

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

**June 2, 2000**

**MAINTENANCE RECORDS GROUP CHAIRMAN'S FACTUAL REPORT**

**DCA-00-MA-006**

**A. ACCIDENT**

Location: Atlantic Ocean approximately 60 miles south of Nantucket Island,  
Massachusetts

Date: October 31, 1999

Time: About 0152 Eastern Standard Time (EST)

Aircraft: Boeing 767-366ER, SU-GAP, Egypt Air flight 990

**B. MAINTENANCE RECORDS GROUP**

Chairperson: Frank McGill  
National Transportation Safety Board  
Washington, D.C.

Member: Maher Ismaiel Mohamed  
Egyptian Civil Aviation Authority  
Cairo, Egypt

Member: Abd El-Maseeh Adly Fouad  
Egyptian Civil Aviation Authority  
Cairo, Egypt

Member: Richard Jones  
Federal Aviation Administration  
Renton, Washington

Member: Mohammed Riad El Mansoury  
Egypt Air  
Cairo, Egypt

- Member: Mohamed M. Talaat  
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- Member: Abdel-aziz M. Ebrahim  
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Cairo, Egypt
- Member: Hossam M. Abd El Wahab  
Egypt Air  
Cairo, Egypt
- Member: Jeff Orth  
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Seattle, Washington

### C. SUMMARY

On October 31, 1999, at approximately 0152 Eastern Standard Time,<sup>1</sup> a Boeing model 767-366 ER<sup>2</sup> (767) airplane, SU-GAP, operated by Egypt Air (MSR),<sup>3</sup> as flight 990, and equipped with two Pratt & Whitney (P&W) model 4060 turbofan engines, crashed into the Atlantic Ocean approximately 60 miles south of Nantucket Island, Massachusetts. The flight had departed John F. Kennedy International Airport (JFK), Jamaica, New York, and was en route to Cairo International Airport (CAI), Cairo, Egypt. The previous flight had been from Los Angeles International Airport (LAX), Los Angeles, California, to JFK. Flight 990 was operating in international airspace as a regularly scheduled international passenger service flight under the Convention on International Civil Aviation and the provisions of 14 Code of Federal Regulations (CFR) Part 129, and was on an instrument flight rules (IFR) flight plan. The 4 pilots, 10 flight attendants, and 203 passengers were killed, and the airplane was destroyed. Under the International Civil Aviation Organization (ICAO) treaty, the investigation of an aircraft crash in international waters is under the jurisdiction of the country of registry. At the request of the Egyptian government, the National Transportation Safety Board (NTSB) accepted the lead in the investigation.

On November 9, 1999, the Maintenance Records Group met at the Egypt Air Technical/Operations Building, Cairo International Airport, Cairo, Egypt, to commence the field

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<sup>1</sup> Unless otherwise indicated, all times are Eastern Standard Time, based on a 24-hour clock.

<sup>2</sup> The type design reliability and performance of this airplane has been evaluated in accordance with FAA Advisory Circular 120-42A and found suitable for extended range (ER) operations, when configured in accordance with Boeing Document D6T11604, dated August 1996. This approval is for a two-engine airplane to operate over a route that contains a point farther than one hour flying time at the normal one-engine inoperative cruise speed (in still air) from an adequate airport. The 767 Maintenance Program supports the requirements for a maximum diversion time of 120 minutes.

<sup>3</sup> Three-letter International Airline Decoding Designator assigned on a worldwide basis by the International Civil Aviation organization (ICAO). Egypt Air is assigned "MSR."

investigation. The required historical maintenance references for the MSR fleet, including computer databases relating to the tracking and history of airplane and component maintenance, are located here. The Maintenance Records Group completed the field examination of the records on November 16, 1999.

## **D. DETAILS OF THE INVESTIGATION**

### **1. Egypt Air Flight Operations Specifications**

#### **(a) Egyptian Civil Aviation Authority:**

“Egypt Air”<sup>4</sup> is authorized to conduct air carrier operation by the Egyptian Civil Aviation Authority (ECAA) of the Arab Republic of Egypt, Ministry of Transportation (Certificate Number: MSR10, issued November 1, 1998), in accordance with Egyptian Civil Aviation Regulations (ECARs).

ECAA Noise Certificate Number 52 for SU-GAP lists maximum approved weights as:

|  |                   |
|--|-------------------|
| Maximum Takeoff Brake Release Gross Weight | 181,436 Kilograms |
| Maximum Landing Weight                     | 145,149 Kilograms |

The FAA has assessed Egypt’s ability to provide safety oversight of its air carriers that operate in the United States as Category I.<sup>5</sup> The assessments are not an indication of whether individual foreign carriers are safe or unsafe, rather they determine whether or not foreign civil aviation authorities are in place and the extent to which those authorities ensure that operational and safety procedures are maintained by their air carriers.

Egypt Air’s fleet, listed on the D85 certificate (identifies type and number of airplanes), consists of the following:

|            |                       |
|------------|-----------------------|
| B777-266   | 2                     |
| B767-366ER | 2 (SU-GAP and SU-GAO) |
| B747-366CF | 2                     |
| B737-566   | 5                     |
| B737-266   | 3                     |
| B707-366F  | 2                     |

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<sup>4</sup> “Egypt Air” is the Air Operator Certificate name for the national air carrier of Egypt. It consists of a Flight Operational Division and a Maintenance (Technical ) Division. The air carrier was established in 1932 as Misr Airwork, and later changed to Misr Air in 1946. In 1958, MISR Air was transformed to a multinational state airline with the merger of Syria, and became United Arab Airlines (UAA). The airline kept this name until 1971, even though Syria left the airline in 1961, when it took its present name. Egypt Air is a 100% state owned company.

<sup>5</sup> Category I rating indicates that Egypt’s civil aviation authority has been assessed by FAA inspectors and found to be able to license and oversee air carriers in accordance with ICAO aviation safety standards. Note: The FAA has established three ratings for the status of these civil aviation authorities: (I) complies with ICAO standards, (II) conditional, and (III) does not comply with ICAO standards.

|               |   |
|---------------|---|
| A300-B4-203-F | 2 |
| A300-622R     | 9 |
| A320-231      | 7 |
| A321-231      | 4 |
| A340-200      | 3 |

(b) International Civil Aviation Organization:

The regulations of the ECAA are also in accordance with the standards and recommended practices contained in Part 1(International Commercial Air Transport), Annex 6 (Operation of Aircraft) to the Convention on International Civil Aviation (fifth edition-July 1990) of the International Civil Aviation Organization (ICAO).

The ECAA was assessed initially under the ICAO voluntary safety oversight assessment program from March 23-27, 1997. An assessment follow-up audit was performed March 21-25, 1999. A review of the audit summary report, dated June 11, 1999, did not reveal any findings that may have affected the ECAA in its ability to carry out oversight responsibilities in maintenance practices or procedures concerning aircraft airworthiness.

The aircraft registration prefix of MSR is established by ICAO under Annex 7 (Aircraft Nationality and Registration Marks). The prefix characters of registration designated to all MSR airplanes are "SU."

(c) United States Department of Transportation/Federal Aviation Administration:

Egypt Air operates under the provisions of Title 14 Code of Federal Regulations (CFR) Part 129, within the United States in accordance with ICAO regulations and Economic Authority regulated and authorized from the United States Department of Transportation (DOT). Federal Aviation Administration (FAA) Certificate Number: EGYF 529D was issued on February 19, 1966, with the last noted status change occurring on June 6, 1997.

Authorized regular airports are JFK and LAX, with nine other alternate airports designated on Operations Specifications (Foreign Flag Air Carrier).

## **2. Egypt Air Technical Repair Station Operations Specifications**

"Egypt Air Technical"<sup>6</sup> is authorized to operate an approved maintenance repair station by the Egyptian Civil Aviation Authority (ECAA) of the Arab Republic of Egypt, Ministry of Transportation (Certificate Number: CAI/Egypt Air/AS/01/98, issued November 1, 1998), in accordance with Egyptian Civil Aviation Regulations (ECARs).

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<sup>6</sup> "Egypt Air Technical" is the Certificate of Approval name for the Maintenance Repair Station, which has a separate certificate from the airline. However, it is also the maintenance division of MSR.

Note: Egypt Air Technical is not FAA approved, nor has it requested certification under Title 14 CFR Part 145 “Foreign Repair Station” requirements.

Egypt Air Technical maintains MSR’s approved maintenance program, including the reliability program authorization. The Boeing 767-300 maintenance program is prepared in accordance with the Technical Procedures Manual (TPM) and Boeing 767 Maintenance Planning Document (MPD) satisfying ECAA requirements for 767-300 operation (Approval Number: CAI/MS/B767-300/M.P./Revision [1]/99) dated March 18, 1999.

The repair station has the following “Limited”<sup>7</sup> ratings: airframe, powerplant, avionics, instruments, accessories, and special services. The airframe ratings include Airbus model A300, A320, A321, A340, and Boeing model 707, 737, 747, 767, and 777 airplanes. The powerplant engine ratings include: Pratt & Whitney JT3D-7, JT8D-17, JD9D-7R4, 4060, 4090, 4158, International Aero Engine V 2500, and General Electric CF6.

The ECAA approved Operations Specifications (Parts A, B, C, and D), which included standards, terms, conditions, and limitations, were reviewed.

No United States contractors are listed on MSR’s D77 (Maintenance Contractual Arrangement Authorization for entire Aircraft) Operations Specifications.

AAA Aircraft Component Services (Landing Gear), Miami, Florida, is the only United States contractor listed on MSR’s D78 (Maintenance Contractual Arrangement Authorization for Specific Maintenance) Operations Specifications.

MSR’s D81 (Parts Pool Agreement Authorization) lists 16 airlines, which includes four carriers located at JFK airport, on the Operations Specifications. No participants are listed at LAX.

### **3. Airplane History**

|  |   |
|--|---|
| Type:                                    | Boeing 767-366ER (extended range)   |
| Minimum Crew:                            | 2 (pilot and copilot)   |
| Manufacturer, (Boeing Airplane Company): | The first flight of a 767-300ER was on February 1988. As of October 1999, 524 Boeing 767-300’s have been built, with 39 on order. |

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<sup>7</sup> The ECAA issues “Limited” ratings to repair stations to perform maintenance, preventive maintenance, or alterations to specific aircraft areas and components, by make, model, or process.

|  |  |
|--|--|
| Airplane delivered new to Egypt Air:       | September 26, 1989, with two model Pratt & Whitney (P&W) 4060 engines (P724126 and P724133).                           |
| Egyptian Registration:                     | SU-GAP   |
| Factory Serial Number:                     | 24542  |
| Fuselage Line Number:                      | 282  |
| Delivery Vendor Number Variable:           | VN212  |
| Interior Configuration:                    | 10 First Class, 22 Business Class, and 185 Economy Class. Crew rest areas not dedicated.<br>Total Passenger seats: 217 |
| ECAA Required Number of Flight Attendants: | 5  |
| Total Airplane Hours:                      | 33,354   |
| Total Airplane Cycles:                     | 7,594  |

#### **4. Type Certificate Data Sheet**

FAA "Type Certificate Data Sheet"<sup>8</sup> number A1NM (revision 16, dated September 1, 1998) for Boeing 767-300 series airplanes was reviewed for compliance conditions and limitations. No discrepancies were noted.

FAA "Type Certificate Data Sheet" number E24NE (revision 7) for Pratt & Whitney (P&W) model PW4000 engines was reviewed for compliance conditions and limitations. No discrepancies were noted.

#### **5. Engines: PW4060 Turbofan**

The PW4060 is an axial-flow, dual-spool, single stage fan, four-stage low pressure compressor, eleven-stage high pressure compressor, annular combustor, two-stage high pressure turbine, and four-stage low pressure turbine bypass turbo engine. It has a 60,000 pound (lb) thrust rating, and is flat rated at 92°F inlet temperature, with a bypass ratio of 5:1.

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<sup>8</sup> The document that prescribes conditions and limitations under which the product, for which the type certificate was issued, meets airworthiness requirements.

|                                 | <u>Engine Position 1</u><br>(Left Side) | <u>Engine Position 2</u><br>(Right Side) |
|---------------------------------|---|--|
| Serial Number (SN)              | 724126                                  | 724127                                   |
| Time Since New (TSN)            | 25,708 hours                            | 19,316 hours                             |
| Cycles Since New (CSN)          | 5,888 cycles                            | 4,475 cycles                             |
| <br>                            |   |  |
| Date of Installation on SU-GAP  | April 19, 1998                          | June 3, 1998                             |
| Time Since Installation (TSI)   | 4,866 hours                             | 4,768 hours                              |
| Cycles Since Installation (CSI) | 1,306 cycles                            | 1,281 cycles                             |

(a) Engine (724126) was removed from SU-GAO, position 2, by Egypt Air in CAI, on February 2, 1997, with TSN 20,842 hours and CSN 4,582 cycles, for high pressure compressor (HPC) upgrade and complete refurbishment. It was sent to SR Technics LTD (SR Technics), Zurich, Switzerland, for maintenance repair. Airworthiness authority approvals for the repair station include Joint Aviation Requirements (JAA) Certificate Reference Number FOCA-001, with P&W 4000 series engines.

It was noted by SR Technics that the engine was disassembled as necessary, refurbished, modified, inspected, reassembled, and tested in accordance with P&W engine manual procedures. Wear and tear were found to be above average; however, they were in line with total time/cycles accumulated, and conditions in which the engine was exposed. No deposits were found from the initial filter and magnetic-plug inspections.

An engine test run was performed on November 14, 1997, and the engine was released for service on November 19, 1997.

The SR Technics Engine Condition Report and Engine Test Summary Log were reviewed, and no discrepancies were noted.

(b) Engine (724127) was removed from SU-GAP, position 1, by Egypt Air in CAI, on March 7, 1997, with TSN 14,548 hours and CSN 3,194 cycles for specified upgrades and total restoration. It was sent to SR Technics for maintenance repair.

SR Technics noted that the engine was disassembled as necessary, refurbished, modified, inspected, reassembled, and tested in accordance with P&W engine manual procedures. Wear and tear were found to be generally normal for a high time engine, and no deposits were found from the initial filter and magnetic-plug inspections.

An engine test run was performed on February 18, 1998, and the engine was released for service on the same day.

The SR Technics Engine Condition Report and Engine Test Summary Log were reviewed, and no discrepancies were noted.

## 6. Maintenance Time Limitations

Scheduled maintenance checks are approved by the ECAA (MSR Operations Specifications D88), and are in accordance with the Boeing 767 Maintenance Planning Data (MPD)<sup>9</sup> document.

|   |  |
|---|--|
| <u>Transit Check:</u>                     | Before each flight.  |
| <u>After Landing Check (ALC):</u>         | After each arrival to base.                                  |
| <u>Daily Check:</u>                       | Every 48 hours that the airplane is in service.              |
| <u>Ramp Check:</u>                        | Every 8 days (calendar).                                     |
| <u>Check "A" Systems and Multiples:</u>   | Every 500 flying hours and multiples.                        |
| <u>Check "A" Structure and Multiples:</u> | Each 300 cycles, with the nearest "A" system check.          |
| <u>Check "C" Systems and Multiples:</u>   | Every 6000 flying hours or 18 months, whichever comes first. |
| <u>Check "C" Structure and Multiples:</u> | Every 3000 cycles or 18 months, whichever comes first.       |

## 7. Airframe Maintenance Check Summary

(a) The last "Transit Check" was completed on October 30, 1999, in JFK. No discrepancies were noted. Included in the check was the inspection of engines for damage, latch security, and fluid leakage.

(b) The last "A Check" was completed on October 4, 1999, in CAI, with total hours 33,140 and total cycles 7,533. Minor discrepancies included:

- (1) Total cycles were not noted on the Maintenance Check Certification Cards, even though a space was provided. However, cycle data is computerized and was available.
- (2) An open item (nonroutine card number 007811) noted a 1- by 1-inch section of skin damage on the number two engine-pylon that received temporary repair.
- (3) On the post check inspection, high-speed tape was used to cover a number two engine pylon-access latch. A replacement latch (part number 9284-4) was not available, and the temporary action resulted in an open item.

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<sup>9</sup> The Boeing 767 Maintenance Planning Data (MPD) document provides maintenance planning information necessary for each 767 operator to develop a customized scheduled maintenance program.

(c) The last “6C Check” was completed on May 2, 1998, in CAI, with total hours 28,587 and total cycles 6,313. The check included the following events: flight data recorder was sent to the avionics shop for repair, the three landing gears were removed and sent to a repair facility for overhaul, the lower thrust reverser (TR) actuator on the number two engine was replaced because of a hydraulic leak, and a worn left side lower blocker-door hinge on the number two engine TR was replaced. Minor discrepancies included:

- (1) On the post check inspection, the positive pressure-relief valve test (maintenance task card 21-010-01) was not accomplished because tester and/or spares were not available. The check was not accomplished until September 1998.

## **8. Weight and Balance Summary**

All MSR aircraft must be weighed at least once every 36 consecutive months, as authorized by ECAA E96 (Weight and Balance Control Procedures) Operations Specifications.

SU-GAP was last weighed on September 17, 1998, in CAI. The results were:

|                     |                                    |
|---------------------|------------------------------------|
| Basic Empty Weight: | 189,213 pounds or 85,826 kilograms |
| Arm:                | 964.157 inches                     |

Up until the time of the accident, there were no corrected or amended summaries issued to change the master weighing.

## **9. Airframe Airworthiness Directive Compliance Summary**

The Airframe Airworthiness Directive (AD)<sup>10</sup> report, issued by MSR’s technical division for SU-GAP, was reviewed. The document denotes the subject matter of the AD, methods of compliance, status, and times and dates of repeating intervals. All applicable ADs were reviewed for compliance and the following were reviewed in detail: AD 86-22-11R0, AD 88-07-02, AD 90-01-09R0, AD 90-18-04R0, AD 91-13-10R1, AD 93-05-13CR0, AD 93-13-01R0, AD 94-12-10R0, AD 94-12-10R0/SB 767-78A0046/SB 767-78-0051/SB 767-78-0062R2, AD 96-19-10R0, AD 97-02-19R0, AD 97-19-15R0, AD 98-07-13R0, AD 98-07-26R0, and AD 98-13-12R0. No discrepancies were noted.

## **10. Engineering Change Orders/Service Bulletins/Fleet Campaign Directives**

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<sup>10</sup> 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.

Engineering Change Orders (ECOs)<sup>11</sup> listed on the MSR document by Airline Transport Association's (ATA)<sup>12</sup> code were reviewed. The document classified the titled ECO by mandatory, alert, or recommended status. Boeing and other vendor Service Bulletins (SBs)<sup>13</sup> were identified by number or reference and date of accomplishment. No discrepancies of the ECOs or any significant repairs were noted.

ECO number B767-1165R1, referencing AD 96-06-09 that upgrades the Engine Indication and Crew Alerting System (EICAS), was completed on May 6, 1997.

The following SBs by ATA codes were reviewed in detail: 22 (Autopilot), 23 (Communications), 27 (Flight Controls), and 28 (Fuel). The accomplished SBs on SU-GAP included: 22A0097, 22A0092, 22-0074, 22-0062, 22-0042, 22-0038, 27-0142, 27-0135, 27-0134, 27A0159, 27-0126, 27-0127, 27A0122, 27-0117, 27-0111, 27-0104, 27-0103, and 27-0102.

There were no MSR Fleet Campaign Directives (FCDs)<sup>14</sup> noted on Boeing 767 airplanes.

## **11. Time Controlled Components**

Time Controlled items listed on the Boeing 767 maintenance program, including task card number, MPD document number D622T001, part/serial numbers, and time interval, were reviewed. The listing by task card noted categories (inspection, functional check, restoration, or discard), and component manufacturer's recommendations. Engines, including auxiliary power unit (APU), and landing gear component life limitations for task requirements were also reviewed. No MSR time intervals exceeded MPD recommendations. No discrepancies were noted.

Time Controlled Components, including engines, APUs, and landing gear, on SU-GAP were reviewed. The listing included a description, life limits, part/serial numbers, and installation date with total hours and cycles. No discrepancies were noted.

## **12. Minimum Equipment List**

The Egyptian Civil Aviation Authority (ECAA) approved Revision 24a (dated March 1999) of the Boeing 767 Master minimum Equipment List (MMEL)<sup>15</sup> for Egypt Air on October

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<sup>11</sup> Engineering Change Order (ECO) is an authorizing document created by the MSR engineering to perform modifications, alterations, new installations, technical evaluations, and other support equipment requirements to an aircraft.

<sup>12</sup> Airline Transport Association (ATA) system designations are numbers used to standardize a tracking format in aircraft maintenance.

<sup>13</sup> A Service Bulletin (SB) is issued by the manufacturer of an aircraft, engine, or component that describes a service procedure the manufacturer recommends to make the device safer, or to improve its service life.

<sup>14</sup> A Fleet Campaign Directive (FCD) is authorized by MSR engineering to initiate and record the results of special inspections or actions on an aircraft, engine, or component.

<sup>15</sup> The Master Minimum Equipment List (MMEL) is a FAA approved document, with participation by the aviation industry, intended to assist airline operations and maintenance organizations in developing the procedures required to operate aircraft in various nonstandard configurations. It is also intended to permit operation with inoperative

20, 1999 (approval number: CAI/MS/B767-300/MEL/REV.3/99). This revision was FAA approved on August 27, 1999. Due to the limited content of the MMEL revision, Boeing did not issue a change at this time to the 767 Dispatch Deviation Guide (DDG)<sup>16</sup>.

Note: Boeing issued a message to all 767 operators on November 10, 1999, concerning an error in the DDG concerning dispatching procedure with an inoperative auto-cabin pressure system.

### **13. Maintenance Reliability Program**

Reliability Program Authorization listed on Operation Specifications (Paragraph 74: Entire Aircraft) and (Paragraph 75: Airframe, Powerplant, Systems, or Selected Items) for the 767 was approved on November 1, 1998, (Certificate Number MSR10) by the ECAA. The authorization allows the use of a maintenance reliability program that contains standards for determining maintenance intervals and processes, and controls the inspection, check, and overhaul times.

Provisions for task oriented maintenance performed under MSG-3<sup>17</sup> processes are included on 767s, 777s, 300-600s, 320s, 321s, and 340s. MSG-2<sup>18</sup> processes are applied on 737s, 747s, and 300-4Bs.

The Reliability Control Board (RCB)<sup>19</sup> action items status from RCB #9, November 2, 1998 to RCB #13, dated October 13, 1999, were reviewed. There were no significant actions referencing Boeing 767 airplanes, and no action items from the latest RCB #13 report.

The Maintenance Records Group reviewed 2 years of system data. The last published System Reliability Report was from August 1998 to August 1999. No unacceptable trends or discrepancies were noted. The report included data on each fleet airplane regarding general statistics, technical delays, dispatch reliability, pilot reports, unscheduled engine removals, and

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items of equipment for a period until repairs can be accomplished. In order to maintain an acceptable level of safety and reliability, the MMEL establishes limitations on the duration of and conditions for operation with inoperative equipment. It is the basis for development of individual operator MELs that take into consideration the operator's equipment configuration and operational conditions.

<sup>16</sup> A Boeing document that assists airlines in developing procedures required to operate airplanes in various nonstandard configurations allowed by the MMEL and Configuration Deviation List (CDL).

<sup>17</sup> The Maintenance Steering Group (MSG) task force is an active participation of government and industry efforts to supply process and decision logic used to develop maintenance program development, which provide retention of safety and reliability, or provide economic benefit. Since 1993, this task force has been designated MSG-3R2. From MSG-3 logic, the FAA establishes the Maintenance Review Board (MRB) document that outlines initial minimum maintenance/inspection requirements for the airframe, engines, systems, and components. The airplane manufacturer then develops a Maintenance Planning Data (MPD) document that provides maintenance planning information necessary for each operator to develop a customized scheduled maintenance program.

<sup>18</sup> MSG-2 is an earlier process-oriented analysis and decision logic that was developed before MSG-3 task-oriented analysis that is used on later model aircraft.

<sup>19</sup> The Reliability Control Board (RCB) is an audit and standards committee of permanently selected senior maintenance members that govern the reliability program operation, including evaluation proposals and any changes to the program. The RCB meets once a month (representatives from the ECAA are invited) and board minutes are published.

in-flight shutdowns. Dispatch reliability was nearly 94%, and there were no engine in-flight shutdowns or technical incidents<sup>20</sup> in the last 12 months for either of the two 767 airplanes. The airline averaged 4.67 technical delays per month during this period.

SU-GAP had three technical delays in June 1999. The delays were: landing gear oleo strut seal leaking (repacked seal), left and right engine EEC mode and both N1 mode fault lights on (reset probe heaters circuit breaker), and a fuel leak from the number two engine (fuel-filter main packing replaced).

SU-GAP had two technical delays in July 1999. The delays were: left hand shock strut oil-seal leaking and hydraulic leak from brake unit (brake unit de-activated).

Mandatory Investigation Action Reports, including recommendations, are issued from the Maintenance Control Center as part of the data collection, and are reviewed by Quality Control and Engineering. If actions are required, the report is sent to the RCB for decision. RCB reports from November 29, 1997 to August 23, 1999, were reviewed on airplane SU-GAP. The last system report was issued on August 23, 1999, because of a hydraulic leak from the right elevator power control actuator; no further action was required. The last engine report was issued on March 18, 1999, relating to the right engine thrust reverser isolation-valve light. Broken sensors were replaced and no further action was required.

Alert notices of Pilot Reports<sup>21</sup> from the fourth quarter period of 1997 until the second quarter period of 1999 were reviewed for 767 airplanes. Alert notices noted by ATA code were: two ATA 21 (air conditioning), one ATA 28 (fuel), one ATA 29 (hydraulic power), two ATA 30 (ice and rain protection), one ATA 34 (navigation), one ATA 49 (air borne auxiliary power), and one ATA 52 (doors).

The Maintenance Records Group reviewed 1 year of component reliability. The last published report was for the third quarter of 1999. A vendor description of the component, with part number and ATA code, included removal rate and "alert value."<sup>22</sup> No discrepancies or unusual rates were noted.

Component alert notices from the third quarter period of 1997 until the second quarter period of 1999 were reviewed for fleet 767 airplanes. One ATA 31 code (instruments) and two ATA 34 code (navigation) alerts were noted.

#### **14. Quick Access Recorder**

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<sup>20</sup> Any event of a technical nature, which may be considered to significantly affect the airworthiness of the airplane.

<sup>21</sup> A Pilot Report is any condition entered into the technical log by the flightcrew that requires corrective action by maintenance.

<sup>22</sup> An "alert value" is an upper control limit that is established to provide a signal that an investigation is required to determine the cause and identify corrective action.

The Quick Access Recorder (QAR)<sup>23</sup> part number 981-6103-002, serial number 375, was installed on SU-GAP on April 30, 1999. The unit had been overhauled and tested on April 4, 1999, by Egypt Air Technical, using ECAA authority for airworthiness tag approval.

## **15. Supplemental Type Certificates/Type Design Modification**

There were no Supplemental Type Certificates (STCs)<sup>24</sup> or Type Design Modifications (TDMs)<sup>25</sup> listed on the airplane.

## **16. Thrust Reverser**

A lower thrust reverser (TR) hydraulic leak on engine number one was discovered on October 27, 1999, in CAI, after the airplane returned from Kuwait (KWI). A nonroutine card (number 001629) was issued to inspect and repair as necessary. Because of a hydraulic leak from the lower actuator (part number-S315T360-31) and another actuator not being available, the TR was deactivated per MEL 78-31-01.

SU-GAP was dispatched on October 28, 1999, from CAI to Beirut, Lebanon (BEY) and back to CAI. Inspection for the hydraulic leak was repeated in CAI, and it was found that the lower non-locking actuator was still leaking. Nonroutine card (number 007786) was issued to remove the hydraulic tube (part number-315T3602-7), which was a return line between the center actuator and the lower actuator. Both actuators were capped (part number BACC14AD06), and a leak checked was performed. No TR flight indications or discrepancies were noted before or after the deactivation.

The airplane was dispatched on October 28, 1999, from CAI to Rome, Italy, (FCO) and then back to CAI. A nonroutine card (number 007480) was issued to check hydraulic leakage from the capped lower and center TR actuators. No evidence of leakage was found.

Following these events, SU-GAP was dispatched from CAI to Khartoum, Sudan (KRT) and then back to CAI on October 29, 1999. The airplane was dispatched from CAI to FCO and then back to CAI on October 29, 1999. No further reports of TR actuator hydraulic leakage or anomalies were noted.

The airplane was then dispatched from CAI to JFK, JFK to LAX, and LAX to JFK on October 30, 1999. The TR stayed deactivated, with no further noted problems.

### Note:

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<sup>23</sup> QAR is a maintenance recorder mounted in the electronic equipment center located below the main cabin floor just aft of the nose gear wheel well. The recorder allows maintenance personnel to quickly access information for troubleshooting.

<sup>24</sup> A certificate issued by the FAA authorizing a major change or alteration to aircraft, engine, or component that has been built under an approved type certificate. However, the change is not so extensive as to require a new type certificate.

<sup>25</sup> A design modification that requires a new type certificate or an amendment of the original type certificate.

On May 2, 1998, both engines on SU-GAP were “functionally”<sup>26</sup> checked (Boeing card number 78-431-C1-1 and C1-2) to verify the status of thrust reverser sync-locks.<sup>27</sup> This check satisfied the requirements in AD 94-12-10. MPD task item numbers were N78-34-13-A and N78-34-13-B.

## 17. Deferred Maintenance Log Discrepancies

There were two deferred log items listed on SU-GAP at the time of the accident:

- (a) The number one engine thrust reverser was deactivated by Egypt Air Technical at CAI, due to the lower right hydraulic actuator leaking, on October 28, 1999 (defect log number 004961, maintenance log number 002500). The deactivation was referenced by MMEL 78-31-1.
- (b) On October 29, 1999, defect log number 004962 was issued because the tail skid drag shoe paint was scratched. A tail skid/strike conditional inspection (MM 05-51-32, page 201) was performed. Because MSR determined that the discrepancy did not affect the safe operation of the airplane, the tail skid was noted as serviceable, and the drag shoe was scheduled to be repainted at the next check.

## 18. Aircraft Technical Log Sheets

Aircraft Technical Log Sheets were reviewed from July 29, 1999, to October 30, 1999. No significant discrepancies were noted. The last 15 days of flights noted the following discrepancies:

- (a) October 18, 1999: There is evidence of tail skid contact with the ground (log 0002477). Maintenance action: Tail skid found to be serviceable. Item to be repainted at next check.
- (b) October 21, 1999: The right radio altimeter is inoperative (log 0002484). MEL per 34-33-1. Maintenance action performed on October 24, 1999 (log 0002492): Right radio altimeter receiver/transmitter antennas replaced. System checks normal.
- (c) October 27, 1999: Engine number one thrust reverser has a hydraulic leak at lower TR actuator (log 0002500) and no spare is available. Maintenance action: Number one TR deactivated per MEL 78-31-1.

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<sup>26</sup> A “functional test” is a quantitative check to determine if one or more functions of a system perform within specified limits.

<sup>27</sup> The thrust reverser sync-lock is a means to detect and prevent latent failures of reverser components to ensure integrity of the system. There are two sync-locks for each engine thrust reverser, and they are installed on the lower non-locking hydraulic actuator of each thrust reverser sleeve.

(d) October 29, 1999: Captain's loudspeaker erratic (log 000158). Maintenance action: Volume control cleaned. Checks normal.

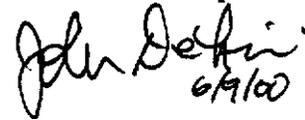
(e) October 30, 1999: Number 8 tire flat upon arrival at LAX (log 001560). Maintenance action: Replaced number 7 and number 8 tire and wheel assemblies. Both unserviceable tires placed in bulk cargo bin deflated.

## 19. Service Difficulty Report Data

FAA Service Difficulty Reports (SDRs)<sup>28</sup> were reviewed from all operators flying 767 airplanes for the following ATA system codes: 22 (autopilot), 27 (flight controls), 76 (engine controls), and 78 (engine exhaust) for 1998 and 1999. Accident and Incident Data from all operators flying 767 airplanes between 1990 and 2000 was also reviewed. No maintenance trends or anomalies were noted that were considered relevant to the circumstances of this accident.



Frank McGill  
Maintenance Records Group Chairman



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<sup>28</sup> Service Difficulty Report (SDR) is an FAA summation of a 'mechanical reliability' report, which is submitted by an aircraft operator or maintenance facility, as required by regulation.