

No. 11

Turkish Airlines, F-28, TC-JAO, accident at Izmir/Cumaovasi, Turkey,
on 26 January 1974. Report No. T-5-199, not dated, released by the
Ministry of Communications, Turkey.

1.- Investigation1.1 History of the flight

On 24 January 1974, the aircraft completed the flights Istanbul/Izmir/Athens/Izmir normally. The aircraft and crew remained overnight in Izmir.

On 25 January aircraft flights, number TK-301 Izmir/Istanbul and TK-304 Istanbul/Izmir, were completed without incident. Later, on the same day, flight TK-309 departed Izmir for Istanbul but, owing to bad weather conditions at Yesilkoy Airport, returned to Izmir. Then, after completing an Izmir/Athens/Izmir flight the same crew and aircraft remained overnight at Izmir/Cumaovasi Airport.

On 26 January at 0507 GMT (0707 local) the aircraft was ready for the Izmir/Istanbul flight with the same flight crew. Having completed ground servicing, filed a flight plan, and boarded passengers the pilot-in-command made his aircraft walk-around inspection. At this time the station manager gave the weight and balance sheet to the pilot-in-command.

Shortly after closing the doors and receiving tower permission the aircraft was taxied to the threshold of Runway 35 and began a rolling take-off without delay. According to witnesses the aircraft had run approximately 3 200 ft before becoming airborne. When about 8 to 10 m above the ground it yawed to the left and pitched nose-down. Contact with the ground was made in a nearly level attitude, first by the outboard fairing doors of the left wing flap, then by the left side of the fuselage belly, hitting the bank of a drainage ditch, which parallels the left (west) side of the runway at a distance of 28 m from the runway. The aircraft then disintegrated and caught fire within 100 m of travel.

Airport personnel and others who witnessed the accident ran towards the site and tried to assist in personnel evacuation. The airport fire department, helped by the fire services of the city of Izmir and of a nearby military airport, was able to control the fire and then extinguish it. Simultaneously the injured crew members and passengers were taken to hospital for medical care.

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	4	60 adult 2 infant	-
Non-fatal	1	5 adult 1 infant	-
None	-	-	

1.3 Damage to aircraft

The aircraft was destroyed by the impact and subsequent fire.

1.4 Other damage

None.

1.5 Crew information

The Pilot-in-command, aged 37, married, was the holder of a valid airline transport pilot licence with F-27, F-28 and instrument ratings. He graduated from the Air Force Academy in 1958 and had 2 600 flight hours, including F-86, F-104 and T-34 jet time. In 1970 he resigned from the Air Force to join Turkish Airlines. He received F-28 training in the Kingdom of the Netherlands and in Turkey, and became a captain in 1972. In 1973 he was qualified as an F-28 check pilot. He had accumulated 1 903 flight hours in F-27 and 577 in F-28 aircraft.

The Co-pilot, aged 36, married, was the holder of a valid airline transport pilot licence with F-28 and instrument ratings. He was a graduate of the Air Force Academy. When he resigned from the Air Force in 1973 he had a total flying experience of 2 794 hours including C-47, Viscount, C-54 and H-19 helicopter time. In 1973 he joined Turkish Airlines and completed F-28 training in the Kingdom of the Netherlands. Before the accident he had flown 395 hours, all in F-28 aircraft.

1.6 Aircraft information

The aircraft, serial number 11057, was built in 1972 by Fokker-VFW NV. It met requirements and Airworthiness Certificate L-1954 was issued on 23 November 1972 by the Netherlands Civil Aviation Authority. Also a type certificate for F-28 aircraft was granted by the U.S. Federal Aviation Administration. A Turkish Airworthiness Certificate was issued to this aircraft and it was registered as TC-JAO on 9 January 1973 with annual renewal. According to the records the Airworthiness Certificate was valid until 13 December 1974 and there had been no damage sustained and no unusual mechanical difficulties encountered prior to the accident. Relevant documents revealed that all periodic inspections and required maintenance had been performed. Examination of the weight and balance document showed that prescribed limits were observed. No contamination of the JET A-1 fuel supply was found. Shortly before departure the aircraft was checked by the pilot-in-command and ground technicians by a walk-around inspection.

1.7 Meteorological information

According to reports issued by the Cumaovasi Airport Meteorological Office the weather conditions were as follows:

Hour	Visibility	Wind	Temperature	Clouds	Pressure	Humidity
0445 GMT	7 km Slight fog	200°/02 knots	0°/0°C	1/8 So 3 000 1/3 Ac 10 000 3/8 Ci 20 000	1 022.0 mb 30.18 in	97%
0545 GMT	5 km Slight mist	310°/02	0°/-1°C	1/8 So 3 000 2/8 Ac 10 000 3/8 Ci 20 000	1 022.2	95%

According to reports issued by Cigli Airport Meteorological Office (approximately 15 km distant) the temperatures and humidities recorded there were as follows:

Date	Hour	Temperature	Humidity
25 Jan 1974	2100 GMT	4/3	91%
26 Jan 1974	0100 GMT	1/-1	91
26 Jan 1974	0400 GMT	0/-2	95
26 Jan 1974	0500 GMT	3/2	97
26 Jan 1974	0700 GMT	6/1	90

1.8 Aids to navigation

Not applicable; however, at Izmir there are navigation aids, such as VOR and NDB. Inspection revealed that those aids were in normal operation and there were no NOTAM pertaining to them.

1.9 Communications

Normal VHF communications existed between the aircraft and the tower. Permission to taxi and take-off was obtained.

1.10 Aerodrome and ground facilities

a) Aerodrome. Cumaovasi Airport has one runway, 17/35, which is asphalt covered, 150 by 6 005 ft. On its east side, 150 m from the runway edge the terrain begins a gradual rise. On the west side, approximately 28 m from the runway and parallel to it, there is a drainage ditch having an average depth of 1.3 m. Near the north end of the runway and 50 m west of it there was a gravel pile 7 to 7.5 m high. South of this, but 150 m from the runway, was a quantity of empty 50 gallon drums stacked 2 to 3 m high.

b) Fire and rescue facilities. Cumaovasi Airport has two jeeps, each one carrying 136 kg of dry chemical dust and one fire fighting truck with a capacity of 400 litres of foam and 4 tons of water. There was one ambulance equipped with four 20 kg CO₂ bottles. On the date of the accident the fire fighting truck was inoperable but the other vehicles were serviceable and used. In the fire fighting and rescue team there were two drivers and three firemen on duty. Off-duty personnel in the area also participated in the rescue operation.

The fire fighting trucks and ambulance were situated in front of the hangar and were ready when the aircraft engines were started. The take-off and accident were seen by the firemen and the alarm was given also by the tower operator. The fire fighting team arrived promptly at the scene of the accident and began fire fighting and rescue operations. Ten minutes later one fire fighting team arrived from the Gaziemir military airport and one from the city of Izmir. They were of considerable help in putting out the fire in the total time of 30 minutes.

Military and civilian personnel in the area assisted in sending the injured crew and passengers to hospitals.

1.11 Flight recorder

The aircraft was equipped with flight recorder Sundstrand UCDD Model FA-542, S/N 4606. It was found in good condition and sent to the U.S. National Transportation Safety Board for analysis. The following data was provided by the read-out:

Recording was started before take-off and lasted for 1.30 minutes, until the time of the accident.

Elevation - The height record did not show any real elevation but the fluctuation in static pressure and the statement of witnesses indicated that the aircraft reached a height of approximately 8 to 10 m above the ground.

Velocity - The airspeed indicator line started recording 3 seconds before the aircraft was lined up with the runway heading which indicates a rolling take-off was made. The maximum recorded speed was 133 KIAS. In the last 4 seconds the line was found to be meaningless.

Magnetic heading - The heading trace shows that take-off was on Runway 35. In the total recording time of 20 seconds the aircraft heading had veered left to 289 degrees at power cut-off time. The airspeed, when heading change occurred, was 124 KIAS.

1.12 Wreckage

Examination of the accident site

Inspection showed that the aircraft had a ground run of 3 200 ft, became airborne to an altitude of about 8 to 10 m, then banked to the left and first hit the ground slightly with the left wing flap outboard fairing doors. After 16.5 m of travel the left wing was raised and for 45 m was in apparently level flight. Then it banked left and touched the ground again with the fairing doors. Thereafter, the left side of the fuselage belly contacted the bank of the drainage ditch which was 50 cm above the runway surface. Shortly afterwards impact with the ground ruptured the left wing fuel tank and fire started.

From that point, aircraft disintegration began and the tail and engine empennage separated from the fuselage, overtaking it and striking the forward fuselage between the cabin and cockpit sections. This resulted in separating the cockpit from the passenger cabin. The main fuselage turned upside down. The nose section, passenger door and a part of the service door scattered ahead of the fuselage's final travel and came to rest in the stack of empty drums (mentioned in 1.10).

Detailed inspection

As shown in the attached sketch* the aircraft diverted heading 45 degrees to the left on reaching a point 4 050 ft down the runway; after hitting the bank of the ditch the aircraft disintegrated within 100 m and caught fire. The main fuselage, wings and some other parts burned out completely where they were scattered.

During disintegration the nose wheel spar went 30 m to the left of the fuselage and one tire from the main landing gear came off and travelled 110 m eastward. Flap actuator spindles were found in a burned-out condition. Subsequent examination of the spindles substantiated symmetric flap extension of 18 degrees.

1.13 Physical and pathological information

The physical condition of each pilot was satisfactory according to 6 month periodic medical certificates prepared by government hospitals designated by the Ministry of Health. Both the pilot-in-command and co-pilot licences were renewed according to these medical reports. Examination of these reports revealed no evidence of any diseases.

1.14 Fire

As explained above, the aircraft was destroyed by fire except for the tail, engine and cockpit sections.

1.15 Survival aspects

The accident was not survivable. Because of the quick starting fire, which spread over the accident site, it was not possible to save all passengers and crew with the attendant fire fighting and rescue facilities.

1.16 Tests and research

Some parts and components, listed below, were taken from the wreckage and sent to the appropriate manufacturer for testing and examination. The results showed no failures and normal functioning before the accident.

Parts and components sent to Rolls-Royce

Fuel flow
Fuel backing pump (LP)
Fuel pump (HP)
Air flow control
Regulator
Top temperature control actuator
Low pressure governor

*ICAO Note: Sketch not reproduced.

Parts and components sent to Fokker-VFW

Lift dumper manifold
Elevator booster unit
Tension regulator
Elevator gust lock unit
Auto pilot elevator servo unit
Stabilizer control unit
Rudder control unit
L.H. aileron control unit
Voice recorder tape

In addition, two stick shakers were tested in Turkish Airlines' facilities and found normal.

2.- Analysis and Conclusions2.1 Analysis

The aircraft remained overnight at Cumaovasi Airport in an open area. In the morning, 26 January at 0400 GMT, the temperature was 0 degrees C and the relative humidity was 95 per cent. When the take-off was made the temperature had reached +3 degrees C and the humidity 97 per cent. In that weather condition some frost accretion existed on the upper wing surfaces and elevators. (The same kind of frost occurred on the wings of another F-28 waiting at the apron at the same hours next day under almost the same meteorological conditions.)

During the walk-around inspection prior to take-off, frost formation was not noticed. It is quite possible that the temperature on the wings and tail of an aircraft parked overnight in the open could be even lower due to radiation.

The length of Cumaovasi runway is 6 005 ft. According to the temperature and to the load of the aircraft a run of 2 800 ft is required to reach V_1 and V_R . Indications of the flight data recorder were that the aircraft became airborne when it reached 124 kt and a 3 200 ft run. The data recorder also showed that the speed of the aircraft reached 133 kt then dropped to 124 kt when it veered left. This indicates that the aircraft was rotated more than the normal angle of attack. It is believed that the frost accretion on the wings caused the aircraft to stall soon after take-off, whereas it would have flown safely in normal conditions.

Because of the low altitude after take-off the pilot could not recover from the stall.

2.2 Conclusionsa) Findings

1. The aircraft was in an airworthy condition.
2. The pilots were properly licensed and rated.
3. Periodic maintenance checks had been performed.
4. The Cumaovasi Airport is suitable for F-28 aircraft operation.

5. The fire fighting team and equipment were not adequate for a large fire.
6. Examination of the same type of aircraft which remained overnight at Cumaovasi, on the day following the accident, showed frost accumulation on the wings with more on the left wing than on the right one, which was towards the buildings.
7. Subsequent detailed examination of the parts and components removed from the wreckage showed no defects.
8. It was learned that on 25 February 1969 an F-28 of another airline, experienced a stall on take-off attributable to frost on the wings.
9. Examination of a sample of hydraulic oil taken from the wreckage revealed that the oil was dirty but it was not contributory to the accident.
10. Inspection of oil spot samples taken from the runway showed no evidence of having originated from this aircraft.

b) Cause or
Probable cause(s)

The aircraft stalled on take-off due to over-rotation and frost accretion on the wings.