ACCIDENT REPORT

NO. 04/365

FEDERAL MINISTRY OF AVIATION
FEDERAL SECRETARIAT SHEHU SHAGARI WAY P.M.B. 5012 WUSE, ABUJA

REPORT ON THE ACCIDENT TO THE CHANCHANGI AIRLINES'S BOEING 737-200 AIRCRAFT REGISTERED YU-ANU WHICH OCCURRED AT KADUNA AIRPORT ON SUNDAY THE 22ND OF FEBRUARY, 1998.

FINAL REPORT ON THE ACCIDENT TO THE CHANCHANGI AIRLINE'S BOEING 737-200 AIRCRAFT REGISTERED YU-ANU, WHICH OCCURRED AT KADUNA AIRPORT ON SUNDAY THE 22nd OF FEBRUARY 1998.

Aircraft Data.

Type:	Boeing 737- 200
Serial No.	24139
Registration:	YU-ANU
Date of manufacture:	April 1988
Engine Type:	Pratt and Whitney JT-8D-15
Owner:	Aviogenex
Owner's address:	Narodnih heroja 43 11070 Belgrade. Yugoslavia.
Operator:	Chanchangi Airlines Nigeria Ltd. 2, Sambo Close, Kaduna.
Place of Accident:	Taxiway out of runway 23.
Time of accident:	16:23 UTC.

1. HISTORY OF FLIGHT:

The aircraft completed a flight from Lagos through Abuja to Kaduna and was parked for over an hour when at 14:45 UTC, the Chief Pilot of Chanchangi Airline Ltd. approached the Air Traffic Controller personally that he would like to fly around the circuit for a training flight. He was told that the visibility was 600 meters which was below the landing minima and was then advised against it. The Pilot then suggested that he would carry out a "Rejected Take-Off' training.

At 15:37 UTC. He requested a take off clearance which was granted, and was directed to proceed to the holding point of runway 05. At the holding point the pilot gave the number of souls on board as 24 and a fuel endurance of 4 hours.

The prevailing visibility was 600 meters and the wind was 090 at 10 knots. The "Rejected Take Off' training runs were carried out as follows;

16:01 UTC the first aborted take off was carried out along the runway
05 A 180-degree turn was made to use the runway 23 for the second run.
16:06 UTC the second aborted take off was carried out along the runway 23.
A 180-degree turn was again carried out to use the runway 05 for the third run.

16:09UTC the third aborted take off was carried out along the runway 0.5.

The aircraft was turned through 180 degrees to use the runway 23 for the fourth run.

16:13 UTC the fourth aborted take off was carried out along the runway 23.

1.2 Injuries to persons.

All the souls on board the aircraft were evacuated without injuries.

1.3 Damage to aircraft.

The aircraft was totally burnt to ashes in the accident.

1.4 Other damage.

The taxiway was heavily contaminated.

1.5 Personnel Information:

Pilot in Command(Instructor)	Capt. Vjekoslav Mihajlovic
Licence:	ATPL. No. 449/3512 (Yugoslavia)
Validity:	17th October 1998.
Nationality:	Serajevo
Date of Birth:	10th June 1939.
Total Flight Hours:	13,000+
Total on type:	5,000+

First Officer (Left seat)	Lekic Dragomir (On the left-seat during final taxi and fire)
Licence:	661/5286 (Yugoslavia)
Nationality:	Serj
Date of Birth:	8th August 1947.
Total flight hours:	Uncertain.
Validity:	April 1998.
Captain (Right Seat)	Capt. Ostojic Dragan (Performed the fourth rejected Take off from the right-seat)
Licence:	ATPL No. 844/9584 (Yugoslavia)
Nigerian Validity:	Valid until the 18th of April 1998.

1.6 Aircraft information.

Aircraft: Boeing 737-2K3

Serial Number 24139

Manufacturer's Line Number: 1530

Customer No. PN-502

Date of manufacture April 1988

Current registration YU-ANU

Certificate of Airworthiness: (SFR of Yugoslavia No. 1536) valid until the 8th June 1998.

Maintenance clearance certificate (Nigerian No. 97/45) Issued on the 13th May 1997 valid to the 12th May 1997.

1.7 Meteorological information.

QAM.	1600 UTC
QAN:	060/06Knots.
QBA:	600 meters.
QBB:	9000 meters.
QNY:	Thick dust haze.
QMU:	30/03 Celsius.
QFE:	942 MBS.
QNH:	1017 EBB.

1.8 Aids to navigation.

Not applicable.

1.9 Communications.

There was adequate communication between the aircraft and the Air Traffic Controller. Transcript of the conversation is included in the appendix.

1.10 Aerodrome information.

Kaduna runway is designated 05/23 and is 3000 meters long.

1.11 Flight recorders.

The aircraft was equipped with a Fairchild / 17M600-00A Flight Data Recorder and a Sunstrand / AV557C Cockpit Voice Recorder.

1.12 Wreckage and impact information.

The aircraft was burnt to ashes in a fire that resulted from overheated brake units in the left landing gear.

1.13 Medical and pathological information.

There were no ambulances or medical personnel in attendance.

1.14 Fire.

At 1624 UTC the aircraft requested for fire vehicles and the Controller Instructed the fire services to proceed to the aircraft. But prior to this instruction, the fire personnel were already heading toward the distressed aircraft on their own initiative. Eye witness account had it that the fire truck was at first positioned on the right side of the airplane whereas, the source of the fire was on the left. Then they were directed to reposition on the left side and were then seen to be

directing the nozzle spray to the top of the left wing instead of the left main-landing gear under the wing. The following pieces of equipment were used by the fire services:

1 Patroller
1 MAC-09
1 Water tanker

The MAC-09 vehicle contained 2,110 litres of fluoro-protein foam concentrate.

It was noticeable that there was no sign or smell of foam agent around the aircraft and furthermore, the fire men also complained that the fluoro-protein foam compound was unstable and ineffective.

1.15 Survival aspects.

The accident was survivable as the spread of the fire was slow enough for successful evacuation of all the souls on board.

1.16. Tests and research.

Not applicable.

1.17 Organisational and management information.

The State of registry of the Boeing 737-200 was Yugoslavia and the aircraft was owned by a Yugoslavian company, Aviogenex which is based in Beograd. The aircraft was on a wet lease to a Nigerian operator, Chanchangi Airlines Nigeria Ltd. whose operational base is the Kaduna Airport

The State of Yugoslavia was responsible for the certificate of airworthiness of the aircraft and Nigeria being the State of operator was supervising the maintenance of the aircraft with the issuance Of the Maintenance Clearance Certificate.

1.18 Additional information.

Nil.

1.19 Useful or effective investigation technique.

The investigation of this accident was by standard procedures of the ICAO and the Civil Aviation Regulations of Nigeria.

CHAPTER 2. ANALYSIS.

An aircraft's brake units develop high temperatures as the brakes are used each time the aircraft is brought to a stop. These temperatures can rise to the extent of melting down the brake discs and the units if caution is not exercised in ensuring that an adequate cooling period is allowed after each extensive use of the brake system. The manufacturer of each aircraft, therefore, provides a chart which provides a "Brake cooling schedule." The operating parameters such as the weight of the aircraft, the outside air temperature, wind components, and the braking configuration can be entered into the charts to give the number of minutes that should be allowed before another safe utilization of the brake system.

This technical information is part of the lessons that the pilot is taught in the ground school before he is awarded the type ratings to fly the aircraft.

In the process of carrying out a rejected take off, as the aircraft accelerates to a speed below V I (The maximum speed at which a rejected take off may be carried out) the thrust reversers and the braking systems are the main systems that will eventually bring the aircraft to a halt after the take off run is rejected. Consequently, after a rejected take off, the brake units are so hot that the brake cooling schedule must be observed.

This Boeing 737 aircraft in carrying out four rejected take off runs within an interval of twelve minutes, must have developed unacceptably high temperatures around the brake units that the upsurge of fire was virtually inevitable.

Based on the operating ambient parameters on that day, a single exercise of a rejected take off would have required a cooling period of at least ten minutes. It is thus obvious that carrying out the process of rejecting four take off runs within twelve minutes at intervals of three minutes is setting oneself up for a severe fire outbreak from the brake units, which exactly was what happened.

In the interviews conducted with the crewmembers a point was emphasized by all of them that the rejected take off exercises were commenced at about 80 knots, speed brakes deployed and reversers actuated below the first detent and no brakes were used. This investigator considers these points as begging the issue and an after thought consequent upon the disastrous outcome of the accident. For any Rejected Take off exercise to be meaningful, the proper procedures must be carried out as near the speed of V 1 as much as possible. The exercise as described by the Crew-members is meaningless and does not constitute a real training. Furthermore the observance of the correct brake cooling schedules as recommended by the Boeing Aircraft Company must be considered as part of a realistic training exercise.

With the foregoing, the Training Captain and Instructor on this flight is considered liable and totally blameworthy for the accident.

At the end of the fourth run, the left main landing gear number 2 brake unit had started to burn as evidenced by the molten rubber pieces that were picked up along the runway centre line. The reverted rubber continued for a distance of 270 meters as the aircraft turned off the runway into the last taxiway. Fifty meters from the runway 05 threshold the left inner wheel failed and leaving a molten rubber footprint on the taxiway and at the same time the hydraulic fluid of the brake units started to spill tracing an oily track along. Pieces of broken wheel rim were randomly shed for a distance of 150 meters when the rims appeared to undergo a major collapse. The footprint of the two left wheels became more pronounced for a distance of 120 meters when there was a positive turn to the left indicating a total failure in roll from the left wheel assembly. The

zigzag motion continued for about 699 meters until the aircraft could no longer be easily moved and the pilot called for the fire trucks.

The aircraft burnt to ashes on the spot.

The Investigators further view with dismay and great concern that the Instructor Pilot accepted twenty-four passengers on the training flight. This action on his part was reckless and ill-conceived. There was no point in endangering the lives of innocent citizens to demonstrate to the Chairman of the company that he was accommodating and adventurous.

The weather condition at the time of the training exercise contributed to the disastrous outcome. With the visibility at only 600 meters, it was difficult for the Air Traffic Controller, the operating crew or anyone standing by to notice the smoke which started when the aircraft was completing its fourth rejected take off and was still on the active runway. Had the weather conditions been favourable, it is possible that the emerging fire could have been given immediate attention and a total conflagration averted.

Finally the instructor pilot put forward the argument that the brake units were not properly adjusted during the maintenance that was carried out the previous day hence the overheat and subsequent fire. The Accident Investigation Bureau cannot accept this view because the records show that this aircraft, after the maintenance package made a flight from Kaduna to Lagos to Port-Harcourt to Lagos to Abuja and then back to Kaduna making five successful landings at weights far above the weight at the rejected take-off exercise. If anything were wrong with the brakes units, the fault would have elicited itself.

2.1 Performance of the fire services.

At the time 1624 the aircraft requested for fire vehicles and the Controller instructed the fire services to proceed to the aircraft. But prior to this instruction, the fire personnel were already heading toward the distressed aircraft on their own initiative. Eye witness account had it that the fire truck was at first positioned on the right side of the airplane whereas, the source of the fire was on the left. Then they were directed to reposition on the left side and were then seen to be directing the nozzle spray to the top of the left wing instead of the left main-landing gear under the wing. The following pieces of equipment were used by the fire services:

1Patroller
1 MAC-09
1 Water tanker

The MAC-09 vehicle contained 2,110 litres of fluoro-protein foam concentrate.

It was noticeable that there was no sign or smell of foam agent around the aircraft and furthermore, the fire men also complained that the fluoro-protein foam compound was unstable and ineffective.

This aircraft may have been saved from total destruction had the Fire-Services acted effectively. Obviously there was no analysis of the fire outbreak to identify the source of the fire, and the fact that the fire trucks had to leave scene of the fire to replenish their fire agents while
the fire was still spreading, rendered the rescue exercise a total failure. The fact that the firemen were standing at about 50 meters from the burning aircraft can be explained by their lack of adequate protective clothes.

2.2 Attitude of Captain Mihajlovic Vjekoslav

Considering the fact that the above-mentioned captain committed a technical blunder of carrying out four rejected takeoffs within 12 minutes, he was not forth coming and divisively evasive during the course of the interview; in gross disregard of Civil Aviation(investigation of accident) Regulations 1965 subsection 13.

3. Conclusions.

1. The aircraft had a valid certificate of airworthiness and a certificate of registration.

2. The crew members that were involved in the incident were properly licenced.

3. The visibility at the time of the accident was below the State minima.

4. The abort take-off procedure adopted was not the standard recommended rejected takeoff by the manufacturers of the aircraft.

5. The aircraft carried twenty-four non aviation personnel illegally for the training flight.

6. The aircraft had all clearances to operate scheduled flights in Nigeria including a maintenance clearance certificate.

7. The instructor pilot violated his company's "rest period regulations" as at the time of the accident. He needed a rest period of at least 36 hours before assuming the training flight.

8. The decision of the instructor pilot to carry out four rejected take-off exercises within a time interval of twelve minutes was the main cause of the accident. His estimate of reducing the brake temperatures by avoiding the use of brakes was a fabrication which is contradicted by the fact that the brake units on the left main landing gear did heat up and started the fire.

4. Safety Recommendations:

1. The fire services at Kaduna Airport must be ungraded and equipped to serve their purposes. Furthermore, the use of fluoro-protein foam compound should be reassessed and may be the pure protein foam agent which was originally used in Nigeria may be reintroduced. There is definitely a need to adopt a more effective foam compound.

2. With immediate effect, Captain Mihajlovic Vjekoslav is banned from operating an aircraft within the Nigerian airspace. This is a directive from the Honourable Minister of Aviation in Nigeria.

3. The Kaduna Airport runway and associated taxiways, should be derubberised, especially the contamination resulting from this accident.

4. All training programmes must adhere to the recommendations of the aircraft manufacturers. Improvisations in drawing up or amending standard programmes may result in commissions or omissions in other areas that may not readily come into mind in the improvised programmes.

5. The provision of medical personnel during aircraft emergencies must remain a standard procedure in effecting a search and rescue operation.

TAPE TRANSCRIPT ON NICH 901 B737 REGISTRATION Yu-ANU FIRE INCIDENT OF 22ND FEBRUARY 1998

TIME	CALL SIGN	TRANSMISSION
1541	NCH 901	Kaduna this is the NCH 901. NCH 901 Kaduuna go ahead.
	TOWER	NCH 901 Request start up clearance please.
	NCH 901	NCH 901 start up approved Q)N11 1017. Temp 30, Time 1537.
	TOWER	
1549	NCH 901	NCH 901 taxi clearance please.
	TOWER	NCH 901 taxi holding point runway 05. 05.
	NCH 901	NCH 901 confirm taxying to the threshold of the runway.
	TOWER	
1550	NCH 901	What accord talk with you half hour ago will be the same please no problem.
	TOWER	Roger holding point 05.
1556	NCH 901	NCH 901 Holding 05.
	TOWER	Roger holding point 05. Confirm requesting aborted take off.
1557	NCH 901	Okay we are requesting line up please.
	TOWER	Roger line up and wait and advice when ready.
	NCH 901	Roger line up and wait.
1601	NCH 901	NCH 901 ready for take off.
	TOWER	Alt the wind is 090 at 10 knots cleared for take fof 05.
	NCH 901	Standby.
	TOWER	Say again souls on endurance'?
1602	NCH 901	Will continue in the end of runway and back track.
	TOWER	Roger requesting Souls o11 board endurance.
	NCH 901	Is all 24, endurance is all 4 hours.

TIME	CALL SIGN	TRANSMISSION
	TOWER	Roger 180 and back track.
1607	NCH 901	NCH 901 ready for take off.
	TOWER	901 cleared for aborted take-off runway 23 wind 060/12.
	NCH 901	Roger.
1608	TOWER	901 aborted take off at 1606.
	NCH 901	Roger.
1610	NCH 901	Ready for take off.
	TOWER	Cleared aborted take off runway 05 wind 060/06.
	NCH 901	Roger.
1614	NCH 901	Kaduna NCH 901 ready for take off.
	TOWER	Roger 901 in position cleared for aborted take off runway 23 wind is easternly at 10 knots.
	NCH 901	Roger copied cleared for aborted take off.
1616	TOWER	901 aborted take off at 0914.
	NCH 901	Roger copied. We will call you when ready to vacate runway.
1618	NCH 901	Tower NCH 901.
	TOWER	Go ahead.
	NCH 901	Runway cleared.
	TOWER	Roger runway cleared, you are welcome.
	NCH 901	We are going to park. Then you for your cooperation.
	TOWER	Roger.
1623	NCH 901	Kaduna NCH 901.
	TOWER	NCH 901. go ahead.
	NCH 901	Do you have towing van for us.
	TOWER	Say again, say again I have you in sight, say again your request.
	NCH 901	We request towing truck, towing truck, towing van.
	TOWER	Towing back to the threshold confirm, confirm towing back to the apron or to the threshold.

TIME	CALL SIGN	TRANSMISSION
	NCH 901	Please send us eh, send us eh car please we have.
1624	TOWER	901 confirm you request towing back, towing back to the apron or to the threshold runway 05.
	NCH 901	We requesting fire, fire, fire car please immediately, fire car.
	TOWER	Roger.
	NCH 901	Send us immediately fire car please eh.
	TOWER	Roger.
	NCH 901	Send us immediately fire car please eh
	TOWER	Say again.
	NCH 901	Fire car please immediately, advice our ground mechanic we have fire, we have fire please, we have fire please.
	TOWER	Fire confirm.
	NCH 901	Fire, we have fire, we have fire, we have fire please, we have fire please, we have please immediately fire car, please.
1625	NCH 901	Send fire car please, we have fire, fire car immediately, fire car please, fir car please.
	TOWER	Confirm fire car, fire on board.
	NCH 901	Immediately we have fire, fire, fire car please fire car give, give me fire car.
	TOWER	They are coming, they are coming, they are coming, they are coming.
1628	TOWER	NCH 901 how do you read.

Tape Transcript by

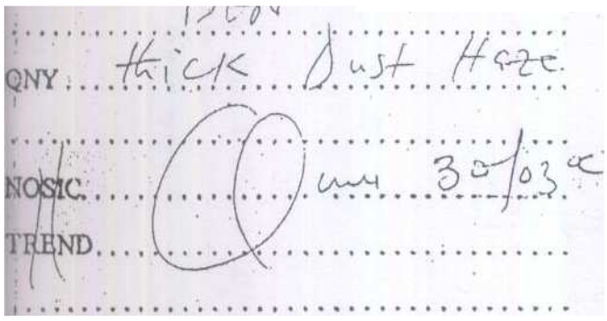
SI

DEPARTMENT OF METEOROLOGICAL SERVICES *(NIGERIA)* ı

Trend Landing Forecast for.....

l . '. .'„1. . .

QBB ....



r'

...,... .... QF . . ..

s= . . .1:f . .. . . . Ins

QNx .... ~1′/. . . S= ..... Irfs-a ....,.....

.....

`~orecaster'. Time of

Observer. ~ Receipt

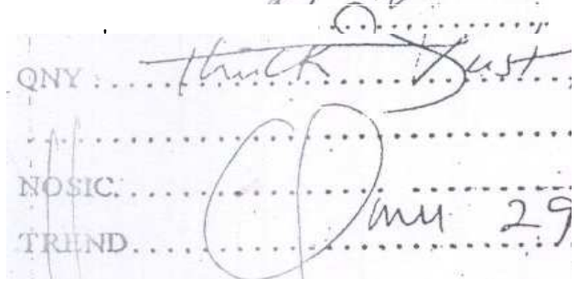
V,

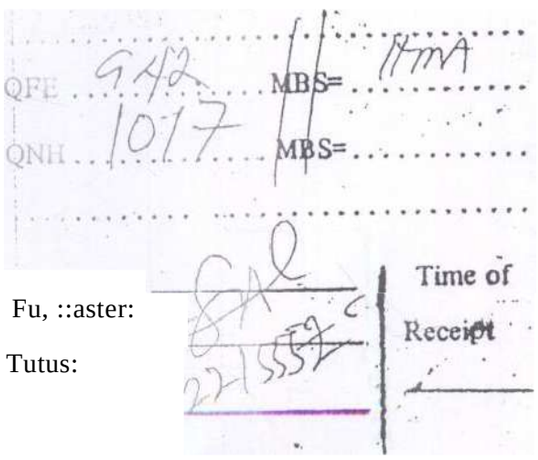
DEPARTMENT OF METEOROLOGICAL SERVICE'S (NIGERIA)

Trend Landing Forecast for.. . : .I.

.,..GMT. "" ..._

. .rte.-(--%.OBA .....



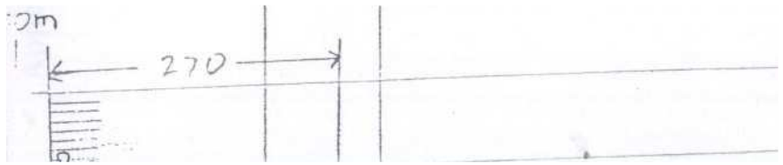


Fu, ::aster:

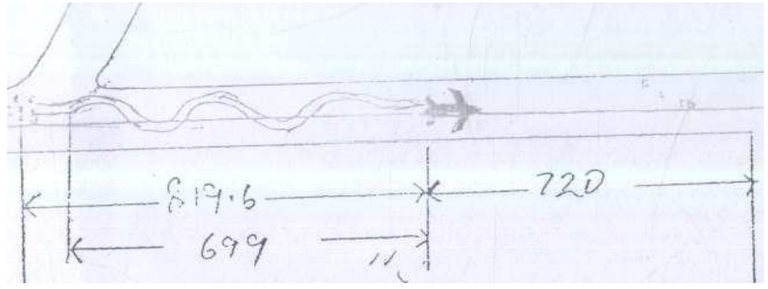
. .. Tutus:

M

A
L7
S
v



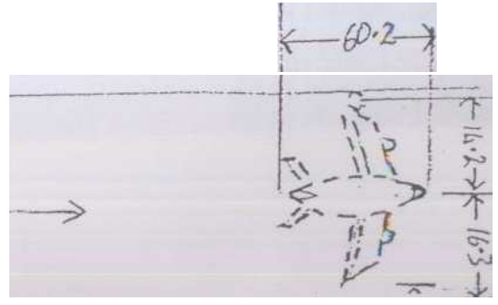
CENTER LINE



T/B

V JE Cut Of
BROKEN RIM

3



WRECKED CAR

WHERE BRAKE FLUID SPILAGE STARTED
(50m FROM TRESHOLD)

M (ZjZ 1^'\ 1V l)
Ni S