

CIVIL AERONAUTICS BOARD

AIRCRAFT ACCIDENT REPORT

ADOPTED: September 14, 1960**RELEASED:** September 20, 1960

U. S. OVERSEAS AIRLINES, INC., C-54-G, N 4000A, NEAR THE
U. S. NAVAL AIR STATION, JACKSONVILLE, FLORIDA, OCTOBER 15, 1959

SYNOPSIS

At approximately 2105 e. d. t., October 15, 1959, a U. S. Overseas Airlines C-54-G, N 4000A, a cargo flight, was ditched in a small lake, caught fire, and sank in 10 feet of water approximately eight minutes after takeoff from the U. S. Naval Air Station, Jacksonville, Florida. The two pilots, the only occupants, were seriously injured.

U. S. Overseas Airlines, Inc., operates both 6- and 8-fuel-tank C-54's, which have different fuel selector positions. The 6-tank system has a 2-position wing tank selector; the main tank positions are forward and the off positions are rearward. The 8-tank fuel system, which N 4000A had, has three tank selector positions; the auxiliary tank positions are forward, the main tank positions are center, and the off positions are rearward.

The accident was caused by fuel exhaustion due to the inadvertent positioning, prior to takeoff, of the four fuel selectors to the nearly empty auxiliary tanks. During the four or more minutes that power was being lost, first on the No. 4 engine, then No. 3, then No. 2, the crew made no effort to reposition the fuel selectors to the full main tanks.

As a result of this accident the company has blocked off the No. 2 and No. 3 tank selectors from the auxiliary positions on all 8-tank aircraft. Also, a large placard has been placed directly in front of the fuel tank selectors in all C-54 aircraft stating whether the aircraft has a 6- or 8-tank fuel system. The C-54 checklist has also been revised to require a response after MAIN TANKS of "Full Forward" on the 6-tank system, and "Center Position" on the 8-tank system.

Investigation

N 4000A was engaged in a "Quicktrans" scheduled U. S. Navy contract cargo flight which originated in Oakland, California, the previous day. Captain Jewell Reid and Copilot Gordon Cole were scheduled to make the flight from Jacksonville to MCAS Cherry Point, North Carolina, with a stop at Charleston, South Carolina.

N 4000A, flown by a different crew, arrived at Jacksonville NAS from Dallas at 1750.^{1/} The two new crew members arrived for duty at 1800. The copilot completed the

^{1/} All times are eastern standard based on the 24-hour clock. All distances in nautical miles and altitudes are mean sea level.

military Form 175 flight plan and the weight and balance record. The captain was briefed on the weather and conducted the aircraft preflight check. The aircraft was being refueled at the time of the preflight check. Approximately 10 minutes later the captain drained the fuel tank sumps onto the ramp and observed no evidence of fuel contamination. The captain then required that some of the cargo tie-downs be retied. The gross weight at takeoff was 66,501 pounds, 7,299 pounds under the allowable maximum gross weight.

The IFR flight plan was direct to Jacksonville via Victor Airway 3 to Ritter intersection and Victor Airway 185 to Charleston with Norfolk, Virginia, as the alternate airport. Jacksonville weather at departure was broken clouds at 2,500 feet, 10,000 feet overcast; visibility three miles in fog and smoke.

The preflight engine start, engine runup, and the takeoff at 2057 on runway 090 were normal. The Jacksonville-Imeson Airport departure control cleared the flight direct Jacksonville, Victor 3 to Brunswick, Georgia, maintain 5,000 feet, climb on runway heading to 1,500 feet until further advised.

The crew stated that following takeoff the gear retraction, power reduction, flap retraction, and radio communications were routine. Upon reaching approximately 1,400 feet altitude the No. 4 engine surged. No. 4 throttle was retarded and again advanced but surging continued and the manifold pressure fell off. A check of the instrument panel revealed that all instruments were normal except the No. 4 fuel pressure and fuel flow which fluctuated. No fuel warning light was observed. The use of carburetor heat and selection of the low and high fuel booster pumps did not improve the conditions.

At 2101, N 4000A advised the FAA Imeson Airport departure control at Jacksonville it was having trouble with No. 4 engine and requested permission to circle east of Jacksonville Naval Air Station at 1,500 feet. This was approved. At 2103, N 4000A requested a radar vector back to Jacksonville Naval Air Station. The pilot was instructed to turn to a heading of 275 degrees. Subsequently, the following clearance was given to N 4000A: Cleared to Navy Jacksonville low frequency range, maintain 1,500 feet, stand by this frequency. Neither the clearance nor the radar heading was acknowledged by the pilot. At 2105 the radar blip of N 4000A disappeared below the horizontal capabilities of the Imeson Airport departure control radarscope.

Following loss of No. 4 engine, the pilot initiated a left turn towards the 275-degree heading suggested by departure control. During the turn the No. 4 cylinder head temperature decreased; the cowl flaps were then closed, and the captain had just decided to feather the propeller when the No. 3 engine began to surge. Feathering of No. 4 propeller was deferred and the captain called for METO power instead. This power could not be obtained as No. 3 engine continued to surge. Approximately five seconds later No. 2 engine began surging. During the emergency the copilot stated, "I think we must have taken on jet fuel. It acts like a C-46 did when they were given jet fuel." During this time the copilot reached over and checked the position of the fuel selectors but the captain does not remember whether they were moved from their positions.

The flight crew did not notice the engine instrument readings after the No. 4 engine difficulty nor did they notice whether there was a loss of power from No. 1 engine.

The aircraft was descending rapidly and an attempt was made to ditch on a small lake directly ahead. Several trees were struck in the attempt and the aircraft hit the water, wings level and in a tail-low attitude, on a heading of 25 degrees.

The aircraft came to rest on a 290-degree magnetic heading in 10 feet of water approximately 300 feet from the lake's western shore and 280 feet from its southern shore, with approximately 80 percent of the fuselage submerged. Fire consumed the upper fuselage down to the top window line between fuselage stations 129 to 621.

Sections and small pieces of the left and right wings, including the ailerons, and pieces of the left and right stabilizers were found strewn along the approach path. All four separated propellers were in the shallow water near the lake's southern shore on and to the right of the approach path centerline.

Investigation of the aircraft, prior to moving the wreckage, revealed that the fuel tank selector valves were in the auxiliary tank positions. Examination of the fuel lines, fuel screens, fuel filters, and available fuel pumps revealed no restrictions in the fuel flow to the four engines or evidence of failure prior to impact. There was no evidence of mechanical malfunction, failure, or fire involving any part of the aircraft prior to impact and no evidence of crew incapacitation prior to impact. A check of the aircraft records revealed that there were between 25 to 50 gallons of fuel in each of the four auxiliary fuel tanks when the crew accepted the aircraft. Only the main fuel tanks were filled during the refueling operation at the Jacksonville Naval Air Station and no additional fuel was added to the auxiliary fuel tanks. Investigation and analysis of fuel samples from the servicing units and storage tanks disclosed no contamination by foreign materials at the time of servicing the aircraft.

U. S. Overseas Airlines, Inc., had the following fleet.

- 7 C-54-B-DC aircraft (6-Fuel Tank System)
- 5 C-54-E-DC aircraft (8-Fuel Tank System)
- 1 C-54-G aircraft (N 4000A) (8-Fuel Tank System)
- 2 DC-6A aircraft
- 2 DC-6B aircraft

All of these Douglas aircraft have somewhat similar fuel systems. Among the differences between the C-54-B and the E and G are the number of fuel tanks installed and the tank selector handle positions. The fuel selector positions for the 6-tank C-54's are: REAR - OFF; FORWARD - MAIN TANKS. The fuel selector valve positions for the C-54 8-tank system are: REAR - OFF; CENTER - MAIN TANKS; FORWARD - AUXILIARY TANKS.

The checklist in the aircraft was of the rotative type and was found set at a point indicating that it had been rolled past the following items: PREFLIGHT; ENTERING AIRCRAFT; PRESTARTING; START ENGINES; and PRETAXI. The prestarting and pretakeoff checklist section relating to fuel tank selector settings are as follows:

PRESTART - MAIN TANKS (Type System) - ON

PRETAKEOFF - MAIN TANKS (Note Type System) - ON

In addition, the following placards were found on the instrument panel above the fuel selectors:

"CAUTION - Before takeoff, check operation of each engine on all eight main and auxiliary tanks "

"Takeoff on main tanks, cruise on auxiliary tanks, then back to main tanks for landing."

The company operations manual specifies that fuel will be used out of auxiliary tanks to an indicated minimum of 50 gallons and that remaining fuel may be used one tank to an engine at a time.

No reference was found in the operations or flight manuals regarding the different configurations of C-54 fuel system and fuel selector positions.

Captain Reid had flown C-54 aircraft 7,303 hours, 6,500 of which were as captain. The flight records of Captain Reid indicated that since his employment with U. S. Overseas Airlines July 21, 1958, he had completed 240 flying hours in C-54-B series aircraft and 233 flying hours in C-54-E and G aircraft. His last previous flight was in a C-54-E series aircraft.

Copilot Cole had a total flying time of 9,024 hours, of which 255 hours were in C-54 aircraft. He had flown 69:45 hours in C-54 aircraft during the previous 30 days. He had flown a total of 209 hours in C-54-B series aircraft and 46:55 hours in C-54-E and G series aircraft.

The recorded weather at the time of the accident was: broken clouds at 2,500 feet, 10,000 feet overcast; visibility three miles in fog and smoke. However, according to verbal statements of the captain, the actual weather was scattered clouds with visibility unlimited and the moon fully visible. A U. S. Navy aircraft circling the wreckage shortly after the accident reported weather conditions as broken clouds at an estimated 3,000 feet and visibility 10 miles.

Analysis and Conclusions

An analysis of all evidence indicates that the accident resulted from fuel exhaustion due to positioning the fuel tank selectors to virtually empty tanks prior to takeoff. The 25 to 50 gallons of fuel in each auxiliary tank was sufficient to take off and reach the accident site and the No. 1 fuel tank contained slightly more fuel than the others. It is also obvious that the copilot did not move the fuel selectors during the emergency, as considered possible by the captain, but mistakenly considered himself to be in a 6-fuel-tank aircraft and believed, therefore, that the forward fuel selector positions were correct for the main fuel tanks and merely made sure that they were positioned to the forward detents as found.

The flight crew suspected improper or contaminated fuel but that area was thoroughly explored and completely eliminated by the various laboratory analyses of fuel samples and investigation of airport fuel handling and dispensing. The main fuel tanks were filled to a total of 951 gallons but the four auxiliary fuel tanks were not. Only 25 to 50 gallons of fuel remained in each of these tanks as indicated by the gauges when checked by the previous flight crew.

While it is not unreasonable for the captain to have considered the possibility of improper fuel as a reason for the loss of power, the Board believes it should not have been accepted to the exclusion of fuel starvation. Fluctuation of fuel pressure and fuel flow should have alerted the captain to the actual difficulty, particularly

in view of the surging of the engines and the fact that the fuel boost pump did not remedy the condition, and the fact that the low cylinder-head temperatures eliminated the possibility of the presence of jet fuel. Switching fuel selectors to another tank should normally be one of the first acts of a pilot after a sudden decrease of fuel pressure and fuel flow. In addition, Captain Reid had four or more minutes to analyze his problem before impact.

Probable Cause

The Board determines that the probable cause of this accident was incorrect fuel system management, resulting in a power loss in three engines.

BY THE CIVIL AERONAUTICS BOARD:

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/s/ CHAN GURNEY
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S U P P L E M E N T A L D A T A

Investigation

The Civil Aeronautics Board was notified of the accident shortly after it occurred. An investigation was immediately initiated in accordance with the provisions of Title VII of the Federal Aviation Act of 1958.

Air Carrier

United States Overseas Airlines, Inc., holds a temporary CAB certificate of public convenience and necessity to operate as a domestic Supplemental Air Carrier which expires March 30, 1961, and FAA Air Carrier Operating Certificate No. NY-1, authorizing irregular air carrier passenger and cargo operations. The carrier's principal operating and maintenance base is located at Oakland Municipal Airport, Oakland, California.

Flight Personnel

Captain Jewell Reid, age 45, was employed by U. S. Overseas Airlines on July 21, 1958, as a copilot in C-54 aircraft following his retirement from the U. S. Navy where he was a naval aviator in transport-type equipment. He held a currently effective airman certificate with airline transport and other appropriate ratings. His last first-class physical was completed April 3, 1959. He was upgraded to reserve captain on February 6, 1959, and to captain on August 28, 1959. He had a total of 12,166 flying hours, 7,303 of which were in C-54 type aircraft. He had flown a total of 216 hours within the last 90 days, all of which were in C-54 type aircraft. He had completed the required ground school tests, instrument, and proficiency checks.

Copilot Gordon Cole, age 37, was employed by U. S. Overseas Airlines on July 16, 1959. He held an airman certificate with commercial privileges and single-engine land rating. His last second-class physical was completed July 27, 1959. He had a total of 9,024 flying hours, 255 of which were in C-54 type aircraft. He had completed the required ground school tests, instrument, and proficiency checks.

The Aircraft

Douglas C-54-G, N 4000A, serial number 36063, was purchased by U. S. Overseas Airlines from the U. S. Air Force on November 16, 1955, and was of a cargo configuration. It had a total flying time of 19,269 hours, 10,543 hours since the last major overhaul. Nos. 1 and 4 engines were Pratt & Whitney R-2000-D-5 twin Wasps. Nos. 2 and 3 engines were Pratt & Whitney R-2000-7M2 twin Wasps. No. 1 engine had 17,531 total hours, 895 hours since last overhaul. No. 2 engine had 6,506 total hours, 591 hours since last overhaul. No. 3 engine had 17,630 total hours, 799 since last overhaul. No. 4 engine had 16,754 total hours, 357 hours since last overhaul.