

NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety Washington, D.C. 20594

Maintenance Records - Factual

NTSB No: DCA20MA059

May 20, 2020

A. <u>ACCIDENT:</u>

Operator:	Island Express Helicopters, Inc.
Location:	Calabasas, CA
Date:	January 26, 2020
Time:	9:45 AM Pacific Standard Time
Aircraft:	Sikorsky S76-B (S/N: 760379), Registration N72EX

B. <u>MAINTENANCE RECORDS GROUP</u>

Group Chairman:	Greg Borsari National Transportation Safety Board Washington, D.C.
Member:	Pocholo Cruz National Transportation Safety Board Washington, D.C.
Member:	Jerry Badillo Federal Aviation Administration Van Nuys, CA
Member:	Adam Green Island Express Helicopters, Inc. Long Beach, CA

C. <u>SUMMARY</u>

On January 26, 2020, about 0945 PST, a Sikorsky S76-B helicopter, N72EX, was destroyed when it was involved in an accident near Calabasas, California. The pilot and eight passengers were fatally injured. The helicopter was operated as a Title 14 Code of Federal Regulations Part 135 charter flight.

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LIST OF ACRONYMS

AD	AIRWORTHINESS DIRECTIVE
ADS-B	AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST
AMM	AIRCRAFT MAINTENANCE MANUAL
CFR	CODE OF FEDERAL REGULATION
CVR	COCKPIT VOICE RECORDER
ELT	EMERGENCY LOCATOR TRANSMITTER
FAA	FEDERAL AVIATION ADMINISTRATION

LIST OF ACRONYMS Continued

GPS	GLOBAL POSITIONING SYSTEM
IEH	ISLAND EXPRESS HELICOPTERS
lbs	Pounds
LED	LIGHT EMITTING DIODE
MEL	MINIMUM EQUIPMENT LIST
MGB	MAIN GEAR BOX
MISR	MECHANICAL INTERRUPTION SUMMARY REPORT
OpSpecs	OPERATION SPECIFICATIONS
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
SATCOM	SATELLITE COMMUNICATION
SB	SERVICE BULLETIN
SDR	SERVICE DIFFICULTY REPORT
SN	SERIAL NUMBER
STC	SUPPLEMENTAL TYPE CERTIFICATE
TC	TYPE CERTIFICATE

D. <u>DETAILS OF INVESTIGATION</u>

1.0 Air Carrier Certificates

Island Express Helicopters, Inc. (IEH) is located at 2601 E. Spring Street, Long Beach, CA. A Part 135 operations certificate number, ISHA094F, was originally issued to Island Express Helicopters, Inc. by the Federal Aviation Administration's (FAA) Western Pacific Region Long Beach Office on January 26, 1988.

2.0 Operations Specifications (OpSpecs)¹

IEH Certificate, which includes the standards, terms, conditions, and limitations contained in the FAA approved Operations Specifications were reviewed:

- (a) Air carrier was authorized as a 14 CFR Part 135 operation.
- (b) Section D085 of the OpSpecs, IEH has six² aircraft in the fleet. Two Airbus AS-350-B2, one Airbus AS-350-BA and one Sikorsky SK-76-A and two Sikorsky SK-76-B.
- (c) Section D095 of the OpSpecs authorized IEH to use an FAA approved Minimum Equipment List (MEL) for its fleet of aircraft.
- (d) Section D102 of the OpSpecs authorized IEH to use the following additional Maintenance Requirements for the SK-76B Rotorcraft:

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

² Includes helicopter N72EX.

Aircraft Engine: Each installed engine, to include turbosuperchargers, appurtenances and accessories necessary for its functioning shall be maintained in accordance with the maintenance documents. The engine shall be overhauled on or before the time in-service.

Rotorcraft Type	Make and Model	Maintenance Document	Time in Service Interval
SK-76B	Pratt and Whitney PT6A-36	Sikorsky Maintenance Manual SA4047-76B-2-1 Pratt and Whitney PT6A-36 Maintenance Manual Part Number 3034442	4,000 Hour Overhaul Inspection

Rotor: Each installed main and auxiliary rotor shall be maintained in accordance with the manufacture's maintenance document listed below:

Rotorcraft Type	Rotor Main and Auxiliary Maintenance Document
SK-76B	Sikorsky S76B Maintenance Manual

(e) Section D104 of the OpSpecs authorized IEH to use emergency equipment in its 14 CFR Part 135 nine seats or less operations, provided the applicable aircraft have met the additional maintenance requirements of Section 135.421.

3.0 Type Certificate Data Sheet

The Type Certificate Data Sheet (H1NE) 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, Sikorsky Aircraft Corporation is the holder of the TC.

4.0 Helicopter Information

The Sikorsky Company manufactured the S76-B Helicopter, Serial Number 760379 in 1991. The FAA issued a standard airworthiness certificate on June 6, 1991. The helicopter was owned by several operators prior to the sale to Island Express Holding Corp, August 17, 2015. The helicopter was put on the IEH certificate on April 4, 2016. The helicopter had accumulated approximately 4,716.1 total flight hours with 11,239 landings according to the daily flight log dated January 26, 2020 prior to the accident.

The helicopter was equipped with two Pratt & Whitney Canada PT6B-36A Engines. The engines had accumulated the following operating times as of January 26, 2020 (see next page).

	No.1 Engine	No.2 Engine
Manufacturer	Pratt and Whitney	Pratt and Whitney
Part Number	PT6B-36A	PT6B-36A
Manufacture Date	September 1990	May 1990
Date Installed	May 25, 1991	May 25, 1991
Serial Number	PCE 36149	PCE 36144
Engine Hours at Overhaul	3,497.9	3,454.8
Date of Overhaul	7/9/2007	7/22/2005
Total Time (Engine Hours)	4,506.30	4,680.50
Total Cycles	9,513	9,678
Time Since Overhaul	1,009.3	1,225.70
Cycles Since Overhaul	1,133	2,445

Engine Information

5.0 Maintenance Program

IEH is responsible for all maintenance, preventive maintenance, rebuilding, and alteration of the airframe, engines, appliances, and component parts in accordance with 14 CFR Parts 43 and 135. This includes all life-limited parts that are removed from a type certificated product, segregated and controlled as defined in 14 CFR §43.10. The helicopter, engine, rotor and components must be maintained in accordance with manufacturer instructions.

The Sikorsky S-76B Aircraft Maintenance Manual (AMM) Chapters 4 (Airworthiness Limitations) and 5 (Time Limits / Maintenance Checks) contain the maintenance intervals for each airworthiness limitation item, 100-hour inspection, annual inspection, supplemental structural inspections and progressive inspection requirements.

The Replacement Schedule found in AMM Chapter 4 provides a list of all component parts installed in the Model S-76B helicopter that must be removed from service at the expiration of a specified number of flight hours or calendar time. The replacement times listed are mandatory. Items listed as On Condition are maintained in a continuous airworthy condition by the periodic and progressive inspection checks, servicing, preventive maintenance, and applicable overhaul procedures as outlined in appropriate inspection programs, publications, and authorized repair station procedures, and by the specific inspections called out in the referenced notes. These notes also contain replacement criteria for certain conditions. Replacement (retirement) times are predicated on operation of the helicopter within all flight and maintenance parameters, as required by the current manuals and applicable Federal Aviation Regulations. Refer to Pratt & Whitney

Canada PT6B-36 series manuals for powerplant Airworthiness Limitations.

Sikorsky AMM Chapter 5 contains the basic overhaul periods for major components of the S-76B model helicopter and are found in the Overhaul Schedule (AMM 5-10-00). IEH Maintenance/Inspection Intervals as based on service bulletin incorporation are as follow:

- (a) 25- Hour Inspection.
- (b) 50-Hour Inspection.
- (c) 100-Hour Inspection.
- (d) 300-Hour Inspection.
- (e) 500-Hour Inspection.
- (f) 600-Hour Inspection.
- (g) 900- Hour Inspection.
- (h) 1,500-Hour Zone 1 Inspection.
- (i) 1,500-Hour Zone 2 Inspection.
- (j) 1,500-Hour Zone 3 Inspection.
- (k) 1,500-Hour Zone 4 Inspection.
- (l) 1,500-Hour Zone 5 Inspection.
- (m) 6 Month Inspection.
- (n) 12 Month Inspection.
- (o) 24 Month Inspection.
- (p) 36 Month Inspection.
- (q) 36 Month Inspection.
- (r) Annual Inspection.

The following is the history of N72EX that lists the most recent airframe inspections completed:

Check Type	Date	Total Time
25 Hour Inspection	1/1/2020	4,701.7
50 Hour Inspection Checklist	1/1/2020	4,701.7
100 Hour Inspection Checklist	10/25/2019	4,654.40
300 Hour Inspection Checklist	10/25/2019	4,654.40
500 Hour Tail Rotor Spar Inspection	12/16/2019	4,375.90
500 Hour Main Rotor Blade Composite Inspection	3/13/2019	4,489.00
600 Hour Inspection Checklist	10/3/2018	4,450.50
900 Hour Inspection Checklist	10/29/2012	3,876.50
1,500 Hour Zone 1 Inspection	7/13/2006	3,613.10
1,500 Hour Zone 2 Inspection	7/13/2006	3,613.10
1,500 Hour Zone 3 Inspection	7/13/2006	3,613.10

Airframe inspections table continued:

Check Type	Date	Total Time
1,500 Hour Zone 4 Inspection	7/13/2006	3,613.10
1,500 Hour Zone 5 Inspection	7/13/2006	3,613.10
6 Month Inspection (Hour)	9/13/2019	4,629.20
12 Month Inspection (Hour)	3/13/2019	4,489.00
24 Month Inspection (Hour)	12/19/2018	4,487.70
36 Month Inspection (Hour)	3/13/2019	4,489.00
36 Month Inspection of Main Components (Hour)	12/31/2017	4,197.40
Annual Inspection (Hour)	3/13/2019	4,489.00

The most recent Pratt & Whitney Canada PT6B-36A routine inspections completed:

Check Type	Date - No.1 Engine	Hours – No.1 Engine	Date - No.2 Engine	Hours - No.2 Engine
50 H	1/1/2020	1.400.6	1/1/2020	1 ((2 5 0
50 Hour	1/1/2020	4,490.6	1/1/2020	4.663.50
Airworthiness				
Inspection				
150 Hour	9/13/2019	4,418.10	9/13/2019	4,591.00
Airworthiness				
Inspection				
150 Hour/6 Month Gas	9/13/2019	4,418.10	9/13/2019	4,591.00
Generator Case				
Inspection				
150 Hour/12 Month	9/13/2019	4,418.10	9/13/2019	4,591.00
Output Shaft Leak				
300 Hour	10/25/2019	4,443.30	10/25/2019	4,616.20
Airworthiness				
300 Hour Fuel Nozzle	10/25/2019	4,443.30	10/25/2019	4,616.20
Cleaning				
300 Hour/12 Month	10/25/2019	4,443.30	10/25/2019	4,616.20
Compressor Inlet				
600 Hour Fuel Filter	10/25/2019	4,443.30	10/25/2019	4,616.20
600 Hour/12 Month	3/13/2019	4,277.90	3/13/2019	4,450.80
Electric Contact Clean				
900 Hour/12 Month	3/13/2019	4,277.90	3/13/2019	4,450.80
Flange & Joint Seal				
1,200 Hour Fuel Nozzle	7/9/2007	3,497.9	10/25/2019	4,616.20
Function				
300 Hour/12 Month Oil	3/13/2019	4,277.90	3/13/2019	4,450.80
Change				
150 Hour Oil Filter	9/13/2019	4,418.10	9/13/2019	4,591.00
Cleaning				

Routine engine inspections completed continued:

Check Type	Date - No.1 Engine	Hours – No.1 Engine	Date - No.2 Engine	Hours - No.2 Engine
1,200 Hour Oil Filter	3/13/2019	4,277.90	3/13/2019	4,450.80
Cleaning				
24 Month Oil Filter	3/19/2019	4,277.90	3/13/2019	4,450.80
Replacement				

The most recent work order for the monthly items due dated January 22, 2020 was reviewed. The following discrepancies were identified and corrected during the visit.

- (a) Black and Yellow tail rotor blade boots torn Replaced rotor boots.
- (b) Performed tail rotor low balance check.
- (c) No.2 Yaw actuator inoperative Installed overhauled No.2 yaw actuator.
- (d) Left hand landing light bulb cracked Installed new light bulb.
- (e) Monthly GPS data base updated.
- (f) Monthly fire extinguisher inspections complied with.
- (g) Complied with ARTEX ME406 ELT operational status.
- (h) Monthly life vest inspections complied with.
- (i) Three-month jet emergency battery inspection complied with.

In addition, work order dated January 1, 2020 for the most recent 25 & 50-hour airframe, 50-hour lube and 50-hour engine inspections were reviewed. No discrepancies were noted during the review. Summary of the inspection items are noted below.

- (a) Inspect tail rotor blade spar.
- (b) Inspect exposed main rotor spindle cuff/blade attachment bolts with blades installed.
- (c) Inspect nose wheel and tire assembly.
- (d) Main wheel and tire assemblies for inflation and condition.
- (e) Main landing gear brake wear inspection.
- (f) Inspect visible portion of angle, 76202-04001-107, and longeron 76202-04001-147 for cracks. Paying particular attention to area of bulkhead stringer cutouts, left side.
- (g) Tail rotor pitch control rods and pitch beam for corrosion, damage, and security. Rod end bearings for condition.
- (h) Tail rotor blade assembly.
- (i) Engine mount forward crossbeam for cracks.
- (j) Main rotor blade assembly.
- (k) Tip cap screws for evidence of looseness.
- (1) Rotating and stationary scissors for bearing wear and general condition.
- (m) Swashplate shield for damage or dis-bonding.
- (n) If less than 0.040 inch, check at next 50-hour interval.
- (o) Inspect main rotor droop stops.
- (p) Check damper bearings for too much play and wear.
- (q) Main rotor pitch control rods for condition and security.
- (r) Exhaust duct for cracks or distortion.

6.0 Minimum Equipment List (MEL)³

IEH was authorized to use an approved MEL on its helicopters per its OpSpecs. Tracking of all deferred items were per General Operations and Maintenance Practices Manuals. At the time of the accident, there were no open MEL items for N72EX.

7.0 Airworthiness Directives (AD)⁴ and Service Bulletins (SB)

IEH provided AD and Service Bulletin reports for helicopter N72EX for review. The AD reports contained the applicable Service Bulletins. A review of Airworthiness Directive status lists for the helicopter, powerplants and appliances were conducted. The AD Compliance Record review found no discrepancies.

8.0 Helicopter Daily Logs

Helicopter Daily Logs were reviewed from September 1, 2019 thru January 26, 2019. The following items were noted.

Date	Discrepancy	Corrective Action
1/11/2020	GPS update required.	GPS database updated.
12/31/2019	Pilot reported the yaw Stability Augmentation System stuck full deflection No.1 & No.2.	Removed and replace the No.1 and No.2 Auto Pilot computers part number 7003183- 914. Removed inoperative No.2 Yaw Stability Augmentation System actuator and replaced with overhauled unit, part number 76900-01802.
11/22/2019	Monthly Squawks.	Installed (x4) new horizontal stabilizer bolts per 1,500 hour / 2 year requirement. Removed and replaced M/R damper reservoir PN 76106-08050-043. Removed and replaced starter generator PN 23092- 002, SN 140 installed.
10/1/2019	MGB pressure switch leaking.	Removed and replaced MGB pressure switch PN70351-08091-101. SN 10410 installed.
9/27/2019	MGB chip detector light illuminated on start up.	Drained MGB oil and cleaned chip plugs. Found sliver of metal on LH chip plug. Reinstalled chip plug and replenished oil. Performed ground run with no defects noted.
9/13/2019	Removed left hand brake assembly due to wear. Removed T/R pitch change shaft liner, pilot and snap ring.	Installed overhauled brake assembly PN 5007555-3 SN JUL-91-476. Installed new T/R pitch change shaft liner PN 300SSDRML2410, Pilot PN 76101- 05022-103 and Snap Ring PN RR165S.

³ 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.

⁴ 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.

Log items continued:

Date	Discrepancy	Corrective Action
9/5/2019	Removed No.2 starter generator.	Installed overhauled starter generator PN
		23092-002 SN 260.
9/2/2019	Engine No.2 chip light.	Found fuzz on forward engine chip plug.
		Inspected engine oil filter, no defects noted.
		Drained and serviced engine oil. Performed
		20-minute penalty run. Inspected both chip
		plugs and oil filter. All work performed per
		Pratt & Whitney PT6B-36 AMM.

9.0 Weight and Balance Summary

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

The last weight and balance for N72EX was performed on March 13, 2019, at Rotorcraft Support Inc. in Van Nuys, CA.

Basic Operating Weight:	8381.5 lbs	
Longitudinal Arm:	208.27 inches	Lateral Arm: 0.07 inches
Moment:	1745614.50 lb-inches	Lateral Moment: 625.00 lb-inches

10.0 Service Difficulty Reports (SDR)⁵ and Mechanical Interruption Summary Report (MISR)⁶

The Maintenance Records Group reviewed the SDR and MISR for the accident helicopter. There were no SDR or MISR reported for N72EX by IEH.

11.0 Major Repairs

IEH provided the major repairs listing applicable to N72EX. The five structural major repairs were accomplished on N72EX prior to IEH operating the helicopter. There were no discrepancies noted.

⁵ As required under 14 CFR 135.415, 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 96 hours of the event.

⁶ Each certificate holder is required under 14 CFR Part 135.417 to mail or deliver, before the end of the 10th day of the following month a summary report of the following occurrences in multiengine aircraft for the preceding month to the certificate holding district office. (a) Each interruption to flight, 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.

12.0 Supplemental Type Certificates (STC)⁷ and Major Alterations

39 STCs and Major Alterations are on file with the FAA. See table below for the ten major alterations incorporated by IEH. No discrepancies were noted.

Date	Location	Summary
03/13/2019	Rotorcraft Support Inc	Removed existing Transponder system and installed Mode S transponders with GPS and ADS-B out. Removed Weather Radar system.
12/01/2017	Rotorcraft Support Inc	Installed Provisions for ASPIRE-200 Satellite comm system
12/01/2017	Rotorcraft Support Inc	Removed existing audio panels and installed PS Engineering Audio selector panels
2/20/2017	Rotorcraft Support Inc	Removed existing strobes and installed Whelen Engineering LED Strobes
8/19/2017	Rotorcraft Support Inc	Removed Spidertracks 3 and installed Spidertracks 7 Satellite Flight Following System
3/16/2016	Rotorcraft Support Inc	Cabin interior seating modification
3/16/2016	Rotorcraft Support Inc	Installation of the Spidertracks 3 satellite tracking system.
3/16/2016	Rotorcraft Support Inc	Installation of Two Hour Meters
3/16/2016	Rotorcraft Support Inc	Install of serviceable interior for up to nine passengers
3/16/2016	Rotorcraft Support Inc	Removal of CVR and Aircell SATCOM System

13.0 Time Limit Components

The maintenance group reviewed the Time Limit Component reports for the airframe, engine and rotor components installed on N72EX.

Components were tracked by the manufacturer part number and serial number. IEH manually tracks all components via a spreadsheet. Components are tracked by flight hours, flight cycles, calendar date or any combination of flight hours, flight cycles and date.

As part of the review process attention focused on the main rotor blades, swashplate assembly, main gearbox, main rotor shaft, intermediate gearbox, tail rotor gearbox, main servos, tail rotor shaft, tail rotor flange, tail rotor blades and horn, tail rotor servo. Included were the yaw, roll and pitch actuators.

⁷ 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.

Engine life limited components were reviewed for both engines, such as 2nd & 3rd stage compressor disc, turbine and power compressor disc, hub compressor rotor and impeller. No discrepancies were noted during the review.

14.0 Vendors

All IEH Repair and Overhaul vendors, essential and substantial vendors were audited on an annual basis via mailers. At the time of the review IEH was in the process of accomplishing the audits from its vendors.

The Maintenance Group reviewed the existing Approved Vendor List provided by IEH. There were no discrepancies.

15.0 Method of Record Keeping

Per FAR Parts 43, 91 and 135, IEH maintains records for the helicopter, engines and components with the use of logbooks and component tracking spreadsheets with protected formulas and daily data entry that tracks hours, days and landings. Included is the time remaining for each inspection due and/or life limited component time remaining by days, cycles and/or flight hours.

According to IEH, historical maintenance records were kept for the life of the helicopter and are not discarded even though the maintenance work had been previously superseded.

16.0 Manuals

IEH utilizes the following manual to ensure the airworthiness of its aircraft:

- (a) <u>Maintenance Practices Manual (Rev 14 dated 6/24/2019)</u> This manual was 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:
 - A detailed description of the Maintenance duties and responsibilities.
 - The detailed procedures for compliance with code of federal regulations as required in the areas of airworthiness release, tool and equipment calibration, aircraft/engine/component and deferred maintenance item procedures, training etc.
- (b) <u>Minimum Equipment List (Dated 3/12/2019)</u> The manual allows IEH to dispatch aircraft with equipment items listed in the FAA Approved MEL manual.
- (c) <u>Maintenance Training Manual (Rev1 Dated 7/5/2010</u>) Training Program used by IEH for all Maintenance personnel with regards to company and technical maintenance process and procedures.
- (d) <u>Approved Vendor List</u> The list provides a list of vendors allowed to provide maintenance and services to IEH.
- (e) <u>General Operations Manual (Rev 72 Dated 11/12/2019)</u> This manual provides company personnel with a single source of policy that will guide and assist them in performing duties pertaining to the operation of IEH.

(f) <u>Manufacturer Manuals</u> – Sikorsky Manuals, Pratt and Whitney Manuals and Component Manuals from various manufacturers.

17.0 Maintenance Operations

IEH Primary Maintenance Base is located at 2601 East Spring Street, Long Beach, CA. The facility had all the manuals, components, tooling and equipment to maintain the IEH fleet.

IEH employs two Airframe and Powerplant Certificated Mechanics with one of the two having an Inspection Authorization Certificate (Director of Maintenance). Maintenance Operations at the facility was Monday to Friday with rotating on call duties for weekend coverage.

According to the Director of Maintenance, all minor routine and non-routine inspections were accomplished at the facility. More involved or major maintenance inspections were sent to a Part 145 Maintenance Repair Organization (Primarily Rotorcraft Support Inc. located in Fillmore, CA).

Additionally, IEH uses a Safety Management System program (Prism Armor) for its maintenance operations and Online Aviation Maintenance and OSHA training through a company called Computer Training Systems.