

No. 18

The Flying Tiger Line Inc., Lockheed Super Constellation 1049H/02-03, N 6923C  
ditched in the North Atlantic, 23 September 1962. Civil Aeronautics Board (U.S.A.),  
Aircraft Accident Report, File No. 1-0028 released 13 September 1963.

1. Historical1.1 Circumstances

Flight No. 8816-23-923 (FT 923) was a non-scheduled Military Air Transport Service contract Flight No. BRAF 019/23 originating at McGuire Air Force Base, New Jersey (U.S.A.) for Rhein Main Airport, Frankfurt, West Germany, via Gander, Newfoundland. The flight to Gander was routine.

A crew change was made at Gander, and the aircraft left for Frankfurt on an instrument clearance at 1709 hours GMT with a crew of 8 and 68 passengers aboard. It was to maintain flight level 110.

Having encountered light icing en route the flight changed to flight level 130 and then to flight level 210 which it reached by 2010 hours. Shortly after arriving at this new altitude, and approximately eight minutes past the precomputed Equal Time Point, a fire warning occurred on the No. 3 engine, and its propeller was feathered. The engine failure was reported to Gander Radio and Gander approved the request to descend to flight level 90, the highest altitude which could be maintained in 3-engine configuration at the computed aircraft weight. About six or seven minutes after the No. 3 engine was shut down and shortly after the flight engineer returned to the cockpit after examining the fire in No. 3 engine, the No. 1 engine oversped to 3 300 rpm. This occurred when the flight engineer inadvertently closed the No. 1 engine firewall shutoff valve. No. 1 engine was also shut down, and its propeller feathered. Maximum except take-off (METO) power was then established on engines Nos. 2 and 4 in order to maintain a minimum rate of descent. Repeated attempts to restart No. 1 engine were unsuccessful.

The flight engineer determined that the 2-engine configuration at the computed weight of the aircraft precluded flight above flight level 50.

At approximately 2025 hours the co-pilot reported Nos. 1 and 3 propellers feathered, requested flight level 50 and an escort. It was the captain's opinion that the weather conditions at Keflavik, Iceland, eliminated its use as an emergency field and so the flight stated it was proceeding to Shannon. Fuel was not dumped as the captain believed that there would be an insufficient safety margin if this were done.

At 2045 hours the flight requested sea conditions from Gander Radio and they were relayed to FT 923 as: wind from 260° at 28 kt; primary swells from 260° true, 8 to 12 ft high; secondary swells from 300° true, 8 ft high.

Two aircraft were diverted to intercept FT 923 Riddle 18H, a DC-7 on an eastbound flight, was asked by Gander at 2050 to alter its course and at 2103 hours Prestwick asked MATS 33246, on a westbound flight, to do likewise.

At about 2115 hours a fire warning on No. 2 engine occurred. Power was reduced, and the warning ceased. Power was reapplied to about 1 or 2 inches of manifold pressure less than METO power. Course was altered for Ocean Station Vessel "Juliett", which was 480 NM away. A further fire warning for No. 2 engine was experienced, power was further reduced and the warning stopped. Power was increased to slightly less than the previous power setting, and the co-pilot called Shannon to inform them that the flight would be unable to maintain flight level 50.

After encountering trouble with No. 2 engine, all attempts to restart engine No. 1 were discontinued.

On reaching flight level 30, altitude was maintained at about 150 kt IAS, with METO power on No. 4 engine and reduced power on No. 2 engine.

At 2154 hours, No. 2 engine failed, but its propeller was not feathered in the hope that hydraulic pressure might be maintained by windmilling. The captain informed the passengers that a ditching was to take place. By that time MATS 33246 was in visual contact with FT 923 and so was Riddle 18H, three minutes later.

The captain obtained a radio altimeter reading of 3 100 ft from the navigator and set his altimeter to that reading. The aircraft was turned to the left to ditch on a heading of 265°. Halfway through the turn the flight controls "froze", and the captain commenced to disengage the hydraulic control boost. The flight engineer immediately actuated the hydraulic crossover switch and restored boost pressure with the secondary hydraulic system, whereupon the controls responded normally. The aircraft was lined up on the desired heading and power was reduced on No. 4 engine so that directional control could be maintained.

Flaps were used throughout the final approach; with the selection of first 60%, then 80% and finally 100%. Just before impact the captain put the landing lights on and cut No. 4 engine. The nose of the aircraft was brought up to parallel the face of an approaching swell, into which the ditching was accomplished.

The aircraft was ditched in darkness at 2200 hours GMT approximately 560 NM west of Shannon, Ireland. There was only one deceleration during water contact, and it was described as severe.

Following the second engine failure the senior stewardess was briefed by the flight engineer on the ditching procedures. She then briefed the other stewardesses and conducted a ditching drill with the passengers. Knives and flashlights were collected and distributed to certain passengers with special duties, such as opening emergency exits and launching life rafts. Most of the stewardesses did not have knives or flashlights as required. As there were differences between the instructions given by the stewardesses and those contained in the ditching folder inside the pocket behind each seat regarding the correct position to be assumed for ditching, some passengers became confused and when the aircraft ditched they did not assume the correct ditching position. Furthermore, no final signal to "brace" for water contact was given and several passengers and stewardesses were seated in an upright position at the time of impact.

The emergency life raft stowed in the crew compartment had been placed in front of the left rear main exit door where it was tied down. In addition to this 25-man raft the aircraft carried four other 25-man life rafts which were stored in four compartments, two in each wing aft of the rear spar. None of these were seen by the survivors during the evacuation. The only raft used was the one that had been in the crew compartment. Fifty-one persons boarded the raft including the captain, the navigator and one stewardess. Three passengers on the raft died, either on the raft or shortly after being rescued.

Aircraft were overhead continuously from the time of the ditching until rescue approximately six hours later by the merchant ship Celerina.

1.2 Damage to aircraft

The aircraft was destroyed.

1.3 Injuries to persons

Five crew and twenty-three passengers perished in the accident.

2. Facts ascertained by the Inquiry

2.1 Aircraft information

A comprehensive review of the maintenance records of the aircraft indicated compliance with all applicable Airworthiness Directives.

At the time of departure from Gander the aircraft's gross weight was well below the authorized limitations, and the load was properly distributed.

2.2 Crew information

The pilot-in-command, age 44, held a valid airman's certificate with airline transport pilot privileges and was properly rated for the Lockheed Constellation. He had flown a total of 17 500 hours of which 4 300 were on L-1049 aircraft. He had flown 247.4 hours including 172.9 on L-1049s in the last 90 days and 72.6 hours, including 41.2 on L-1049s in the last 30 days.

The co-pilot, age 27, held a valid airman's certificate with commercial airplane single and multiengine land and instrument privileges. He had flown a total of 2 430 hours of which 350 were on L-1049 aircraft. He had flown 184.3 hours in the last 90 days; 65.8 hours in the last 30 days.

The flight engineer, age 30, had a total of 3 750 flying hours, of which 2 450 hours were on L-1049 aircraft. He held a valid airman's certificate with commercial pilot privileges, a flight engineer certificate and an airman's certificate with airplane and powerplant ratings. He had flown 85.6 hours in the last 90 days and 83.2 hours in the last 30 days.

The navigator, age 32, had a total of 7 500 flying hours of which 4 500 were on L-1049 type aircraft. He held a valid airman's certificate with navigator rating. He had flown 236.7 hours in the last 90 days and 74.3 hours in the last 30 days.

### 2.3 Weather information

The following surface weather observation was available from Ocean Station Vessel Juliett at 2100 hours on 23 September:

"position, 52° 30'N, 19° 54'W, partly cloudy (4/10 cloud cover), bases of cumulus and stratocumulus 2 000 ft and 3 500 ft, scattered cirrus, visibility 12-1/2 miles, air temperature 55° F, sea temperature 58° F, dewpoint 41° F, pressure 1021.2 mb, wind northwest 15 kt, pressure rising, past weather partly cloudy. Waves from west-northwest, period 5-7 seconds, 8 ft high waves from west-southwest, period 7-9 seconds, 13 ft high."

The pilot of Riddle 18H, which was flying over the scene at the time of the ditching, indicated that there were scattered clouds in the area, bases near 2 000 ft, tops near 3 000 ft, the weather was good and there was no moon.

### 2.4 Navigational aids

N/A

### 2.5 Communications

The aircraft was in contact with Gander and Shannon during the flight, and messages were relayed to it by other aircraft sent to the area.

### 2.6 Aerodrome installations

N/A

### 2.7 Fire

Shortly after the climb to flight level 210 the captain reported a No. 3 engine fire warning. The fire warning ceased immediately one bank of fire extinguishant was discharged. The engine was checked visually from a cabin window and a residual fire was reported burning in No. 3 power recovery turbine stack. The engineer believed it would go out, and this must have occurred since there was no further difficulty with this engine. Shortly thereafter No. 1 engine oversped.

About one hour after No. 1 engine was stopped the first of a series of No. 2 engine fire warnings came on. Intermittent showers of sparks were observed emitting from No. 2 engine. The last shower of sparks was more prolonged and culminated in an engine fire and violent failure.

## 2.8 Wreckage

N/A

## 3. Comments, findings and recommendations

### 3.1 Discussion of the evidence and conclusions

Based upon information developed in the course of the investigation the ETP (Equal Time Point) utilized was in error in excess of one hour. However, since the error was in favour of continuing flight toward Shannon, which was preferable under the circumstances, it is not considered a causal or contributing factor in the sequence of events which ultimately led to the ditching.

The engine failures could not be related to improper maintenance, overhaul or contamination of fuel. The information available indicates the circumstances of the engine failures were unrelated and each is treated separately.

#### No. 3 engine

The essential facts pertinent to the No. 3 engine failure are:

- 1) fire warning with no other cockpit indication;
- 2) subsequent awareness of loss of oil with no information regarding when or at what rate the loss occurred;
- 3) No. 3 PRT (power recovery turbine) location exhaust stack fire; and
- 4) although not conclusive, some testimony indicating sparks trailing rearward.

The circumstances suggest a No. 3 PRT failure involving both the oil seals and some turbine wheel rotational interference with possibly the former preceding and initiating the latter. Although such a failure is not compatible with the reported almost total depletion of the No. 3 engine oil without warning, it was considered to be the most likely cause of the No. 3 engine fire warning.

#### No. 1 engine

The overspeed which prompted the stopping of the No. 1 engine was accepted without question. The only clue to account for the overspeed was the reported "reopening" of the No. 1 emergency shutoff valve control lever, as observed by the captain, with the assumption that it had been closed. It was concluded oil was turned off long enough, probably 30 to 60 seconds, to cause initial "oil starvation" damage and subsequent seizing of the engine and concurrently to starve the propeller of oil which is essential to maintaining rpm control. Oil starvation for more than a minute is expected to cause gross engine damage with subsequent seizure at shutdown unlikely.

The operation of the firewall shutoff valve is in the immediate action portion of the Flying Tiger Line checklist and the captain testified that he would expect the flight engineer to accomplish this operation without command from him. However, in view of the time element between the failure of engines No. 3 and No. 1, it is unlikely that the No. 1 firewall shutoff valve was actuated prior to the flight engineer's return to the

cockpit after checking on the fire in the No. 3 engine. The delay in operating the firewall shutoff valve was probably due to the fact that the flight engineer had been hired by The Flying Tiger Line only a short while before this flight and had very limited experience with their procedures. (This is in marked contrast to his substantial amount of experience with another carrier whose procedures refer to the operation of the firewall shutoff valve in the "cleanup" portion of the checklist.) It appears likely that, with residual fire in the exhaust stacks of the No. 3 engine, and the pilot's decision not to discharge the second fire bottle, the action on the emergency procedures was resumed upon the flight engineer's return to the cockpit. At this time the No. 1 firewall lever was mistakenly moved instead of No. 3. With the resulting overspeed of the No. 1 engine, the flight engineer apparently recognized the mistake and was in the process of correcting it when observed by the captain.

The captain did not observe the tachometer reading, but the co-pilot reported to the captain later that the maximum rpm reached was 3 300. Overspeed to this extent is not in itself damaging to the engine. It is believed that the propeller pitch lock functioned.

From the captain's testimony it was evident that he was not fully aware of the safety features of the pitch lock system, or he may not have feathered the engine immediately, thereby retaining power on this engine. Also, Flying Tiger Line operations personnel and the Federal Aviation Agency Air Carrier Operations Inspector assigned to the company demonstrated their lack of knowledge and appreciation for the features and applicability of the propeller pitch lock. Testimony indicated that scope and emphasis on training in this area was lacking.

#### No. 2 engine

All instrument indications on No. 2 engine were normal until the final failure. The reported circumstances of this powerplant malfunction and failure did not reflect an obvious cause. The series of fire warnings suggested an exhaust system leak becoming progressively more extensive. Intermittent showers of sparks observed emitting from the engine conceivably were the result of exhaust flames contacting the aluminum cowl and/or the cylinder fins. The final failure and fire very likely resulted from some kind of gross cylinder failure, probably initiated by repeated and progressive damage from a leaking exhaust assembly.

The captain's choice of ditching heading, based on the wind and sea state information, was not in accord with the procedures outlined in the approved Flying Tiger Manual or with the procedures recommended by the U.S. Coast Guard or Air Sea Rescue Manuals. He stated he chose a heading of 265° magnetic to land into the wind. This was based on forecast information passed to him during his descent which indicated that the winds were approximately 28 kt from 260° and the primary swell was from 260°, 8 to 12 ft in height. Wind directions given in forecasts such as this are true headings and the magnetic variation which was 20° in the area of the ditching should have been taken into account. Therefore, the ditching was not made parallel to the anticipated primary swell, as recommended, nor was it made into the forecast wind as the captain desired.

While the captain elected to land into the face of a swell, based on his opinion that the interval between swells offered a better ditching situation than those specified in the Flying Tiger Line Manual, this procedure is not recommended because of the potential aircraft destruction.

Failure of the left wing at impact deprived the survivors of the life rafts stowed therein. The reason for the loss of the right wing rafts was not clear from testimony. Difficulty encountered in opening the right rear over-the-wing exit may have contributed.

Some of the preparations which time and circumstances did permit prior to the ditching were not carried out. Furthermore, there is no evidence that such were considered.

### 3.2 Probable cause

The probable cause of this accident was the failure of two of the aircraft's four engines, and improper action of the flight engineer, which disabled a third engine, thereby necessitating a ditching at sea.

### 3.3 Recommendations

The unavailability of the wing life rafts led the Board to question the advisability of their being externally stowed. Their unavailability can be attributed to the loss of the left wing and/or the increase in inflation time resulting from the decrease in the temperature of the CO<sub>2</sub> after prolonged flight at high altitude.

Consideration should be given to improving the life rafts lighting systems so that in high seas, such as were encountered here, they could more easily be found. In addition, automatically actuated lights should be required on all life jackets.

Many survivors had considerable trouble inflating their jackets since they could not find the CO<sub>2</sub> cartridge lanyard. There were also many reports of difficulty in swimming with the inflated jackets even though they had been previously checked for tightness by the stewardesses. Consideration should be given to improving the basic design of these jackets.

The above recommendations have been forwarded to the Administrator of the Federal Aviation Agency for consideration.

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