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REPUBLIC OF INDONESIA**

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Aircraft Serious Incident Investigation Report

PT. Sriwijaya Air

Boeing 737-300; PK-CJT

Tabing Airfield, Padang, West Sumatra

Republic of Indonesia

13 October 2012



2016

This Final report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the KNKT in accordance with Annex 13 to the Convention on International Civil Aviation Organization, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 62/2013).

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ABBREVIATIONS AND DEFINITIONS

AC	:	Advisory Circular
AFE	:	Above Field Elevation
AOC	:	Aircraft Operator Certificate
ARQ	:	Airport Route Qualification
ATC	:	Air Traffic Control
ATIS	:	Automatic Terminal Information Service
ATPL	:	Airline Transport Pilot License
ATS	:	Air Traffic Services
CASR	:	Civil Aviation Safety Regulation
CDU	:	Control Display Unit
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DA	:	Decision Altitude
DGCA	:	Directorate General of Civil Aviation
DME	:	Distance Measuring Equipment
FCTM	:	Flight Crew Training Manual
FDR	:	Flight Data Recorder
fpm	:	Feet per minute
ft	:	Feet
IAP	:	Instrument Approach Procedure
ILS	:	Instrument Landing System
IMC	:	Instrument Meteorological Condition
in Hg	:	Inches of mercury
km	:	Kilometer
KNKT	:	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
mb	:	Millibars
nm	:	Nautical Miles
NOTAM	:	Notice to Airmen
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring

SIC : Second in Command
SOP : Standard Operating Procedure
UTC : Universal Time Coordinated
VASIS : Visual Approach Slope Indicator System
VMC : Visual Meteorological Condition
VOR : Very High Frequency Omnidirectional Range

INTRODUCTION

SYNOPSIS

On 13 October 2012, a Boeing 737-300 aircraft was being operated by Sriwijaya Air conducted a scheduled passenger flight from Polonia International Airport, Medan (WIMM) to Minangkabau International Airport (WIPT), Padang.

The aircraft departed Polonia International Airport with flight number SJY 021, on board the aircraft were 102 persons consisted of two pilots, four flight attendants and 96 passengers. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). The flight was the first flight on that day.

The flight from departure until commencing for approach was un-eventful and mostly was on Instrument Meteorological Condition (IMC).

Considering to the cloud condition, the pilot requested runway 33 for the Instrument Landing System (ILS) approach and it was approved by the Minang Approach. On descend the pilots conducted approach briefing for ILS approach runway 33 according to the Instrument Approach Procedure (IAP) chart. The pilots stated that the information contained in the approach chart of "*Tabbing (can be mistaken for Minangkabau Intl)*" was absent during the briefing.

When the flight had established to the localizer, the PIC saw a runway at approximately 10° on the right, the pilot then reported to Minang Approach that the runway was in sight and was instructed to contact Minangkabau Tower controller. The pilot intended to make a visual approach and disconnected the autopilot then flew manually toward that runway. When conducting the visual approach, the pilot assumed that the localizer was incorrect as the runway was on the right side. The pilot continued the approach with landing gear down and flap 40. The PIC also realized that the rate of descent was about 1,700 feet per minute.

After landing, the pilot reported to Minang tower that they had landed at Tabing Airfield. The passengers were completely disembarked safely.

The investigation concluded the contributing factors to this accident are the unclear significant information in the photocopy of the ILS approach chart might have missed by the pilot and might reduce the pilot awareness to the adjacent airport with similar runway direction and dimension; the previous experience of false VOR might have made the approach was continued in an un-stabilized approach condition, and the information of incorrect runway was not provided during the abnormal approach as it was not observed.

Following this accident the aircraft operator has issued six safety actions and the airport operator has issued two safety actions which considered relevant to improve safety. In addition, KNKT issued safety recommendations addressed to aircraft operator, air navigation provider and the Directorate General of Civil Aviation.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 13 October 2012, a Boeing 737-300 aircraft was being operated by Sriwijaya Air as a scheduled passenger flight from Polonia International Airport, Medan (WIMM) to Minangkabau International Airport (WIPT), Padang¹.

At 0912 UTC², the aircraft departed Polonia International Airport with flight number SJY 021. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). The flight was the first flight on the day for the crew. On board in this flight were 102 persons, consisted of two pilots, four flight attendants and 96 passengers (93 adults, 1 child and 2 infants).

The flight from departure until commenced approach was un-eventful and mostly was on Instrument Meteorological Condition (IMC).

The pilot received weather information from Automatic Terminal Information Service (ATIS) which issued by Minangkabau before commenced descent. The ATIS informed that the weather generally was fine and the cloud scattered at 2,000 feet with ground visibility of 10 km.

At 0943 UTC, the pilot made first contact with Minangkabau Approach controller (Minang Approach) and the flight was directed by Minang Approach to MKB³ VOR for conducting VOR DME approach runway 15. Considering to the cloud condition, the pilot requested for the Instrument Landing System (ILS⁴) approach runway 33 and was approved by the Minang Approach.

On descend the pilots conducted approach briefing according to the Instrument Approach Procedure (IAP) chart. Based on interview, the pilots stated that the information contained in the approach chart of “*Tabbing (can be mistaken for Minangkabau Intl)*” was absent during the briefing.

The pilot requested several turns to the left for avoiding weather. While on radial 345 and 15 Nm from MKB VOR, the pilot was instructed to descend 6,000 feet.

As the result of several turns requested, the flight had deviated from the normal route. Before reached over MKB VOR, the flight directed to the MKB used LNAV⁵ mode.

At 0958 UTC, the pilot reported over MKB VOR and Minang Approach instructed to proceed to BAYUR⁶, descend to 5,000 feet and issued clearance for ILS approach to runway 33. The pilot then selected the LNAV mode and flew the radial 195 MKB VOR to BAYUR. Thereafter, the pilot selected the heading mode and on the Control Display Unit (CDU), BAYUR was on top of the page but was not executed.

1 Minangkabau International Airport will be named as Minangkabau for the purpose of this report.

2 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours.

3 MKB is the name of VOR which used in Minangkabau International Airport.

4 Instrument Landing System (ILS) is a ground-based instrument approach system that provides precision guidance to an aircraft approaching and landing on a runway.

5 LNAV is autopilot feature to control lateral navigation.

6 BAYUR is a way point where located approximately 14 Nm from Minangkabau International airport on heading 198°

At 1001 UTC, the pilot reported over BAYUR and instructed by Minang Approach to report when establishing localizer ILS runway 33.

The pilot executed the navigation setting on the CDU to follow the arc profile used LNAV mode and selected the flap 5 then reduced the aircraft speed to 180 knots. The flight was in and out through the clouds.

At 1004 UTC, the pilot reported that the flight had established to the localizer, on that position the PIC saw a runway at approximately 10° on the right. The pilot then reported to Minang Approach that the runway was in sight and was instructed to contact Minangkabau Tower controller (Minang Tower). The pilot intended to make a visual approach and disconnected the autopilot then flew manually toward that runway. When conducting the visual approach, the pilot assumed that the localizer was incorrect as the runway was on the right side. The pilot continued the approach with landing gear down and flap 40. The PIC also realized that the rate of descent was about 1,700 feet per minute.

At 1005 UTC, the pilot contacted Minang Tower which then saw the aircraft was on long final and issued the landing clearance to runway 33. Minang Tower was also observed an aircraft pushing back on the right side of the tower while the aircraft on final was on the left side.

At 1006 UTC, the pilot reported to Minang tower that they had landed at Tabing Airfield⁷. Referred to the information provided by the pilot, the Minang Tower verified and realized that there was no aircraft on runway 33. The Minang Tower then coordinated with the Tabing Airfield authority and the district manager of the aircraft operator following this condition.

The pilot continued taxi to the apron and parked. The PIC called the flight attendant clarified that they had landed at Tabing Airfield instead of Minangkabau. The flight attendant contacted the company flight operations (Flops) officer in Jakarta, informed the condition and requested further instruction.

The passengers were completely disembarked safely.

1.2 Injuries to Persons

There were no injuries to persons as a result of this occurrence.

1.3 Damage to Aircraft

The aircraft was undamaged.

1.4 Other Damage

There was no other damage to property and/or the environment.

⁷ Tabing Airfield will be named as Tabing for the purpose of this report.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Age	: 58 years old
Nationality	: Lithuanian
Marital status	: Married
Date of joining company	: 1 May 2012
License	: ATPL
Validity of license	: 31 January 2013
Aircraft type rating	: B737-300/400/500
Medical certificate	: First Class
Last of medical examination	: 24 April 2012
Validity of medical certificate	: 9 November 2012
Last proficiency check	: 7 July 2012

Flying experience

Total hours	: 15,500 hours
Last 90 days	: 140 hours
Last 60 days	: 140 hours
Last 24 hours	: 5 hours
This flight	: 1 hour
Medical limitation	: The pilot shall use a corrective lens during flight

A day before the occurrence, the PIC arrived at Medan at about midnight after having 3 hours delay, it was caused by weather condition.

The PIC also mentioned having difficulty to take sleep and woke up at about 9 o'clock in the morning, and the PIC felt weary when departed from Medan.

The PIC had flown to Minangkabau three times where all of them landed on runway 15. The occurrence flight was the first approach on runway 33.

On 25 September 2012, the PIC experienced a false VOR on Pangkal Pinang while conducting VOR approach and made go around.

1.5.2 Second in Command

Gender	: Male
Age	: 45 years old
Nationality	: Indonesian, with permanent residence permit in Japan

Marital status : Married
 License : CPL
 Validity of license : 30 April 2013
 Aircraft type rating : B737-300/400/500
 Medical certificate : First Class
 Last of medical examination : 31 August 2012
 Validity of medical certificate : 31 February 2012
 Last proficiency check : 10 April 2012

Flying experience

Total hours : 800 hours
 Last 90 days : 182 hours
 Last 60 days : 173 hours
 Last 24 hours : 5 hours
 This flight : 1 hour
 Medical limitation : None

The SIC had flown to Minangkabau two times used runway 15 and 33. The SIC had finished the line training 1 month before the occurrence flight.

1.5.3 Aerodrome Control Tower

The Minangkabau Tower controller held a valid air traffic control license that was issued on 11 June 2012 and joined PT. Angkasa Pura II. Prior to conduct as aerodrome control tower in Minangkabau, the controller had one week familiarization program as observer. At the time of the occurrence, the controller had been 4 months performed duty as aerodrome control tower.

At the day of occurrence the controller worked for approximately 1 hour 30 minutes.

1.6 Aircraft Information

1.6.1 General

Registration Mark : PK-CJT
 Manufacturer : Boeing Aircraft Company
 Country of Manufacturer : United States of America
 Type/ Model : B737-300
 Serial Number : 24791
 Year of manufacture : 1991
 Certificate of Airworthiness
 Issued : 29 July 2012
 Validity : 28 July 2013

Category : Transport
 Limitations : None
Certificate of Registration
 Number : 24791
 Issued : 13 April 2011
 Validity : 12 April 2014
 Time Since New : 39,010 hours
 Cycles Since New : 34,217 cycles
 Last Minor Check : A6 Check
 (16 September 2012)

1.6.2 Engines

Manufacturer : Boeing Aircraft Company
 Type/Model : CFM56-3CL rated at 22,100 lbs
 Serial Number-1 engine : 858702

- Time Since New : 25,468 hours
- Cycles Since New : 19,357 cycles

 Serial Number-2 engine : 858703

- Time Since New : 24,153 hours
- Cycles Since New : 20,100 cycles

1.7 Meteorological Information

Weather report from Tabing Meteorological Station, issued on 13 October 2012 were as follows:

	0930 UTC	1000 UTC
Wind	260 / 04 knots	240 / 04 knot
Visibility	10 km	10 km
Weather	Haze	Nil
Cloud	SCT 020	SCT 022
TT/TD	29 / 24	28 / 23
QNH (mb / in Hg)	1,009 / 29.82	1,009 / 29.82

1.8 Aids to Navigation

1.8.1 Instrument Landing System

Minangkabau International Airport was equipped with Instrument Landing System (ILS) Category I.

The existing approach procedure of the ILS runway 33 Minangkabau Airport showed the localizer course was 335°, the Decision Altitude (DA) was 250 feet, the glide slope of 3° and vertical speed for aircraft category C⁸ was 753 feet/minute. The chart also contained information: *Tabbing (can be mistaken for the Minangkabau Intl)*.

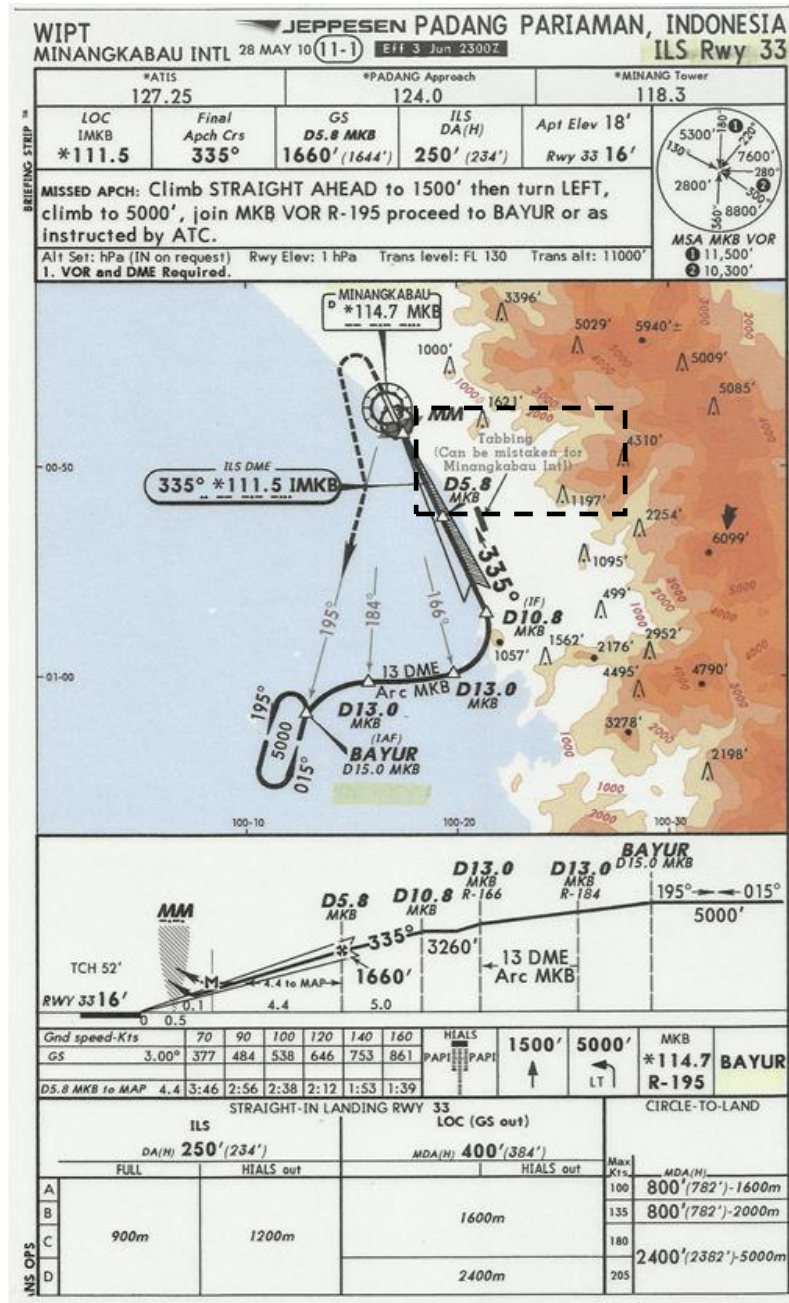


Figure 1: ILS approach chart procedure runway 33 Minangkabau Airport

8 Aircraft category C is an aircraft with approach speed between 120 – 140 knots.

The aircraft navigation equipment and the ground-based navigation aids including the visual ground aids were serviceable and operated normally.

At 1208 UTC and 1216 UTC, there were two aircraft landed used ILS runway 33 and there was no report of the ILS malfunction.

1.8.2 Instrument Approach Chart Used by the Pilot

During the flight, the pilots used a black and white photocopy of instrument approach charts procedure. The information of: *Tabbing (can be mistaken for the Minangkabau Intl)*, as shown on dash box figure 2, was not clearly readable.

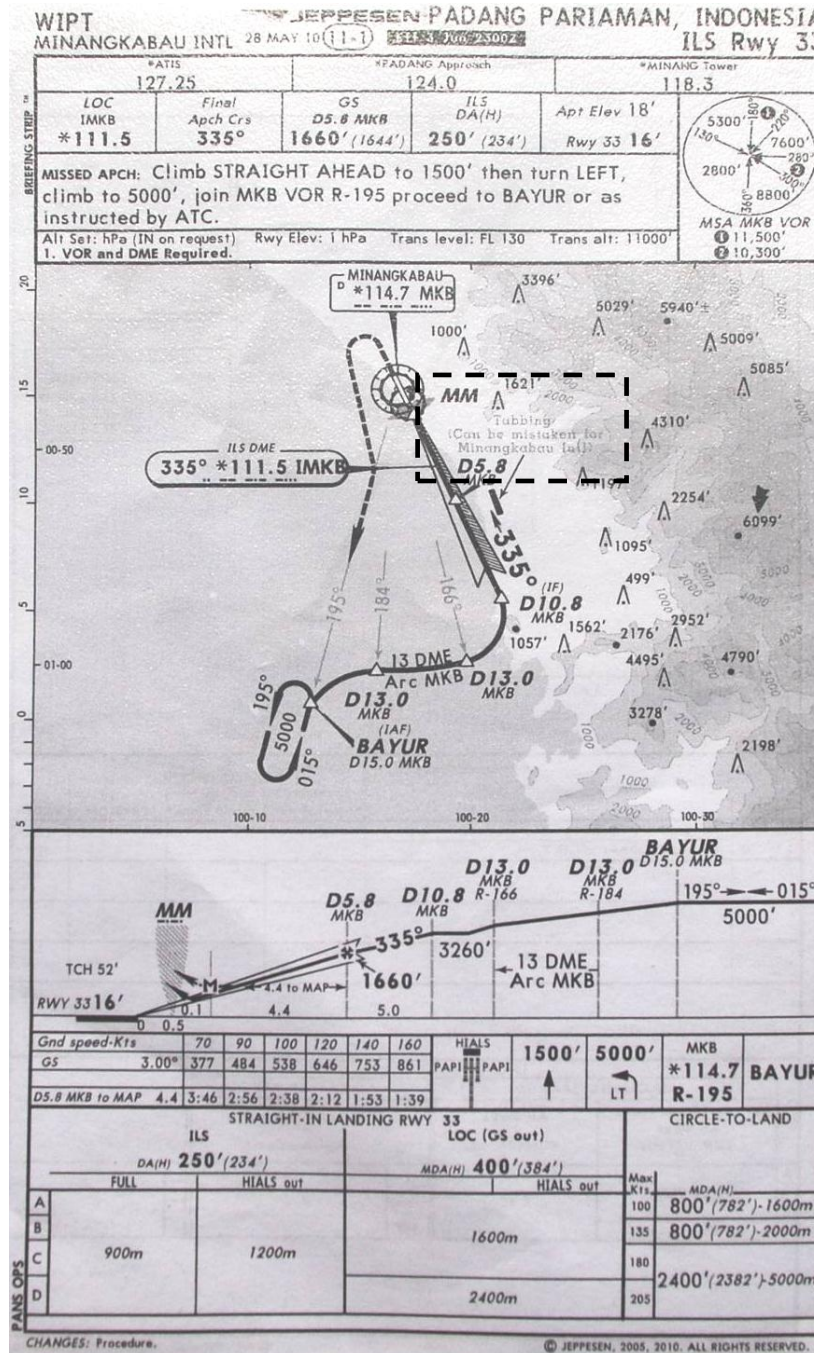


Figure 2: The photocopy of ILS approach chart procedure used by the pilot

1.9 Communications

Communications between ATS and the pilots were recorded by ground based automatic voice recording equipment for the duration of the flight. The quality of the aircraft's recorded transmissions was good.

The significant excerpts of the communication are as follows:

- 0950 UTC, the pilot requested to turn 5 degrees to the left to avoid weather and was approved by Minang Approach controller.
- 0952 UTC, the pilot reported to Minang Approach controller that the flight directed to MKB VOR.
- 0953 UTC, the pilot requested to turn 5 degrees again to the left to avoid weather and was approved by Minang Approach controller.
- 0955 UTC, the pilot reported that they had cleared of weather and the aircraft position was on radial 345 and 15 Nm from MKB VOR, the Minang Approach controller acknowledged and instructed to descend 6,000 feet.
- 0958 UTC, the pilot reported position was over MKB VOR, Minang Approach controller instructed to proceed to BAYUR point descend to 5,000 feet and cleared for ILS approach runway 33.
- 1001 UTC, the pilot reported over BAYUR and was instructed by Minang Approach controller to report when established localizer.
- 1004 UTC, the pilot reported that they had the runway in sight and intended to conduct a visual approach to runway 33, Minang Approach controller acknowledged and instructed to contact Minangkabau Tower controller.
- 1005 UTC, the pilot contacted Minang Tower controller which then issued landing clearance to runway 33.
- 1006 UTC, the pilot reported that they had landed on the runway 34 of Tabin Airfield. The Minang Tower controller confirmed and acknowledged the information.

1.10 Aerodrome Information

1.10.1 Minangkabau International Airport

Airport Name	: Minangkabau International Airport
Airport Certificate	: 009/SBU-DBU/VII/2010
Airport Identification	: WIPT
Coordinate	: 00°47'18"S 100°17'11"E
Airport Operator	: PT. Angkasa Pura II (Persero)
Elevation	: 18 feet
Runway Direction	: 15 and 33 (155° and 335°)
Runway Length	: 2,750 meter

Runway Width : 45 meter
Surface : Asphalt

1.10.2 Tabing Airfield

Airport Name : Tabing
Airport Certificate : Not Available
Airport Identification : Not Available
Coordinate : 00°52'32"S 100°21'02"E
Airport Operator : Indonesia Air Force
Elevation : 9 feet
Runway Direction : 16 and 34 (159° and 339°)
Runway Length : 2,150 meter
Runway Width : 45 meter
Surface : Asphalt

Tabing Airfield was a commercial airport until 22 July 2005, the commercial flight operation moved to the Minangkabau International Airport and the Tabing Airfield was used only for military operation.

On 9 October 2012, the Minangkabau Briefing Office issued NOTAMs which informed that the runway approach light, runway edge light, runway centreline light and VASIS of Tabing Airport were unserviceable. The NOTAMs valid until 9 December 2012, 2359 UTC.

The Tabing Airfield located 6 Nm southeast of Minangkabau airport at approximately 2 Nm right side of the centerline extension of runway 33 Minangkabau.



Figure 3: The airports location

1.11 Flight Recorders

1.11.1 Flight Data Recorder

The aircraft was equipped with a universal Flight Data Recorder (FDR) and the details of the FDR were as follows:

Manufacturer : Sundstrand

Type/Model : UFDR

Part Number : 980-4100-DXUN

Serial Number : 6500

The aircraft was equipped with a magnetic-tape digital flight data recorder designed to record data in an ARINC 573/717 format.

The FDR was downloaded on 17 October 2012 using the Avionica RSUII in the KNKT facility, the FDR contained 25.21 hours of reasonable quality data (some tracks were excellent quality and some others were poor) comprising the occurrence flight and 17 previous flights recorded since 11 October 2012.

Concerning to the data recorded on 11 October 2012 to the occurrence on 13 October 2012 which could not be read, the second downloaded using the KNKT HHMPI equipment performed where the data then imported into the Flightscape Insight Analysis software and the result the required data could not recovered.

To ensure that the FDR data downloaded was unreadable, the FDR data was sent to ATSB facility for further analysis. The result of the FDR data read out in ATSB facility was similar. It concluded that the FDR was not recorded properly prior the occurrence.

1.11.2 Cockpit Voice Recorder

Manufacturer : Honeywell

Type/Model : AV557C

Part Number : 980-6005-076

Serial Number : 11547

The CVR data was downloaded at KNKT flight recorders laboratory. The CVR contained 33 minutes of good quality recording. The communication which recorded on the CVR during approach has overwritten with the communication after the aircraft landed in Tabing.

1.12 Wreckage and Impact Information

Not relevant with this occurrence.

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of this occurrence, nor were they required.

1.14 Fire

There was no evidence of fire in-flight on this occurrence.

1.15 Survival Aspects

Not relevance in this occurrence.

1.16 Tests and Research

The tests or research were not required to be conducted as a result of this occurrence.

1.17 Organizational and Management Information

Aircraft Owner and Operator : PT. Sriwijaya Air

Address : Jalan Pangeran Jayakarta No.68 C15-16
Mangga Dua Selatan, Jakarta Pusat,
Republic of Indonesia

Operator Certificate Number : AOC/121-035

1.17.1 Approach Chart Policy

The aircraft operator used navigation chart published by Jeppesen since 2011 until 2012 and after 2012 changed the navigation chart provided by Naviga (an Indonesian Navigation Chart provider that was approved by the DGCA).

1.17.2 Stabilized Approach (Boeing 737-300 FCTM page 5.4)

Stabilized Approach Recommendations

Maintaining a stable speed, descent rate, and vertical/lateral flight path in landing configuration is commonly referred to as the stabilized approach concept. Any significant deviation from planned flight path, airspeed, or descent rate should be announced. The decision to execute a go-around is no indication of poor performance.

Note: *Do not attempt to land from an unstable approach.*

Recommended Elements of a Stabilized Approach

The following recommendations are consistent with criteria developed by the Flight Safety Foundation.

All approaches should be stabilized by 1,000 feet AFE in instrument meteorological conditions (IMC) and by 500 feet AFE in visual meteorological conditions (VMC). An approach is considered stabilized when all of the following criteria are met:

- the aircraft is on the correct flight path*
- only small changes in heading and pitch are required to maintain the correct flight path*
- the aircraft speed is not more than VREF + 20 knots indicated airspeed and not less than VREF*
- the airplane is in the correct landing configuration*
- sink rate is no greater than 1,000 fpm; if an approach requires a sink rate greater than 1,000 fpm, a special briefing should be conducted*

- *power setting is appropriate for the aircraft configuration*
- *all briefings and checklists have been conducted.*

Specific types of approaches are stabilized if they also fulfill the following:

- *ILS approaches should be flown within one dot of the glide slope and localizer, or within the expanded localizer scale (as installed)*
- *During a circling approach, wings should be level on final when the aircraft reaches 300 feet AFE.*

Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

Note: *An approach that becomes unstabilized below 1,000 feet AFE in IMC or below 500 feet AFE in VMC requires an immediate go-around.*

These conditions should be maintained throughout the rest of the approach for it to be considered a stabilized approach. If the above criteria cannot be established and maintained at and below 500 feet AFE, initiate a go-around.

1.18 Additional Information

1.18.1 Civil Aviation Safety Regulation Part 69

Subpart 69.C Air Traffic Controller Ratings

69.032 Categories of air traffic controller ratings

Directorate General of Civil Aviation of Indonesia has established ratings for air traffic controller with following categories:

- 1. Aerodrome control rating;*
- 2. Approach control procedural rating;*
- 3. Approach control surveillance rating;*
- 4. Area control procedural rating;*
- 5. Area control surveillance rating.*

69.033 Requirements for air traffic controller ratings

1. Knowledge

The applicant shall have demonstrated a level of knowledge appropriate to the privileges granted, in at least the following subjects in so far as they affect the area of responsibility:

a. aerodrome control rating:

- 1) aerodrome layout; physical characteristics and visual aid;*
- 2) airspace structure;*
- 3) applicable rules, procedures and source of information;*
- 4) air navigation facilities;*
- 5) air traffic control equipment and its use;*
- 6) terrain and prominent landmarks;*
- 7) characteristic of air traffic;*
- 8) weather phenomena;*

9) *emergency and search and rescue plans;*

....

2. *Experience*

The applicant shall have:

- a. *satisfactorily completed an approved training course;*
- b. *provided, satisfactorily, under the supervision of an appropriately rated air traffic controller:*
 - 1) *aerodrome control rating: an aerodrome control service, for a period of not less than 90 hours or one month, whichever is greater, at the unit for which the rating is sought;*
 - 2) *approach control procedural, approach control surveillance, area control procedural or area control surveillance rating: the control service for which the rating is sought, for a period of not less than 180 hours or three months, whichever is greater, at the unit for which the rating is sought.*
- c. *the experience specified in b. shall have been completed within the 6-month period immediately preceding application;*
- d. *When the applicant already holds an air traffic controller rating in another category, or the same rating for another unit, the Licensing Authority shall determine whether the experience requirement of 2 can be reduced, and if so, to what extent.*

3. *Skill.*

The applicant shall have demonstrated, at a level appropriate to the privileges being granted, the skill, judgment and performance required to provide a safe, orderly and expeditious control service.

69.xA.4 Check / Assessment Guide

The following points should be considered when assessing the individual performance of a controller:

a. *aerodrome/approach/area procedures:*

- 1) *knowledge of separation standards and their application;*
- 2) *recognition of aircraft capabilities, i.e. differences in speed, climb, descent, altitude requirements, take off/landing requirement, engine failure performance, and other differences of performance;*
- 3) *awareness and analysis of traffic situations;*
- 4) *planning, sequencing and expedition of the traffic flow;*
- 5) *adjusting traffic to changing conditions in case of radar failure, radio aid failure, changes in flight rules, aerodrome closures and diversions;*
- 6) *use of local procedures such as selection of runways, noise abatement procedures, departure and instrument approach procedures;*
- 7) *co-ordination with other sectors/units, including methods of transfers and updating of information;*
- 8) *utilization of radar;*

9) *composition of clearance in respect of contents, clarity, conciseness and expedition.*

1.18.2 Advisory Circular 170-02

7.1 FUNCTIONS OF AERODROME CONTROL TOWERS

7.1.1 General

7.1.1.2 Aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome as well as vehicles and personnel on the manoeuvring area.

Watch shall be maintained by visual observation, augmented in low visibility conditions by radar when available. Traffic shall be controlled in accordance with the procedures set forth herein and all applicable traffic rules specified by the appropriate ATS authority. If there are other aerodromes within a control zone, traffic at all aerodromes within such a zone shall be coordinated so that traffic circuits do not conflict.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

The data from FDR and CVR of the occurrence flight were not available therefore the investigation combined various sources such as aircraft approach procedure, ATC communication transcript, pilot and ATC interview, and the published ILS approach chart.

The investigation identified several safety issues led to the pilot continued landing and the controller attention to the landing aircraft.

Therefore the analysis focused on:

- Predicted flight profile;
- Runway identification;
- Decision to land;
- Attention of the controller to the landing aircraft.

2.1 Predicted Flight Profile

To indicate the approach flight path from 0958 UTC until touchdown, the investigation referred to various sources and might be predicted as follows:

1. 0958 UTC, the pilot reported over MKB VOR at altitude 6,000 feet and was instructed to proceed to BAYUR, descended to 5,000 feet and cleared for ILS approach runway 33.

While approaching BAYUR the pilot set flap 5 and set the airspeed to 180 knots. The D 13.0 point as showed on the approach chart was not displayed on the Control Display Unit (CDU) and the pilot defined D 13.0 point on the CDU but did not execute.

2. 1001 UTC, the pilot reported over BAYUR, it can be assumed that the aircraft altitude was 5,000 feet.

When leaving BAYUR the pilot selected autopilot to the LNAV mode and followed ARC of 13 Nm from MKB VOR as programmed and set the altitude on Main Control Panel (MCP) to 3300. When the aircraft turned on heading 010, the pilot selected the VOR LOC mode.

3. 1004 UTC, the pilot reported to Minang approach that the runway was in sight. The runway was approximately 10° to the right from the localizer and visually above the glide. The PIC assumed that the ILS runway 33 was error, and decided to continue visual approach. The pilot then selected the vertical speed to 1,700 feet/minutes, disengaged the autopilot and performed a side slip to align with the runway.
4. At 1005 UTC, the controller issued landing clearance.
5. At 1006 UTC, aircraft touched down at Tabing Airfield.

Referring to the information above, the predicted flight path superimposed to the available instrument chart showed in the following figure. The numbers (yellow circles) indicated sequence of event as described above and the red dash lines indicated the predicted flight path.

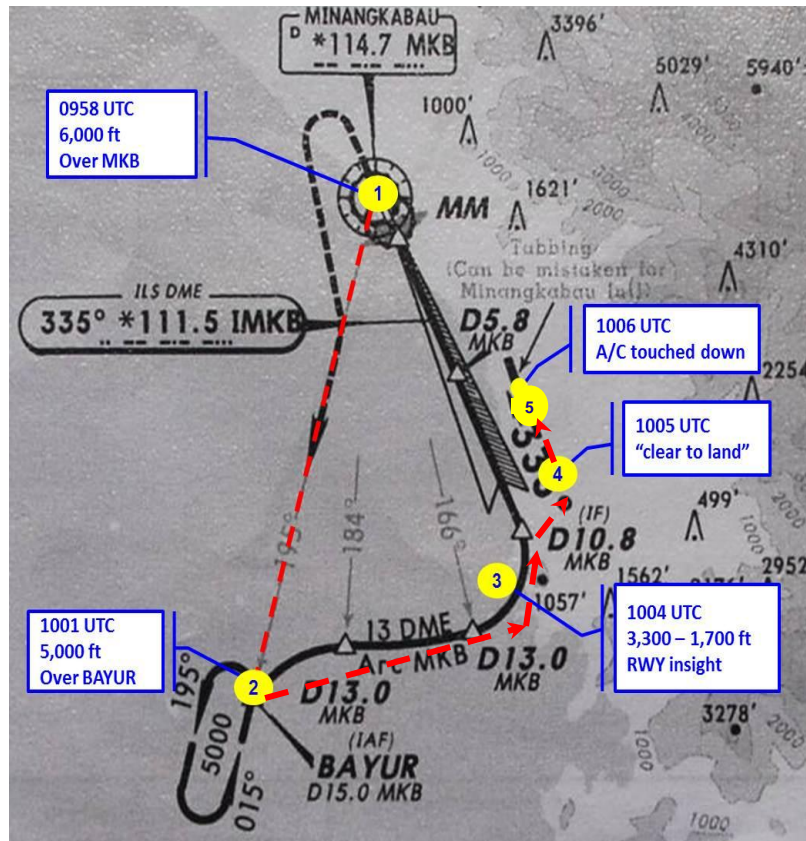


Figure 4: Predicted flight path

2.2 Runway Identification

The ILS approach procedure for Minangkabau showed that at initial approach fix (IAF) the aircraft should maintain the altitude of 3,260 feet until established the localizer and glideslope at 10.8 DME from MKB VOR then continue descend to the decision altitude (DA) at 250 feet.

The ATC communication recorded that at 1004 UTC the pilot reported that the runway in sight, when the aircraft altitude of 3,300 feet.

Based on predicted flight path discussed on chapter 2.1 of this report, at 1004 UTC the aircraft was at approximately 12 Nm from MKB VOR. Based on the interview the PIC saw the runway was approximately 10° on the right of the flight path, and decided to conduct visual approach.

The Tabing Airfield located 6 Nm southeast of Minangkabau Airport at approximately 2 Nm right side of the extension of centreline runway 33. The position when the pilot reported runway insight was approximately 6 Nm to Tabing Airfield.

At altitude of 3,300 feet, the aircraft was on localizer runway 33 Minangkabau and the pilot stated that the aircraft was visually above the glide as the pilot referred to Tabing Airfield.

The PIC assumed that the ILS runway 33 was error which was based on his experience of false indication during conducting VOR approach at Pangkal Pinang Airport. This experience might have affected the judgment to the instrument approach procedure. However according to the predicted flight profile, when the aircraft established to the localizer runway 33 Minangkabau, indicated that the aircraft was on proper flight profile. There was no report of ILS malfunction from the pilots of two aircraft conducted ILS approach runway 33.

The available approach chart in the aircraft was a black and white photocopy. The information available in the approach chart of “*Tabbing (can be mistaken for minangkabau intl)*” was not clearly readable and was not mentioned during the crew briefing.

The occurrence flight was the first flight for the PIC approach on runway 33 Minangkabau. These conditions might have made the pilot did not sufficiently familiar with the approach environment of runway 33.

The absence of significant information “*Tabbing (can be mistaken for Minangkabau intl)*” on approach briefing, previous experience VOR false indication and insufficiently familiar with the approach environment might lead to the mis-identification of the runway when the pilot saw a runway that was almost parallel with the approach path.

2.3 Decision to Land

The pilot stated that when the aircraft established to the localizer at 3,300 feet and saw the runway, the pilot set the rate of descend to 1,700 feet/minute (fpm) and performed a side slip to continue the approach toward the runway in order to get the correct approach profile. The aircraft landed 2 minutes later.

Refer to the Flight Crew Training Manual (FCTM) of the Boeing 737 page 5.4 stabilized approach stated that:

Sink rate is no greater than 1,000 fpm; if an approach requires a sink rate greater than 1,000 fpm, a special briefing should be conducted.

The rate of descend 1,700 fpm and side slip to achieve the correct approach profile was against the stabilized approach criteria otherwise, a special briefing should be conducted.

The decision to land in such condition without special briefing could lead improper cockpit coordination that might increase the risk of flight.

2.4 Attention of the Controller to the Landing Aircraft

The Minangkabau tower controller held a valid Air Traffic Control license that was issued 4 months prior the occurrence. The controller had performed familiarization program by conducting one week observation prior to conduct the duty as aerodrome control tower in Minangkabau. The controller had 4 months experience as aerodrome control tower. At the day of occurrence the controller worked for approximately 1 hour 30 minutes and had rest time before work.

During the occurrence, the Minangkabau Tower controller (Minang Tower) was controlling one aircraft on approach and one on the ground. The approach aircraft was on the left side of the controller while the pushing back aircraft was on the right. Based on interview the Minang Tower stated that the attention was changed to the pushing back aircraft on ground after issued the landing clearance.

According to AC 170-02 chapter 7.1.1.2 stated that aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome. Controlling two aircraft can be considered as a less traffic movement condition and can be assumed as a low workload. However, the controller missed to watch the aircraft on final position.

The CASR 69.033 described the requirements and assessments for air traffic controller ratings including the knowledge, while the applicant shall have demonstrated a level of knowledge appropriate to the privileges granted, in at least the characteristic of air traffic. While the assessment guide shall assess the controller awareness and analysis of traffic situations and planning, sequencing and expedition of the traffic flow.

The absence of aircraft observation might cause an abnormal approach of aircraft on long final was unobserved, un-assessed and unadvised to avoid un-necessary occurrence. This inappropriate implementation of regulations in aircraft observation might possible an indication of insufficient assessment and/or time of under supervision phase.

3 CONCLUSIONS

3.1 Findings⁹

1. The aircraft was certified, equipped and maintained in accordance with existing regulations. There was no evidence of any defect or malfunction in the aircraft that reported prior to the incident.
2. The Flight Data Recorder (FDR) data of the occurrence flight was could not be recovered, and the Cockpit Voice Recorder (CVR) record during approach has overwritten.
3. The flight crew held valid licenses and medical certificates.
4. The Pilot in Command (PIC) acted as Pilot Flying (PF) and the Second in Command (SIC) acted as Pilot Monitoring (PM). The flight was the first flight on that day for the crew.
5. The PIC had flown to Minangkabau for three times used runway 15. The occurrence flight was the first time for the PIC, and the second flight for the SIC approach runway 33.
6. The flight was on Instrument Meteorological Condition (IMC) and considering the weather condition, the PIC requested runway 33 for landing.
7. The runway 33 of Minangkabau was equipped with Instrument Landing System (ILS) which was serviceable and operated normally during the occurrence flight.
8. While establishing the localizer, the PIC saw that the runway at approximately 10° on the right and the aircraft was above the normal glide. Based on previous experience of false VOR at another airport, the PIC assumed that the localizer was wrong, and continued approach to the runway.
9. The pilot flew manually with the rate of descend up to 1,700 feet/minute and performed a side slip to continue the approach toward the runway in order to get the correct approach profile.
10. The Tabing Airfield located 6 Nm southeast of Minangkabau Airport at approximately 2 Nm right side of the extension of centreline runway 33. Since 2005, Tabing Airfield was closed for commercial flight operation and become a military airfield. The runway direction and dimension of Minangkabau and Tabing were similar.
11. The available approach chart in the aircraft was a black and white photocopy. The information available in the approach chart of “*Tabing (can be mistaken for minangkabau intl)*” was not clearly readable and was not mentioned during the crew briefing.

⁹ Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

12. The Minang Tower saw the arriving aircraft on long final was on the left meanwhile the pushing back aircraft was on the right. Based on interview the Minang Tower stated that the Minang Tower attention was changed to the pushing back aircraft on ground after issued the landing clearance for the arriving aircraft.
13. During the occurrence, the Minangkabau Tower controller (Minang Tower) was controlling one aircraft on approach and one on the ground. The Minang Tower attention was changed to the pushing back aircraft on ground after issued the landing clearance.
14. The AC 170-02 chapter 7.1.1.2 and chapter 7.7 stated that aerodrome controllers shall maintain a continuous watch on all flight operations on and in the vicinity of an aerodrome and an aircraft landing or in the final stages of an approach to land shall normally have priority over an aircraft intending to depart from the same or an intersecting runway.
15. The air traffic controller had been experienced for 4 months as aerodrome control tower and had one week as observer prior to conduct as aerodrome control tower in Minangkabau and had performed familiarization program by conducting one week observation prior to conduct the duty as aerodrome control tower.

3.2 Contributing Factors¹⁰

- The unclear significant information in the copy (black and white) of the ILS approach chart might have missed by the pilot and might reduce the pilot awareness to the adjacent airport with similar runway direction and dimension.
- The previous experience of false VOR might have made the approach was continued in an un-stabilized approach condition.
- The information of incorrect runway was not provided during the abnormal approach as it was not observed.

¹⁰ Contributing factors is defined as events that might cause the occurrence. In the case that the event did not occur then the accident might not happen or result in a less severe occurrence.

4 SAFETY ACTION

At the time of issuing this final investigation report, the Komite Nasional Keselamatan Transportasi had been informed of safety actions resulting from this occurrence.

4.1 PT. Sriwijaya Air

On 14 October 2012, the Quality, Safety and Security division issued recommendation as initial safety action following this occurrence.

1. During instrument approach briefing (especially Minangkabau International Airport), both pilots must conduct the complete briefing includes the detail of remarks or caution stated in the approach chart template;
2. The flight execution must follow the procedure as brief before and increase awareness and crew resource management, also the correct flight technique as stated in the SOP (Flight Crew Operation Manual and Flight Crew Training Manual);
3. Avoid scheduling foreign pilot and/or new pilot in command to be paired with initial qualified pilots to fly in the same mission of flight;
4. Copy flight documents specially document which related to the information, SOP and/or flight guidance etc. must be visible and clearly readable by pilots;
5. Re-evaluation of the pilot in command to the competency and knowledge of airport environment area includes the specific weather phenomenon.

On 18 December 2013, the Operation Standard and Training Department issued the bulletin No.05-DS Bulletin-2013 specified the airport category and the content were as follows:

AIRPORT CATEGORY

Airport Category A

These are simple and straightforward airports that have no factors requiring special procedure to enhance the safety aspect of operation. The safety level of operations can be assured and determined by the crew through the study of relevant en-route and approach charts. The PIC is responsible for acquiring the knowledge of that aerodrome.

Category "A" airport satisfies all of the following requirements:

- *An approved instrument approach procedure;*
- *At least one runway with no performance limited procedure for take-off and/or landing;*
- *Published circling minima not higher than 1000ft AFE;*
- *Night operations capability;*
- *The aerodrome is not closely surrounded by mountainous terrain or obstacle.*

Airport Category B

These are airports that do not satisfy the conditions of the Category "A". It requires a written Airport Briefing disseminated to flight crew for proper study, understanding and should certify that he has carried out these instructions to ensure safe level of operations.

Category "B" airport requires extra considerations such as:

- Non Standard Approach aids and/or approach patterns, or*
- Unusual local weather conditions or*
- Unusual characteristics or performance limitations, or*
- Any other relevant considerations including departure/enroute/arrival obstructions, physical layout, lighting etc.*

Airport Category C

Category "C" airport requires additional considerations to a Category "B" airport and is considered to pose certain problems for the approach and/or landing and/or take-off.

Category "C" airfield are subject to Airport Route Qualification (ARQ) procedures for PIC whereby prior knowledge or experience is required. The PIC should be briefed and visit the aerodrome under supervision by Route Instructor and/or undertake instruction in a flight simulator approved by the Authority for that purpose.

The special procedures must be detailed in the Airport Briefing such as:

- Complicated ATC procedures with high density traffic or*
- Difficult or non-standard; departure, approach, and missed approach pattern or*
- Hazardous local weather condition or*
- Hazardous local terrain surrounding the area or*
- Other particular subject that affect normal performance on ground, departure or arrival*

4.2 PT. Angkasa Pura II, branch office Minangkabau International Airport

On 23 October 2012, the Minangkabau International Airport informed the Komite Nasional Keselamatan Transportasi the following safety action as follows:

- Issued NOTAM as follows, "caution to all aircraft destination Minangkabau Airport when established final course RWY 33 to avoid landing RWY 34 at Tabing Airport position 6 NM south east of Minangkabau Airport".*
- Amended the ATC Standard Operation Procedure (SOP) with additional phraseology "report 7 NM" to be used by ATC on duty to warn the pilot which approach using runway 33.*

5 SAFETY RECOMMENDATIONS

The KNKT has received safety actions issued by the related operators concerning to this occurrence and considered that the safety actions were relevant for the improvement.

In addition, KNKT issued recommendations to address the safety issues identified in this investigation.

The Directorate General of Civil Aviation is responsible to monitor the implementation of the recommendations by related parties.

5.1 PT. Sriwijaya Air

- **04.O-2016-61.1**

To emphasize the implementation of stabilized approach procedure.

5.2 AirNav Indonesia District Office Minangkabau Padang

- **04.A-2016-53.2**

To ensure the air traffic controller shall maintain continuous watch as required by the Advisory Circular 170-02.

- **04.A-2016-61.1**

To review the rating assessment process of air traffic controller to ensure the applicant meets the appropriate level of knowledge and ability.

5.3 Directorate General of Civil Aviation

- **04.R-2016-62.1**

To ensure additional information or caution of existing hazard is informed on published Aeronautical Information Publication, including on Instrument Approach Chart.

6 APPENDICES

6.1 National Transportation Safety Board Comment

NO	PAGE	COMMENTS	KNKT RESPONSE
1.	18	1.17.2 Stabilized Approach (Boeing 737-300 FCTM page 5.4) The Boeing Company suggests to cite the Flight Safety Foundation publication rather than directly to cite from Boeing manual and stated that the recommended elements of a stabilized approach on the Flight Safety Foundation publication was cited on Boeing 737-300 FCTM (page 5.4).	KNKT preferred to use the stabilized approach criteria as stated on the Boeing 737-300 FCTM page 5.4 even though the recommended elements were cited from the Flight Safety Foundation. The reason is the pilot has obligation to comply with the aircraft manual rather than the Flight Safety Foundation recommendation.

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