Revision A

THE CORRECTION BELOW ARE INCLUDED IN THIS VERSION OF THE FACTUAL REPORT

**December 13, 2006**

# MAINTENANCE RECORDS GROUP CHAIRMAN'S FACTUAL REPORT

**DCA06MA010**

## ACCIDENT

Location: Miami, Florida

Date: December 19, 2005

Time: 1439 Eastern Standard Time (EST)

Aircraft: Grumman G-73T Mallard, N2969, S/N J-27

- Section 9, page 11-12 - added Chalk's Ocean Airways Director of Maintenance comments.
- Section 12, page 13 - added Chalk's Ocean Airways Director of Maintenance comments.
- Section 13, page 14 – editorial change.
- Section 18, page 16-17 - added Chalk's Ocean Airways Director of Maintenance comments.

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

June 21, 2006

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## B. MAINTENANCE RECORDS GROUP

Chairman: Pocholo Cruz
National Transportation Safety Board
Washington, DC

Member: Dave Avery
Federal Aviation Administration
Miami, Florida

Member: Luis Carrillo
Chalks Ocean Airways
Fort Lauderdale, Florida

Member: Andy Macfie
Grumman Mallard Owners Association
Hayward, California

## C. SUMMARY

On December 19, 2005, at 2:39 pm eastern standard time, a Grumman Mallard G73T, N2969, operated by Flying Boat Inc. as Chalk's Ocean Airways flight 101, crashed into a shipping channel adjacent to the Port of Miami shortly after takeoff. The aircraft, a seaplane, had departed from the Miami Seaplane Base (X44), and took off from the shipping channel with 2 crew and 18 passengers (including 3 infants). The scheduled flight was destined to Bimini, Bahamas, operating under the provisions of Title 14 Code of Federal Regulations Part 121. The seaplane was retrofitted with Pratt & Whitney PT-6 turboprop engines. Witness and video recordings indicated a fire on the right wing and showed the wing separating prior to impacting the water. All 20 occupants suffered fatal injuries. Visual meteorological conditions prevailed at the time of the accident.

The Maintenance Records Group met at the Miami Flight Standards District Office, Miami, Florida on January 3, 2006 to review all air carriers' maintenance records. The Maintenance Records Group departed on January 7, 2006. The Maintenance Records Group met again at the NTSB office in Washington, DC from May 15, 2006 to May 19, 2006 to finish the records review.

## D. BACKGROUND

The company was founded by Arthur B. Chalk, an automobile mechanic in Paducah, Kentucky when he was introduced in 1911 to the noted aviation pioneer, seaplane pilot and barnstormer Tony Janus, who subsequently gave Mr. Chalk flying lessons in exchange for repairs on his aircraft. Mr. Chalk soon followed the path of the early aviation pioneers, barnstorming around the south until he took up residence in the fledgling city of Miami in 1917. Following military service in the Air Corps during World War One, Mr. Chalk returned to Miami and began operations in 1919 as Chalk's Flying Service.

The company built a terminal on a newly created landfill named Watson Island in 1926. That same location, between downtown Miami and the popular South Beach tourist district, is now adjacent to the Port of Miami and remains the main operating base of the airline today.

Mr. Chalk was involved in the daily operations of the airline until 1975. The airline was purchased in the 1980's by Resorts International, a hotel and casino property development company with extensive holdings in the Bahamas. At the direction of James Crosby, the President of Resorts International, the company began two significant initiatives to upgrade the airline's fleet, including the modernization of the company's Grumman G-73 Mallard aircraft by Frakes Aviation which included converting the piston-engine aircraft to Pratt & Whitney PT6 turboprop engines, as well as a complete avionics upgrade and 17-seat interior refurbishment. Additionally, the company

undertook a program, which successfully certified the Grumman HU-16 Albatross, originally built for military service, as the G-111 30-seat passenger transport aircraft.

After being sold by Resorts International in conjunction with the disposition of that company's Bahamas hotel properties, Chalk's was owned by several South Florida investors, and operated for a time in conjunction with the restarted Pan Am under the Pan Am Air Bridge name. In early 1999, in conjunction with the bankruptcy filing of one of the airline's investors, Chalk's reorganized and recapitalized in mid-July 1999 when bought by Florida businessman, Jim Confalone. As part of its re-branding as Chalk's Ocean Airways following the bankruptcy, the Chalk's Turbine Mallard fleet was undergoing extensive refurbishment. Chalk's passenger facilities ashore were being upgraded, and a modernization program for the fleet of 30 seat Grumman G-111 Albatross was being completed for return to service.

## E. DETAILS OF THE INVESTIGATION

### 1.0 Air Carrier Certificates

Flying Boat Inc. doing business as Chalk's Ocean Airways and Chalk's International Airlines, 704 SW 34th Street, Suite 100, Ft. Lauderdale, Florida 33315, Certificate Number FVYA015T, was originally issued by Fort Lauderdale Flight Standards District Office (FSDO), Southern Region on December 10, 1990 and reissued again on March 19, 1997.

Chalk's Ocean Airways also received a Part 145 Repair Station Certificate (Certificate Number FVYR015T) on August 24, 1993, from the FAA's Ft. Lauderdale, Florida FSDO. The repair station, which is located at 704 SW 34th Street, Suite 100, Ft. Lauderdale, Florida 33315, is approved with the following ratings: Limited Airframe, Limited Powerplant, and Limited Specialized Service.

See Attachment 1 for further details.

### 2.0 Operations Specifications (OpSpecs)[1]

Chalk's Ocean Airways Part 121 Certificate, which included the standards, terms, conditions, and limitations contained in the FAA approved Operations Specifications (Parts A, B, C, D) were reviewed.

(a) Air Carrier is authorized to use a Continuous Airworthiness Maintenance Program [CAMP][2] (OPS-SPECS, Para D072).

[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] A Continuous Airworthiness Maintenance Program combines the maintenance and inspection functions used to fulfill an operator's total maintenance needs. The program must be sufficiently comprehensive in scope and detail to fulfill its responsibility to maintain the aircraft in an airworthy condition in accordance

(b) Air carrier is authorized as a 14CFR Part 121/135 operation.

(c) Air carrier is authorized for short-term escalations (OPS-SPECS, Para. D076).

(d) N2969 is authorized for time limitations in the CAMP- (OPS-SPECS, Para. D089).

(e) Air carrier is authorized to make arrangements with other organizations to perform substantial maintenance (OPS-SPECS, Para. D091).

(f) Air carrier is authorized to use an approved Minimum Equipment List (MEL).

(g) Air carrier must have an Aging Aircraft Inspection and Records Review (OPS-SPECS, Para. D485).

(h) N2969 is authorized for Weight and Balance Program- (OPS-SPECS, Para. E096).

## 3.0 Aircraft Information

The airplane was manufactured by Grumman Aircraft Engineering Corporation, Bethpage, Long Island, New York in May 1947. The airplane had 31,226.3 total hours with 39,743 total cycles at the time of the accident.

The airplane was equipped with one Pratt and Whitney PT6A-34AG and one Pratt and Whitney PT6A-34 turbopropeller engines and had accumulated the following operating times at the time of the accident:

| | | No.1 Engine | No.2 Engine |
|---|---|---|---|
| | | | |
| Manufacture Date | | December 96 | September 92 |
| Date Installed | | 3/23/05 | 10/15/04 |
| Serial Number | | PCE-PH0044 | PCE-57465 |
| Total Time (hours) | | 7,515.6 | 9,035.8 |
| Time Since Overhaul (hours) | | 1,154.6 | 3,037.1 |
| Hours since last installation (hours) | | 1,154.6 | 1,677.8 |

to applicable FARs. Basic requirements of CAMP include the following: Inspection, Scheduled Maintenance, Unscheduled Maintenance, Overhaul and Repair, Structural Inspection, Required Inspection Items and Reliability Program (if appropriate). The program shall be included in the certificate holder's manual.

The airplane was also equipped with two Hartzell HC-B3TN-3D/T propellers and had accumulated the following operating times at the time of the accident:

| | | No.1 Propeller | No.2 Propeller |
|---|---|---|---|
| Manufacture Date | | Not Available | Not Available |
| Date Installed | | 3/23/05 | 9/15/04 |
| Serial Number | | BUA28996 | BUA21098 |
| Total Time (hours) | | 11,117.0 | 17,995.3 |
| Time Since Overhaul (hours) | | 1,154.6 | 2,657.1 |
| Hours since last installation (hours) | | 1,154.6 | 599.3 |

## 4.0 Maintenance and Inspection Programs

Per Chalk's Ocean Airways Manuals, the Continuous Airworthiness Maintenance Program (CAMP) revision 21 was approved by the FAA on November 11, 2005.

### Summary of Maintenance Program

Airworthiness Directives and Manufacturer Service Bulletin compliance were written into the program when applicable.

A comprehensive Avionics Inspection, including Compass Swing, Pitot-Static Test and Transponder Test were performed annually.

TS (Transit Service) – performed on all airplanes that over night at a base where maintenance personnel were available. No airplane was permitted to operate more than 48 hours between transit services.

ES (Engine Service) – the engine service includes the powerplant and propellers and performed each 250 flight hours.

C Checks – The airframe maintenance program was designed to completely inspect the airframe, components, systems and appliances in six scheduled maintenance visits at 80-day intervals. The six-scheduled maintenance visits combined were not to exceed 20 calendar months. If the 20-month limit were reached prior to the cycle completion, it would be necessary to perform the remainder of the inspections prior to further flight. The work content was divided into six categories C1-C6 and was programmed in such a way that there was no duplication of work instructions or work conflict between them.

The following are the six C- Check Inspection areas:

C-1 – Left Wing STA 34 to STA 400 – Primary
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Right Hand Main Landing Gear Inspection

C-2 – Lower forward hull STA 0 to STA 250, bow and cargo area STA 0 to STA 108 – Primary
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Nose Landing Gear Inspection

C-3 – Right Wing STA 34 to STA 400 – Primary
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Left Hand Main Landing Gear Inspection

C-4 – Upper and Lower Fuselage STA 250 to STA 428 – Primary
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Right Hand Main Landing Gear Inspection

C-5 – Tail Section and Empennage STA 428 to STA 560
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Nose Landing Gear Inspection

C-6 – Upper hull interior STA 108 to STA 250 and Center Wing STA 34 Left Hand to STA 34 Right Hand – Primary
(a) Preliminary Inspection/Corrosion Control
(b) Lubrication
(c) Avionics check/inspection
(d) Left Hand Main Landing Gear Inspection

The following is listing of the previous inspections accomplished on airplane N2969.

| CHECK | DATE | LOCATION | TOTAL TIME | TOTAL CYCLES | NOTES |
|---|---|---|---|---|---|
| Transit Service | 12/19/05 | FLL | 31,226.3 | 39,743 | |
| #1 Engine Service | 10/19/05 | FLL | 31,035.8 | 39,445 | |
| #2 Engine Service | 11/12/05 | FLL | 31,121.9 | 39,584 | |
| C1 Check | 12/17/05 | FLL | 31,218.6 | 39,731 | |
| C6 Check | 10/10/05 | FLL | 31,011.8 | 39,404 | |
| C5 Check | 10/10/05 | FLL | 31,011.8 | 39,404 | |
| C4 Check | 07/01/05 | FLL | 30,567.7 | 38,769 | |
| C3 Check | 03/23/05 | FLL | 30,071.7 | 38,090 | |
| C2 Check | 12/11/04 | FLL | 29,766.3 | 37,700 | |
| C1 Check | 09/27/04 | FLL | 29,472.4 | 37,330 | |

Further review of recent C1 Check Routine and Non-routine cards revealed some of the cards were not properly filled out as required per Chalk's Ocean Airways General Maintenance Manual. Additional reviews of non-routine and routine cards from previous checks were conducted with similar results. Some of the fields in the cards were left blank or incomplete.

## 5.0 Continued Analysis And Surveillance System (CASS)[3]

Chalk's Ocean Airways conducted monthly CASS meetings to review the previous months maintenance discrepancies on the fleet. The maintenance records indicate that the FAA Principal Maintenance Inspector (PMI) and/or other FAA representatives attempted to attend the meetings. The CASS minutes (January 2005 – November 2005) included Mechanical Interruption Reports, Logbook information, airplane discrepancies and Minimum Equipment List information tracked for each of their airplanes.

[3] 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.

## 6.0 Minimum Equipment List (MEL)[4]

Chalk's Ocean Airways was authorized to use an approved MEL (Revision 2, dated July 18, 2000 and approved by the FAA Fort Lauderdale Flight Standards District Office on September 7, 2000) on its G-73 fleet per its OPS-SPECS. At the time of the accident, there were no open MEL items in the airplane logbook.

## 7.0 Supplemental Type Certificates (STC)[5]

Supplemental Type Certificates (STC), supplied by air carrier, were reviewed. The following STCs are of note:

STC SA3131S0, Installation of a Fairchild Cockpit Voice Recorder in accordance to Aircraft Engineering and Modification Services, Inc. (A.E.M.) drawing number 9113422-00, initial release, dated August 2, 1991, or later approved revision. The maintenance records show that the airplane was modified on June 23, 1992. On June 29, 2000, the airplane was again modified by the removal of CVR and Control GA100 and the installation of CVR A100 and Control A152. The data that was used for this modification was reviewed and approved by the Chalk's Ocean Airways FAA PMI.

STC SA2323WE, Increase in gross weight and installation of United Aircraft of Canada Limited PT6A-27, PT6A-34 or PT6A-34AG engines in accordance with Frakes Aviation, Inc., Master Drawing List FA 5000, Rev. V dated September 13, 1983, or later approved revision. The maintenance records show that the airplane was modified on July 10, 1981.

STC SA4410SW, Installation of seventeen-passenger seat interior in accordance with Frakes Aviation, Inc., Master Drawing List FA 5000 A dated July 7, 1981. The STC was not found in the maintenance records. The FAA airworthiness records; however shows that the airplane was modified on July 10, 1981. The seats and seat belts were inspected for security, cleanliness and proper operation at each C Check and each Transit Service. This inspection was accomplished in accordance with the Frakes Turbo-Mallard G-73T Aircraft Service Manual.

See Attachment 2 for further details.

[4] 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.
[5] 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.

## 8.0 Airworthiness Directive (AD)[6] and Service Bulletin (SB) Summary

The air carrier provided AD and SB summaries, which were reviewed. The following are of note:

AD 98-04-33, AD requires revising the Airplane Flight Manual (AFM) to specify procedures that would prohibit flight in severe icing conditions (as determined by certain visual cues), limit or prohibit the use of various flight control devices while in severe icing conditions, and provide the flight crew with recognition cues for, and procedures for exiting from, severe icing conditions. This amendment was prompted by results of a review of the requirements for certification of the airplane in icing conditions, new information on the icing environment, and icing data provided currently to the flight crews. The actions specified by this AD were intended to minimize the potential hazards associated with operating the airplane in severe icing conditions by providing more clearly defined procedures and limitations associated with such conditions. Chalk's Ocean Airways had complied with this AD on July 6, 2000 by inserting a copy of the AD Note in the airplane flight manual.

AD 97-13-03, AD requires revising the Airplane Flight Manual (AFM) to prohibit positioning the power levers below the flight idle stop, and to provide a statement of consequences of positioning the power levers below the flight idle stop. This amendment was prompted by incidents and accidents involving airplanes equipped with turboprop engines in which the propeller beta was used improperly during flight. The actions specified by this AD were intended to prevent loss of airplane controllability, or engine overspeed and consequent loss of engine power caused by the power levers being positioned below the flight idle stop while the airplane is in flight. Chalk's Ocean Airways had complied with paragraph (a) of this AD on August 6, 1997 with 22,420.2 hours on the airframe.

AD 87-25-08, To prevent jamming of the elevator control system, within 15 days after the effective date of the AD, visually inspect the overlapping contact surface between the elevator control torque tube arm, P/N 109410, and the elevator up stop bolt hex head, P/N G19-5-22, in accordance with Frakes Aviation Service Bulletin G-73-FA26, dated May 1, 1987 (hereinafter referred to as SB G-73-FA26), or later FAA-approved revisions. On June 5, 1987 with 14,591.5 hours, Chalk's Ocean Airways had found Frakes Aviation SB G-73-FA26 was previously complied with.

[6] 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.

## 9.0 Airplane Flight Log Sheets

The maintenance records group reviewed the log sheets from January 1995 to December 1999 and February 2001 to December 18, 2005. Chalk's Ocean Airways could not produce the flight log sheets (numbered 4010 to 4200) from January 2000 to January 2001. There were no open maintenance items in the flight log sheets prior to the accident. The following flight log entries of note were found during the review:

In July 2005, four flight log maintenance record entries (numbered 6172,6173, 6175, 6176) for fuel leaks in the right wing root area. Additionally, in September 2005, three flight log maintenance record entries (numbered 6261, 6262, 6264) for fuel leaks in the right wing dry bay area were noted. The majority of the fuel discrepancies were corrected by removing the existing sealant and applying new sealant.

According to the Chalk's Ocean Airways Director of Maintenance, "The reason there is more than one entry for fuel leaks is that the aircraft fuel tanks in the G-73 T are integral structural fuel tanks (wet wing type). As such, in order to seal the wet wing tank, a sealant compound must be applied in the fuel tank. Once applied, we allow the sealant compound to dry for at least 24 hours after application and then add fuel to the tank to see if the leaks were repaired. If leaks are still present, then we repeat the above process until they are repaired. Also, leaks in the integral fuel tanks may not show seepage for several days, but once they are discovered, the sealant process described above is repeated as evidenced by consecutive work cards referencing fuel leaks."

From 1995 to 2006, numerous discrepancies regarding elevator flutter, elevator vibration, and elevator trim have been documented by Chalk's Ocean Airways pilots. On some of these discrepancies, the records showed maintenance personnel would take several attempts to troubleshoot and rectify these discrepancies.

According to the Chalk's Ocean Airways Director of Maintenance, "The Mallard was designed to land on water and as such, the empennage of these aircraft are frequently in contact with salt water. The original design of the elevator trim tab system spools and jack screws (trim tab actuator), used sealed bearings and multiple moving parts in their complete assembly. In August 2002, Chalk's Ocean Airways hired a Designated Engineering Representative (DER) to re-design the elevator jackscrew for the trim tab system (the trim tab actuator). In October and November 2003, Chalk's together with the DER redesigned the elevator jackscrew and trim tab system spools in an attempt to eliminate the persistent discrepancies regarding this system. In addition on some occasions, after maintenance work was completed, Chalk's would release the airplane for operational check flights under Part 191 (sic) (with no passengers aboard) for the purpose of determining whether the repairs rectified the problem."

There were no maintenance records (i.e. Engineering Order, FAA Form 337, non-routine work order) that indicated that the redesign was installed on the airplane.

See Attachment 3 for further details.

## 10.0 Airplane Technical Logs

The Airplane Technical Maintenance records contain information regarding the airplane's maintenance and maintenance checks. Section 3 of Chalk's Ocean Airways FAA Approved General Maintenance Manual states the maintenance record retention schedule. Chalk's has provided most the records as required by this schedule.

(a) Maintenance records from the date of manufacture through May 10, 1976, Total aircraft time: 7,461.5 flight hours.

(b) Flight logs from January 2, 1995 through December 19, 2005. With the exception of year 2000 flight logs.

(c) Inspection records for the last complete inspection cycle, C1 inspection through C6 inspection.

(d) Inspection records for the current inspection cycle, C1 inspection performed on December 17, 2005.

The maintenance records group was able to review both routine and non-routine record cards for airplane C checks from 2001 through 2005. The following non-routine entries are of note:

(a) August 13, 2003/C3 Inspection/Non-routine Work Card #002195

| | |
|---|---|
| Discrepancy: | "Fuel leak right tank around drain fitting." |
| Corrective Action: | "Right fuel tank leak around fitting repaired and resealed and IAW with GMM." |

(b) May 27, 2003/C5 Inspection/Non-routine Work Card #001880

| | |
|---|---|
| Discrepancy: | "Right fuel tank leak inboard side at STA 48 between skin and spar." |
| Corrective Action: | "Right fuel tank leak repaired, cleaned, sealed and inspected in accordance with Grumman MRM." |

## 11.0 Weight and Balance Summary

Per the Flying Boat Inc. OPS-SPECS, the airplanes are to be weighed every thirty-six (36) calendar months.

The last documented weight and balance summary was accomplished on July 22, 2003 by Chalk's Ocean Airways on Non-routine 001492 contracted to Curtis Yeagle (Designated Airworthiness Representative).

| | |
|---|---|
| Basic Empty Weight: | 9,013 pounds |
| Arm: | 226.82 inches |
| Moment: | 2044335.8 |

See Attachment 4 for further details.

## 12.0 Service Difficulty Reports (SDR)[7]

Chalk's Ocean Airways had 26 Service Difficulty Reports (ranging from July 1982 to January 2005) in its maintenance records; however only 3 records (date range: November 1982 to May 1989) were found in the FAA SDR database for airplane N2969.

According to Chalk's Ocean Airways Director of Maintenance, "Chalk's Ocean Airways' practice has always been to hand-deliver the completed SDR's to the Principal Maintenance Inspector at the Fort Lauderdale Flight Standards District Office (FSDO)."

The breakdown of the SDRs are as follows: Landing Gear/Tires/Brakes (13), Engines (4), Hydraulics (4), Flight Controls (3), Propeller (1), and Structural Corrosion (1).

Of note is the structural corrosion that was reported on December 12, 1991. While performing inspections on the right wing at station 34, the inspector noted some corrosion under the skin and popped rivets. After removing the skin, light to moderate corrosion was found on the top aft beam. On April 13, 1992 a major repair was accomplished to correct the above discrepancy.

A review of the SDR database for both the G-73T and G-73 fleet did not reveal any chronic issues with the fleet.

[7] A Service Difficulty Report (SDR) is a report of the occurrence or detection of each failure, malfunction, or defect as required by 14 CFR 121.703.

## 13.0 Major Repairs and Alterations

(a) On July 2, 2000, a major repair was accomplished to a center wing box lower right skin stringer. The crack was located on the 3rd stringer aft from the wing front spar at wing station 50.5. The repair was accomplished using DER Drawing RT-G7355720.6290. The wing fuel tank was resealed and leak checked in accordance with Frakes Service Manual. At the time of this repair the airplane had accumulated approximately 23,645.9 hours and 29,963 cycles. The time and cycle information was taken from the engine record dated July 6, 2000.

(b) Visual inspection of the aircraft wreckage showed a major repair performed on the lower right wing skin at wing station 34. There was a doubler repair to a long chordwise skin crack just outboard of right wing station 34 consisting of one external and three internal doublers, in close proximity to the wing fracture zone (See Figures 4 through 10 in the Materials Laboratory Factual report 06-010). This repair was a major repair because it meets the requirements per 14 CFR Part 43, Appendix A, Subpart (b).

During the interview with Mr. John Patterson (FAA Designated Engineering Representative used by Chalk's Ocean Airways for the approved repairs on their airplanes), he stated that his calculations showed that the wing skin and stringers carried 70 percent of the load on the wing box section (See Structures Group Factual Report DCA06MA010 page 10, Item 7.2). Since the repair involved riveting a reinforcing skin, or doubler, it met the requirement of a major repair.

Maintenance records provided by Chalk's Ocean Airways did not contain a maintenance record entry for this repair. The FAA Airworthiness Database for N2969 (Blue Ribbon Package) did not indicate a repair was performed in this area. The maintenance records review team was unable to determine who performed this repair, where the repair was performed, when the repair was performed, and what data was used to perform this repair.

(c) On May 6, 1992, a major repair was performed on the left lower wing skin. The repair was done in accordance with Aircraft Engineering and Modification Services Drawing 9212221-01 Rev IR. All work was done at the intersection of wing and fuselage. According to the records, corrosion was the cause of the damage.

(d) On April 13, 1992, a major repair was performed to the right wing upper rear spar cap. The repair was performed in accordance with DER data from Aerospace Testing and Engineering report number 40292 and

drawing number 40492. QC Labs performed an Eddy Current inspection on the area on April 13, 1992.

NOTE: An interview with the both Chief Inspector and Director of Maintenance revealed that when asked what the criteria was for determining if a repair qualified as a major or minor, they said they would call "a big crack, major" but could not state any criteria.

See Attachment 5 for further details.

**14.0 Maintenance Personnel**

There were 11 Airframe and Powerplant mechanics, five Mechanic assistants and one mechanic with an Airframe Certificate. Six of the Airplane and Powerplant mechanics have RII authority. Maintenance personnel worked a day shift and 2nd shift.

**15.0 Vendors**

According to the Director of Quality, Chalk's Ocean Airways used FAA approved facilities to accomplish maintenance on the airplanes, components and appliances. In cases where they needed engineering expertise, they hired a Designated Engineering Representative.

**16.0 Method of Record Keeping**

Chalk's Ocean Airways used flight logs and routine/non-routine work cards to keep track of maintenance of the airplanes. The flight logs were used for recording the flights and non-routine maintenance each flight day and are numbered to allow serialized control.

Routine maintenance, such as C checks, were recorded on checklists using Chalk's Ocean Airways form C.F.008. Discrepancies discovered during the routine checks were documented on Non-Routine forms C.F. 001. Form C.F. 001 is numbered to allow serialized control.

Records were retained in accordance with Section 3, Pages 53034 through 53036 of Chalk's Ocean Airways General Maintenance Manual.

See Attachment 6 for further details.

## 17.0 Manuals

Chalk's Ocean Airways uses the Frakes G-73 Service Maintenance Manual, CAMP Inspection Manual (Rev. 21 dated October 18, 2005), Continuing Analysis and Surveillance System Manual (Volume 12, dated April 9, 2004), Grumman Mallard Service Manual (August 1987), Maintenance Training Manual (Volume 10, Rev. 6 dated April 6, 2005) and Advisory Circular 43.13-1B and 2A to maintain the G-73 fleet.

## 18.0 Procedural Issues

Chalk's Ocean Airways General Maintenance Manual (GMM), (Volume 5, Rev. 19 dated May 24, 2005), contained policy statements and procedures explaining how Chalk's Ocean Airways would meet the requirements of the Code of Federal Regulations. Section 3 of the GMM contained the maintenance policies and procedures used to ensure the airworthiness of Chalk's Ocean Airways airplanes. GMM Section 3, page 53006, Paragraph A, also stated that "Each corrective action will also include a reference to FAA approved data, such as repaired in accordance with GMM, chapter, sec, page or any other FAA approved document applicable to corrective action signoff".

The records review indicated that Chalk's personnel did not follow this section of the GMM. As examples:

(a) On January 24, 2001, on non-routine work card #0756, Item 11, a discrepancy was generated that stated, "Right wing top skin areas 48 STA and STA 62 have five cracks". Additionally, on July 12, 2001, on non-routine work card #0796, item 34, a discrepancy was generated to "Remove and replace loose rivets under right wing at STA 48 and 62". The corrective action entries for the above discrepancies did not follow guidelines set forth in the Chalk's Ocean Airways GMM, page 53006. For example, maintenance personnel failed to provide a reference to FAA approved data as required. In addition, maintenance personnel were to also highlight the difference between non-routine write-ups vs. routine write-ups. These types of discrepancies mentioned above were observed throughout the reviewed maintenance records.

(b) During the inspection of the wreckage, the stringer repair performed on July 6, 2000 indicated that an inspection of the repair after completion was not performed. The rivets used in the repair were not installed in accordance with AC 43.13-1B Section 4, Figure 4-6 (Riveting Practice and Rivet Imperfections), or the engineering data. The DER form 8110-3 did not contain any Instructions for Continued Airworthiness for this repair. Chalk's Ocean Airways did not provide the original discrepancy related to this issue to the team for review.

According to the Chalk's Ocean Airways Director of Maintenance, in late 2001, the FAA Principal Inspector brought the issue (FAA approved data for each corrective action) to their attention. Since then, the mechanics were instructed to document corrective actions taken utilizing data used to perform their task in accordance with acceptable publications.

See Attachment 7 for further details.

## 19.0 Maintenance Issue

The Maintenance Records Group notes the following maintenance discrepancy in the months prior to the accident:

On July 31, 2005, the right and left wing roots were leaking fuel and the aircraft was ferried from PID (Paradise Island, Bahamas) to FLL for maintenance. The airplane was repaired by resealing the leaking areas of the fuel tank. Fuel leaks reappeared again on September 5, 6, and 7 this time in from the right dry bay with corrective actions of resealing the leaking areas (Refer to Attachment 3).

On July 24, 2005, a pilot reported a "slight elevator flutter" with a corrective action of adjustment of the right hand elevator trim tab. On September 12, 2005, a pilot reported another elevator flutter with a corrective action of adjustment of elevator trim tabs. In November 2005, the airplane was written up 9 times for elevator vibrations. The last corrective action was the alignment of the center right hand cowling on November 28, 2005.

Additionally, a comparison of the major repair maintenance records to a visual inspection of the available wreckage revealed the following:

(a) Documentation (FAA Form 337 with 8110-3 & drawing) for the right wing stringer repair of July 6, 2000 was compared to the available wreckage. The following items of interest were found:

1. AN470AD(X)-(X) rivets have undersized shop heads (less than 1-1/2 inch diameter), are over-driven (less than ½ inch diameter in height), or not proper per the standards described in AC43.13-1B Section 4, Figure 4-6 (Riveting Practice and Rivet Imperfections).

2. At an unknown point in time, a large AN470AD6-(X) rivet was added through the skin at the junction of the skin and stringer at the slosh hole (center of stringer repair, stringer failure point). The skin was cracked through the hole.

There was additional work in this area involving the rib to stringer interface, involving angles and blind rivet fasteners, which were not documented in the engineering drawing or FAA Form 337.

(b) There were workmanship or design issues with the right and left lower skin doubler repairs in the vicinity of W.S. 34. As previously stated in the major repair section, maintenance documentation was found for the left wing repair, but none was located for the right wing. These include short fastener edge distance or no edge distance (fastener holes through edge of doubler or filler plate) per the standards of AC43.13-1B Section 4 paragraph 4-57 c. "Rivet Edge Distance" and Figure 4-5 (Rivet hole spacing for single-lap sheet splices); "figure 8" holes (double drilled), and various issues with rivet installation not meeting the standards set forth in AC43.13-1B Section 4 Figure 4-6 (Riveting practice and rivet imperfections).

See Attachment 8 for further details.

**20.0 Program Tracking and Reporting Subsystem (PTRS)**

The PTRS is a subsystem of the FAA's Flight Standards Automation Subsystem and is a database management tool. It establishes a procedure for organizing and tracking Aviation Safety Program work activities (Annual Work Program) assigned to the FAA Aviation Inspectors. A review of the Principal Maintenance Inspector's (PMI) work program cited minor issues (i.e. cleanliness of hanger area and high speed tape being left on the airplane for troubleshooting of a vibration problem) with the Chalks operation.

The work program also revealed that the PMI conducted an FAA mandated Aging Airplane Safety Inspection and Records review on November 4, 2005. Discrepancies were noted by the PMI and corrected by Chalk's Ocean Airways personnel during the combined C5 and C6 inspection performed in November 2005. See Attachment 9 for further details.

Prior to January 2005, the PMI was overseeing four Part 121 carriers (including Chalk's Ocean Airways), one repair station, and four Part 125 operators. Due to regional realignment and his pending retirement, his workload and oversight responsibility was reduced to three Part 121 carriers including Chalk's Ocean Airways. Based on the PMI's assessment during his interview, Chalk's Ocean Airways did a good job of rectifying any outstanding issues/discrepancies that were brought up during FAA inspections in a timely manner.

Pocholo Cruz
Maintenance Records Group Chairman