Manual Capabilities List

According to American Southeast Inflatables the most recent Capabilities Listing at the time of the accident for the Maintenance Repair Organization was Revision 14 dated 7/31/2018 and was approved by FAA on 11/13/2018.

According to American Southeast Inflatable Manuals, the Chief Inspector is responsible for maintaining and revising the Capabilities List. Revision to the Capabilities List would be submitted to the FAA Certificate Holding District Office (CHDO) whenever an article is added or deleted. Before adding or deleting any article, the Chief Inspector conducts a self-evaluation using form ASIF #125, Capabilities List Self-Evaluation Form. The self-evaluation ensures that the repair station has the appropriate rating, current technical data, tooling, equipment and materials, adequate housing and facilities and sufficient qualified personnel.

Results of the self-evaluation are recorded on form ASIF #125 and forwarded to the General/Accountable Manager for review and approval. Upon approval, the Capabilities List will be revised. Investigators requested a copy of the ASIF #125 for the proposed Revision 14 but, as of the date of this report, had not received a copy of the form from American Southeast Inflatables.

Submission to the FAA CHDO will be made by the Accountable Manager or his designee within 5 (five) business days of a revision. Revisions will be submitted by US Mail (certified/return receipt) or by personal delivery. A vertical bar in the margin will identify the revised text on each affected page. Upon receipt of the accepted revision from the FAA CHDO, the repair station will implement within 5 (five) business days. The Chief Inspector will make the necessary copies and distribute to each Capabilities List holder.

The following information was documented in Revision 14 of the Capabilities List:

(a) Page 5 (Rev 14 dated 7/31/2018) of the document noted Life Raft Part Number D23940-100 Series.
(b) Page 22 (Rev 8 dated 10/17/2007; FAA approved 11/8/2007) documented Escape Slide Part Number 5A3307-1 and Page 22A (Rev 14 dated 07/31/2018) of the document noted Escape Slide Part Numbers: 5A3307-3, 5A3307-5 and 5A3307-301.

27.0 Miami Air Audit of American Southeast Inflatables

Miami Air Quality records show that quality audits of American Southeast Inflatables were conducted on 5/29/2014 (Audit Log 254), on 4/28/2016 (Audit Log 384) and on 4/11/2018 (Audit Log 490). There were no documented findings in the last quality audit.

After the accident, on 7/16/2019, a MAI Quality Department conducted an audit (Audit Log 568) of American Southeast Inflatables. Quality Assurance personnel cited multiple findings of 8130s with incorrect revision of the CMM listed on forms. According to the audit the vendor was copy and pasting 8130 information. As a precaution, Miami Air removed American Southeast Inflatables from the MAI Approved Vendor List on 7/17/2019.

28.0 FAA Surveillance of American Southeast Inflatables:

FAA Inspectors use Flight Standards Information Management System (FSIMS) 8900.1 to manage surveillance / inspections of manufacturers, operators and repair organizations. Inspectors document all findings in the National Program Tracking Subsystem (NPTRS) to assess and analyze. FAA Inspectors are to ensure the certificate holder corrects or mitigates any findings. The FAA Inspectors are to track the certificate holder's progress and corrective actions.

According to FAA records, seven inspections were conducted starting from November 12, 2015 to May 31, 2019. The Principal Maintenance Inspector (PMI) overseeing the American Southeast Inflatables Certificate accomplished an inspection on November 2, 2018 (Safety Assurance System 4.0 Technical Operations Data Collection Tool). Three findings were outlined during the inspection in the areas of Training and Qualification, Maintenance Processes and Recording Systems. All three findings were rectified by American Southeast Inflatables to the satisfaction of the Principal Inspector and was closed December 18, 2018.

On November 11, 2018, the PMI conducted an inspection of American Southeast Inflatables Organizational Management (Safety Assurance System 1.0 Organizational Management Data Collection Tool). The Inspector reported that answers to the questions to the data collection tool for the Maintenance Repair Organization were either "Met regulatory and guidance requirements" or "Not Observable". Records show that the inspection was closed on May 31, 2019.

Prior to the accident, there were no outstanding record of corrections by the PMI or from American Southeast Inflatables in the FAA recording and documenting system.
Investigators attempted to get information from the FAA regarding the American Southeast Inflatables PMI's Work Program and surveillance. As of the date of this report, the FAA has not provided the requested information.

FAA Records for American Southeast Inflatables Revision 14 Capability List:

Investigators could not find any data within the FAA system of when or how Revision 14 of the Capability List was submitted to the FAA for review and acceptance. All correspondence (e-mail and US Mail) between the FAA PMI and American Southeast Inflatables concerning Capability Lists revisions between January 2017 thru May 2019 was limited to Revision 13.

29.0 Miami Air Actions

Following the accident MAI conducted the following self-assessment and changes to its maintenance operations.

(a) Conducted a formal review of Phase Check work packages, including that of N732MA, accomplished in 2019 by Quality Control to identify any internal process gaps with paperwork, the MAI General Maintenance Manual Policies and Procedures and MAI Training.
(b) Initiated a comprehensive revision of the MAI GMM. Specifically identified impediments to compliance with Chapter 4, Introduction to Company Maintenance Policies. MAI determined that Chapter 4 had become cumbersome, overly complicated and confusingly organized over its evolution, which in turn made it difficult for MAI users to navigate. MAI is breaking down Chapter 4 and is creating a new chapter that will focus specifically on oversight of vendor maintenance. The revision has been shared with the local FAA Certificate Management Office (CMO) and the final revision will be submitted for approval via the Safety Assurance System (SAS) portal.
(c) Initiated a comprehensive revision to MAI's Continuing Analysis and Surveillance System Program. MAI identified gaps in the existing program, i.e. the program's fidelity in identifying chronic defects, regular auditing, and the structure of a monthly review and oversight meeting. As a result of MAI's internal findings, MAI revised GMM Chapter 14

and added a position to support MAI's CASS Analyst. MAI worked closely with the local CMO on the revisions and has submitted the GMM revision via the SAS portal for review and approval.

(d) Initiated a comprehensive revision to the Maintenance Organizational Structure, including the following:
    1. Separation of the Vice President / Director of Maintenance position into separate positions.
    2. Additional full-time resources added to the Quality Department
    3. Additional contractor resources added to Production to support internal/external maintenance workload events.
    4. Addition of interns to help support MAI projects in CASS, Quality and Production Control.
    5. Additional resources added to support Production Control, i.e. with planning and records.

(e) Developed Standard Operating Procedures and checklists to support maintenance workflow communication and enhance paperwork oversight for MAI's internal maintenance workload.

(f) Enhanced MAI Maintenance Training related to: Airworthiness Release, Auditing Procedures, Fan Blade Lubes, Maximum Power Assurance runs, Inspection Required / Required Inspection Items and General Visual Inspections. MAI also modified its training to ensure all employees are proficient in reading and speaking English.

(g) As a result of the NTSB Investigation and subsequent internal MAI Quality Audits, MAI implemented significant changes to it Inflatables Maintenance program. MAI removed the previous vendor from the approved vendor list and with the support of the local CMO, identified, audited and approved a new vendor. In addition, MAI implemented a program that removed six serviceable slides from inventory, due to age and implemented a program which establishes a maximum service life on MAI slides at fifteen years. MAI has also commenced a review of existing rafts and purchased five new rafts for MAI inventory and will remove older rafts from inventory.