Islamic Republic of IRAN

Civil Aviation Organization

Incident Final Report

State File Number:	**I13940227EPMNI**
Type of Occurrence:	**Incident**
Date of Occurrence:	**17 May 2015**
Place of Occurrence:	**Republic of Armenia**
Aircraft Type:	**A300B4-600**
Registration:	**EP-MNI**
Operator:	**MahanAir**
Date of Issue:	**15 July 2016**

Aircraft Accident

Investigation Bureau

Islamic Republic Of Iran

Civil Aviation Organization

Aircraft Accident Investigation Bureau

Final Report

Basic Information

State File Number: I13940227EPMNI

Type of occurrence: Incident

Date of occurrence: 17 May 2015

Place of occurrence: "Zvartnots" International Airport (UDYZ) .Republic of Armenia

Aircraft Model: A-300B4-603

Registration: EP-MNI

Operator: Mahan Air

Date of Issue : 11 Apr 2016

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Foreword:

According to Aircraft Accident Investigation Act of Civil Aviation Organization of the Islamic Republic of Iran,

Accident investigation shall be conducted separately from any judicial, administrative disposition, administrative lawsuit proceedings associated with civil or criminal liability.

On the basis on Annex 13 to the Convention on International Civil Aviation Organization , Chapter 3, Paragraph 3.1, and Chapter 5, Paragraph 5.4.1; it is stipulated and recommended as follows;

The sole objective of the investigation of an incident or accident shall be the prevention of incidents and accidents. It is not the purpose of this activity to apportion blame or liability.

Any judicial or administrative proceedings to apportion blame or liability should be separated from any investigation conducted under the provisions of this Annex.

Abbreviations:

A/C	Aircraft
ACC	Area Control Center
ALT	Altitude
AP	Autopilot
APP	Approach
ATIS	Automatic Terminal Information Service
BEA	Bureau d'Enquête et d'Analyses pour la sécurité de l'aviation civile
CAO	Civil Aviation Organization
CAS	Calibrated airspeed
CB	Circuit Breaker
CMD	Command
CVR	Cockpit Voice Recorder
EGPWS	Enhanced Ground Proximity Warning System
ENG	Engine
FAF	Final Approach Fix
FDM	Flight Data Monitoring
FDR	Flight data recorder
FIR	Flight Information Region
FL	Flight level
FO	First Officer
FT	Feet
GMT	Greenwich Meridian Time
GW	Gross Weight
IAS	Indicated airspeed
ILS	Instrument Landing System
LAT	Latitude
LONG	longitude
MEL	Minimum Equipment List
MLG	Main Landing Gear
NAV	Navigation
NLG	Nose Landing Gear
PIC	Pilot in Command
PF	Pilot Flying
PNF	Pilot non Flying
QRH	Quick Reference Handbook
R.ALT	Radio Altimeter
RDR	Radar
RWY	Runway
TWR	Tower
VIS	Visibility

Synopsis:

On Sunday, 17.05.2015, the Accident Investigation Department of Civil Aviation Organization of I.R of Iran was notified that an A300, EP-MNI, operated by Mahan Air with flight No; IRM.1150 from the Imam Khomeini International airport (OIIE) to the Zvartnots International Airport (UDYZ) /Republic of Armenia involved an incident which landed before displaced threshold on RWY09 in Zvartnots airport.

The General department of Civil Aviation at the Government of Republic of Armenia has initiated the investigation and According to Annex 13, chapter 5, the Notification was sent to the State of Registry& Operator (Aircraft Accident Investigation Department of I.R of Iran Civil Aviation Organization) and the State of Design &Manufacture (French Aircraft Accident Investigation Bureau-BEA). Due to request of the State of Occurrence, the investigation was delegated to the state of Registry .so The BEA Accredited Representative and his Adviser were introduced to I.R of Iran CAO.

The Flight Data Recorder and Cockpit Voice Recorder have removed from the aircraft. The download of the FDR had performed in Mahan Air laboratory in Imam Khomeini airport and CVR was read out in the Iran Aseman Airline laboratory with attendance of Investigation Team. The State of Manufacturer (BEA) has been provided the information of FDR by investigation team too.

The Main cause of the incident was" incorrect reorganization of Threshold lights by the pilot" so aircraft had landed after temporary approach light just before the threshold.

1. FACTUAL INFORMATION:

1.1 History of the flight:

On MAY 17th, 2015, at 04:27 GMT, the aircraft A306 belonged to the Mahan Air took off from IKA (IMAM KHOMEINI) airport destination to EVN (Yerevan) as a scheduled flight. On this flight the pilot-in-command on left cockpit seat was the Pilot Flying (PF). According to the flight plan, aircraft climbed to FL340 via flight plan route and exit from Tehran FIR via FIR boundary MAGRI at 05:13:49 GMT.

Subsequently at 05:15:21 GMT, the Yerevan ACC controller informed the pilot about radar vectoring for VOR/DME RWY09 for the approach and acknowledged by the pilot. Meanwhile following the pilot request about the serviceability of ILS, the controller advised that: "ILS Unserviceable".

At 05:19:22 aircraft commenced her descent to FL160 and delivered to the approach controller for further descend. When the aircraft was under the control of APP RDR unit, according NOTAM A001/15 the pilot was informed of the displacement of threshold RWY09 by 1450m to the aerodrome reference point by APP controller.

Then, At 05:36:07, the flight was cleared to descend to 5100ft for VOR/DME for RWY09.

AT 05:40:55 about 6 miles on final, the flight was cleared to land by the tower controller.

At 05:42, the pilot was advised by TWR controller that A/C is well below and the flight replied that we are approaching visual with sign of new threshold insight.

Again at 05:42, the TWR controller advised the flight to stop descend and acknowledged by the flight. Finally at 05:44 after landing, the A/C vacated the RWY via taxiway C.

Visual inspection by aerodrome safety personnel has indicated that the A/C landed before displaced threshold and aircraft main wheels have collided with RWY thresholds lights during landing on the ground.

1.2 Injuries to persons:

According to the information provided by the airline, 16 crew and 195 passengers were on board. No injuries were reported.

1.3 Damage to aircraft:

Some minor damages to the main wheels of the aircraft were detected.

1.4 Other Damages:

Two elevated approach lights were damaged by the wheels of the aircraft.

1.5 Personnel Information:

1.5.1 Pilot Flying :(Left Hand Seat)

- Pilot in command
- Male, 58 years old, Iranian Nationality
- Commercial pilot, ATPL (A) No.634 Class 1, from Iran CAO
- Type rating: A300-600
- Valid Medical Certification
- Total flight time: 21500 H
- Flight time on type: 4800 H

1.5.2 Pilot Non Flying: (Right Hand Seat)

- First Officer
- Male, 34 years old, Iranian Nationality
- Commercial pilot, CPL (A) No.3205 Class 2, from Iran CAO
- Type rating: A300-600
- Valid Medical Certification
- Total flight time: 2200 H
- Flight time on type: 900 H

1.6 Aircraft information:

The Airbus A300B4-603, S/N; 408 aircraft with registration EP-MNI was manufactured in 1987. It had Airworthiness Certificate No; 863104, valid until 01 Sep 2017 and issued by I.R.I Civil Aviation Organization. A review of recent records of the aircraft did not show any significant related malfunctions.

According to QRH of this type aircraft with mass 130 kt, the 2260 m length is required for landing on the dry RWY with selection of low auto brake with 40 degree flap configuration. The length of the RWY 09 was suitable for safe landing of this aircraft at the time of incident.

A300-600 MAHAN AIR	LDG DIST AND VAPP	REV 35 SEQ 030	15.05

LANDING DISTANCE - DRY

The Reference Distance (REF DIST) considers : Sea Level (SL), ISA, no wind, no engine reverse thrust, manual landing(1), VAPP=VLS without APPR CORR.

CONF 30/40

Corrections on landing distance (m)		WEIGHT		SPD	ALT	WIND	TEMP	SLOPE	REV
Braking Mode	REF DIST (m) FOR 140T	Per 10T BELOW 140T	Per 10T ABOVE 140T	Per 5kt	Per 1000ft ABOVE SL	Per 5kt TW	Per 10°C ABOVE ISA	Per 1% Down Slope	Rev Avail (one/two)
Max Manual	**1 130**	- 30	+ 190	+ 140	+ 50	+ 120	+ 40	+ 20	0 / 0
autobrake MED	**1 490**	- 50	+ 130	+ 170	+ 70	+ 140	+ 40	+ 10	0 / 0
autobrake LOW	**2 260**	- 80	+ 200	+ 260	+ 100	+ 220	+ 80	+ 50	0 / 0

(1) Automatic landing correction : add 240 meters

CONF 15/20

Corrections on landing distance (m)		WEIGHT		SPD	ALT	WIND	TEMP	SLOPE	REV
Braking Mode	REF DIST (m) FOR 140T	Per 10T BELOW 140T	Per 10T ABOVE 140T	Per 5kt	Per 1000ft ABOVE SL	Per 5kt TW	Per 10°C ABOVE ISA	Per 1% Down Slope	Rev Avail (one/two)
Max Manual	**1 300**	- 70	+ 250	+ 160	+ 70	+ 140	+ 40	+ 30	0 / 0
autobrake MED	**1 700**	- 100	+ 160	+ 190	+ 70	+ 150	+ 60	+ 20	0 / 0
autobrake LOW	**2 620**	- 150	+ 240	+ 300	+ 120	+ 230	+ 90	+ 50	0 / 0

1.7 Meteorological Information:

METAR at 05:30 GMT

Variable 2 m/s VIS 10 km or more Temp. +13 D.P. 10 QNH. 1018 hpa

The meteorological conditions recorded in ATC communication upon landing time were:

Wind calm. CAVOK and QNH1018

1.8 Aids to Navigation:

According NOTAM A0011/15, ILS & PAPAI for RWY 09 in Zvartnots International Airport (UDYZ) was out of service.

1.9 Communications:

No technical communication problems reported by the flight crew. Also whole transcript of recorded communication of the air traffic control units were delivered to IRI CAO Investigator in charge and used for the incident analysis.

1.10 Airport Information:

UDYZ/EVN ZVARTNOTS International Airport is Just 12 km from the center of the capital of Armenia-Yerevan.

ICAO	IATA	AIRPORT NAME	CITY	COUNTRY (STATE/PROVINCE)
UDYZ	EVN	Zvartnots International	Yerevan	Armenia
elevation: 2,838' (865m)			location: N40 8.84 E044 23.75	

ATIS 119.5	Yerevan Approach 126.0 124.0	Yerevan Ground 119.0	Yerevan Tower 128.0 124.0

Runway	Dimension	ILS	note
09 - 27	*3850m x 56m*	yes	Asphalt

At the time of incident the available RWY Length was 2400m (3850 meters excluding Displaced Threshold 1450m). The related issued NOTAM is:

(A0011/15 NOTAMN
Q) UDDD/QFAXX/IV/NBO/A/000/999/4009N04424E005
A) UDYZ B) 1505040930 C) 1506300800
E) A/P YEREVAN (UDYZ) THRESHOLD RWY 09 REPLACED TO THE CENTER OF THE RWY BY 1450M.
AT THAT TIME ILS AND PAPI FOR RWY 09 OUT OF SERVICE.
SIMPL APPROACH LIGHTING SYSTEMS WILL BE AVAILABLE (SINGLE SOURCE) FOR RWY 09 ACCORDING TO FIGUER A-7, ANNEX 14 ICAO.
AT THAT TIME 180 DEGREE TURN OF THE AIRCRAFT ON THE RWY 09/27 IS APPROVED FOR TAKE OFF RWY 09 AND LANDING RWY 27.
FOR RWY 09 TORA (M)-2400, TODA (M)-2800, ASDA (M)-2400, LDA (M)-2400
FOR RWY 27 TORA (M)-2400, TODA (M)-2850, ASDA (M)-2400, LDA (M)-2400
CAT 1 AND 2 OUT OF SERVICE.)

(A0014/15 NOTAMN
Q) UDDD/QPICH/I/NBO/A/000/999/4009N 04424E005
A) UDYZ B) 1505040930 C) 1506300800
E) DUE TO REPAIRING RWY 09 (REF A0011/15 NOTAMN),
IAC VOR/DME RWY09 AND IAC RNAV (GNSS) RWY09 CHARTS ARE CHANGED:
FOR IAC VOR/DME 09:
-FAF DISTANCE FROM ZVR 12.5KM CHANGED TO 11KM.
-ON CHART TABLE ALT ARE CHANGED DEPENDING ON FINAL APPROACH DISTANCES.
ZVR DME11-5100', ZVR DME9-4747', ZVR DME7-4402', ZVR DME5-4056',
ZVR DME3-3711', ZVR DME1-3366'
FOR IAC RNAV (GNSS) RWY09:
FAF AND THR (MAPT) COORD ARE CHANGED
-FAF NEW COORD 400846.79N 0441412.49E
-THR (MAPT) NEW COORD 400850.07N 0442325.11E)

There was a lined threshold sign marking with elevated lights on the displaced threshold with ended white chevrons on beginning of RWY 09.

On the beginning of the displaced area, there was a row of elevated lights which used as approach lights. In this area, the edge line of RWY before displaced threshold was covered by black color. While displacing of this runway, closed marking signs in displaced area could help pilot to distinguish more about displaced area.

1.11Flight Recorders:

This aircraft has been equipped with DFDR and CVR. At the place of incident , the CB of CVR system was pulled out and aircraft dispatched based on MEL . The DFDR was picked up from relatively undamaged compartment of aircraft in a very good condition in IKA airport and presented to Mahan Air Flight Data Monitoring Shop in order to download /analysis. Also according to request of French Authority (BEA) as the state of manufacturer, the Row Data File of DFDR was sent to BEA for further investigation.

1.11.1 Cockpit Voice Recorder:

Made: FAIRCHILD Type: SSCVR

Type Number: 2100-1020-02 Serial number: 00214403

Condition of the Recorder was serviceable with no damaged .The operation of the CVR recording was not stopped by the pilots, while this incident has happened, so far more than 2 hrs the CVR was engaged and the recorded cockpit voices at the time of incident were lost.

1.11.2 Flight Data Recorder:

Condition of the Recorder: no damaged, serviceable.

Made: Honeywell Type: SSFDR

Type Number: 980-4700-042 Serial number: 6634

The download of the FDR was successful .The initial evaluation of the flight data revealed known aircraft configuration.

1.11.3 Flight Data Recorder findings:

The following data are a sequence of events based on FDR data. Time references are based on recorded GMT time of the FDR.

Approach sequences:

Just before reaching the FAF, the aircraft was leveled at 5100 ft QNH with:

- AP1 and both FDs engaged in ALT/HDG modes
- A/THR engaged in SPEED mode
- GW=129T ≤ MLW (= 138T)
- Recorded Baro setting : 1018hPa on CPT side, 1017hPa on F/O side

The whole analyzed useful parameters are descripted as:

Time(GMT)	FDR information	Notes
05:42:14	R.ALT = 630ft AP1 Off	AP1 disconnection
05:43:37	Press ALT=2864 ft R.ALT=50 ft Gear =down CAS=134 A/THR MAN THROTTLE	The pilot put off Auto throttle.
05:43:39	Press ALT=2851 ft R.ALT=43 ft Gear =down CAS=134 NAVLat = 40.14694 NAVLong = 44.36846	Aircraft was ready to land
05:43:42	Press ALT=2823 ft R.ALT=18 ft Gear =down CAS=134 NAVLat=40.14694 NAVLong=44.38562	Aircraft was ready to land
05:43:48	Press ALT=2800ft R.ALT= 0 ft ML/G Gear Compressed CAS=130 Acceleration = 1.21	LH-RH Gear touched the RWY
05:43:53	Press ALT=2800ft CAS=117 Eng1 N_1 =53→74 , Eng2 N_1 =47→64	Both Engine thrust reversers were activated

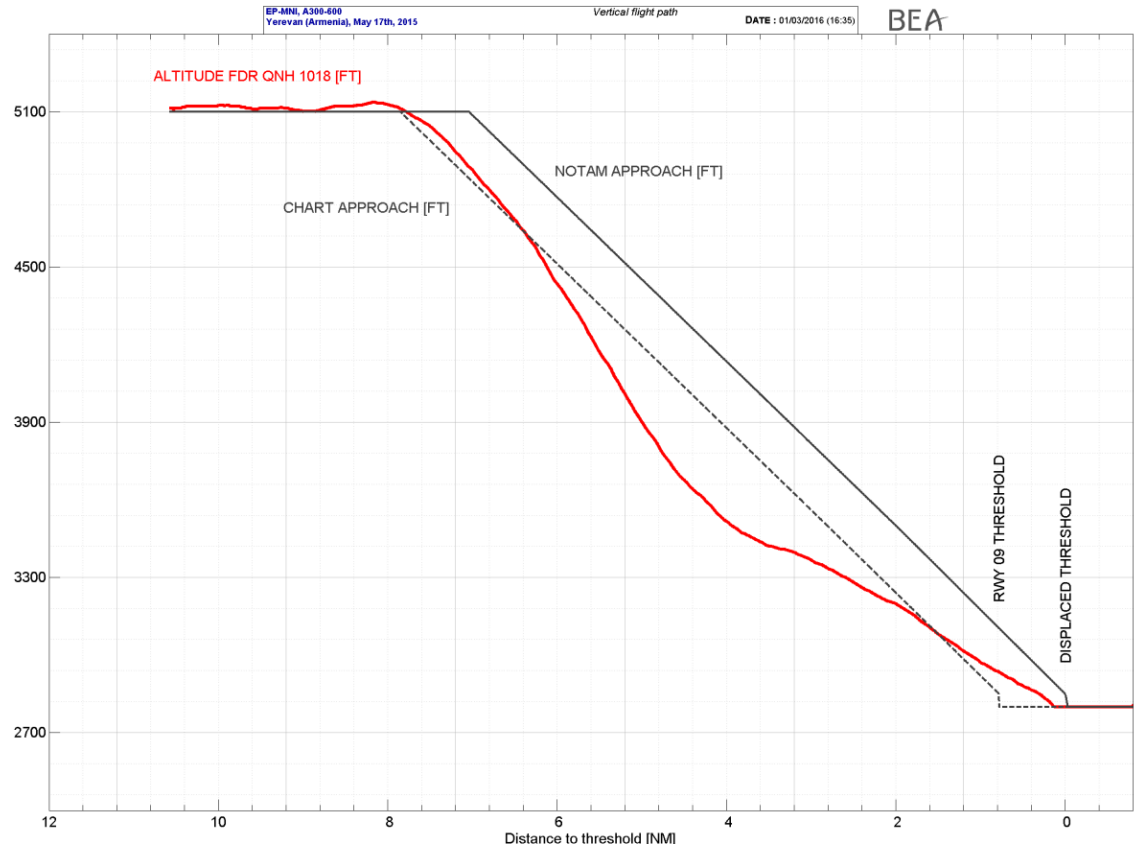
1.11.4 Flight path computation:

Distance to the displaced threshold was computed from positions recorded in the FDR.

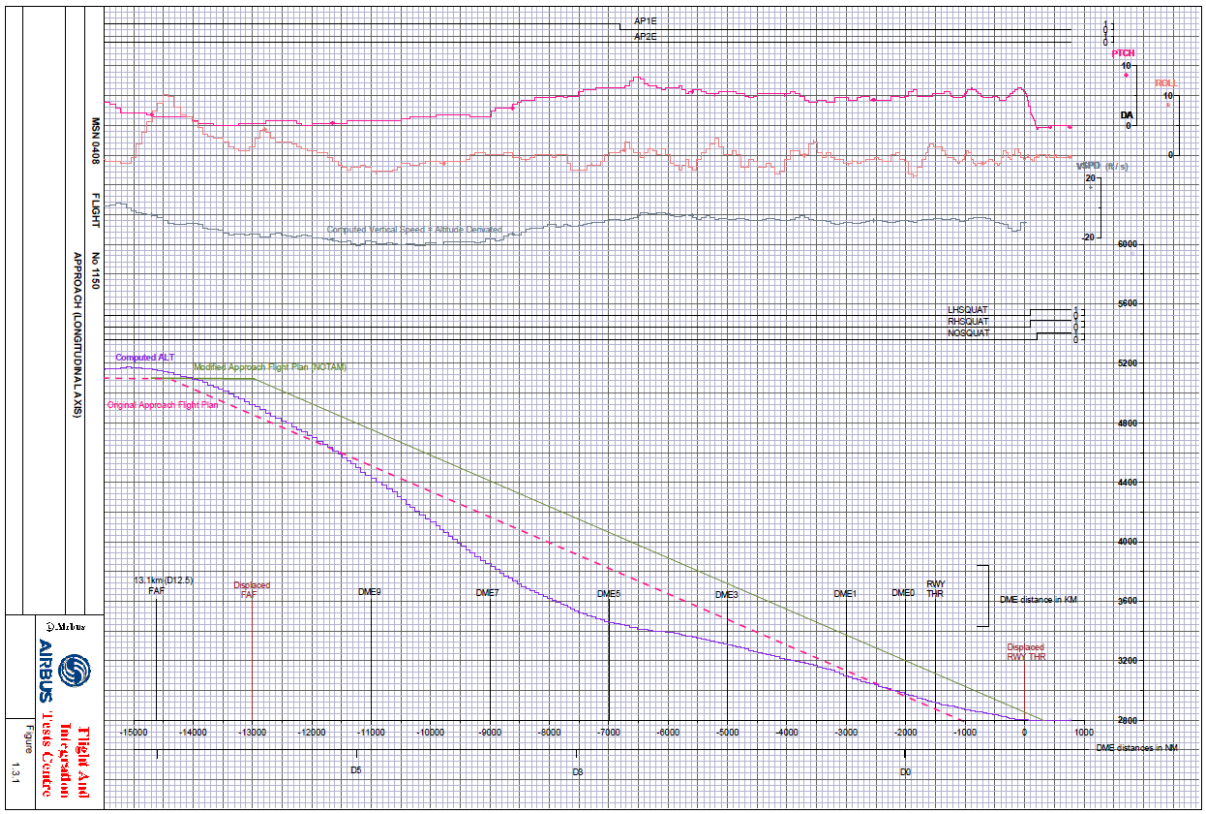
Positions were corrected so that the aircraft Main L/G position at the time of touch down is before displaced threshold.

A vertical flight path was computed from recorded pressure altitude and distance to the displaced threshold. On the following plot, FDR altitude values were corrected with QNH 1018 and levelled to 2800 ft when recorded below 2800 ft.

The flight path is compared to the approach path described in the NOTAM and the approach path of the approach chart (dashed line).



The flight safety office of the Airbus Co. also performed a vertical flight path computation which has similar results.



1.12 Wreckage and Impact Information:

After landing of aircraft in the destination (EVN), the visual inspection was made on the aircraft and RWY threshold with these results:

- There was not any deflection on the airframe and control surfaces.
- There are signs of impact of elevated threshold light on the main gear tire.

1.13 Medical and Pathological Information:

The Alcohol tests were done for both pilot and co-pilot by request of Armenian Authority immediately after the incident and the result analysis was Negative.

1.14 Fire:

No fire occurred for the aircraft.

1.15 Survival Aspects:

Nobody was injured in this incident, so survival aspects are not considered.

1.16 Tests and Research:

The raw data of FDR was sent to the BEA/ France for read out. The read out of FDR parameters had some differences from FDM of the Operator, so some corrections of available data were made.

1.17 Organizational and Management Information:

Mahan Air is an Iranian private airline that offers passenger and cargo services, including domestic and international flights. The company's corporate office is in Mahan Air Tower, Azadegan St., Karaj Highway, Tehran. This Airline operates a fleet of more wide body airplanes, consisting of Airbus 300s, 310s, 340s; Boeing 747s and BAe-146s.

1.18 Additional Information:

The pilot used "JEPPESEN "approach chart available in his IPAD for flying to the EVN airport and no difference was detected with Armenian AIP.

1.19 Useful or Effective Investigation Techniques:

The standard and normal techniques were applied.

2. ANALYSIS:

On 17 May 2015, at the morning time of the day both pilots were attended in Dispatch office of Mahan Air in Imam Khomeini Airport (IKA)/Tehran. The dispatcher delivered flight document bag to the pilot without concentration about EVN NOTAM. The crew briefing has been done in the dispatch but the pilot did not pay attention to the available NOTAM in flight documents so far coordination between him and his first officer was not done.

The aircraft took off from RWY 29 R IKA (Imam Khomeini) airport destination to EVN (Yerevan) as a scheduled flight. On the whole time of flight the pilot-in-command on left cockpit seat was the Pilot Flying (PF). The cruise flight level was FL340 and the flight has entered Yerevan FIR via point MAGRI.

Subsequently, the Yerevan ACC controller informed the pilot about radar vectoring for VOR/DME RWY09 for the approach and acknowledged by the pilot. Based on listening to ATIS, the copilot request about the serviceability of ILS, the controller advised that: "ILS Unserviceable".

Then the aircraft was cleared to perform approach. The pilots didn't have enough information about NOTAM while performing initial briefing. The flight was requested to descend to FL160 and delivered to the approach controller for further descent. When the aircraft was under the control of APP RDR unit, according NOTAM A001/15 the pilot was informed of the displacement of threshold RWY09 by 1450m to the aerodrome reference point by APP controller.

Then, the flight was vectored to descend to 5100ft for VOR/DME for RWY09. According to mentioned NOTAM the final approach fix point (FAF) position displaced about 1.5 KM near to the RWR 09 of EVN airport.

FOR IAC VOR/DME 09:
-FAF DISTANCE FROM ZVR 12.5KM CHANGED TO 11KM.

With this correction, the flight should be level off from 5100 feet about 7 DME from the threshold but the pilot began it from 8 DME according to JEPPESEN available approach chart in his IPAD and the text of NOTAM was not considered by the pilot so he made VOR/DME approach chart for RWY 09 based on uncorrected chart. While the pilots were informed about displaced runway , the pilot decided to continue flight at visual approach and use maximum length of the shorten runway so the flight path shows below glide path. Since provided NOTAM have not been read completely by the cockpit crew, so they were not fully informed about the situation mentioned in the NOTAM

AT 05:40:55 about 6 miles on final, the flight was cleared to land by the tower controller.

At 05:42:00 and elevation of about 3500 ft., the pilot was advised by TWR controller that A/C is well below and the flight replied that we are approaching visual with sign of new threshold insight. So far the pilot decreased the rate of aircraft descend and observed continues of the flight via visual condition.

The pilot did not recognize the temporary approach elevated lights so his concentration was on threshold elevated lights .Finally at 05:43:48 the aircraft has landed just before threshold of RWY 09. The touch points of MLG wheels were just before threshold and the touch points of NLG wheels were after threshold so aircraft main wheels have collided with RWY thresholds lights during landing on the ground. Then the aircraft vacated the RWY via taxiway C. Visual inspection by aerodrome safety personnel has indicated that the A/C landed just before displaced threshold.

Although considering those mentioned matters for the real root cause of the incident; there were not enough closed marking signs before threshold lights to prevent landing in this unauthorized displaced area according standard criteria in Annex14. It was recommended in annex 14 that:

7.1.1 A closed marking shall be displayed on a runway or taxiway or portion thereof which is permanently closed to the use of all aircraft.

7.1.2 **Recommendation.—** *A closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.*

3. CONCLUSIONS:

3.1. Findings:

- Lack of pilot attention to the available NOTM in flight documents.
- Lack of briefing between flight dispatcher and flight crew before departure about NOTAM.
- Noncompliance of cockpit crew to controller advice.
- If The Closed marking before runway threshold of EVN airport was observed, it could help the pilot to distinguish displaced area more.

3.2 Main Cause:

The main cause of this incident was "Human Error" of the pilot to review required flight documents before flight to prepare condition of flight for the destination .

3.3 Contributive Factors:

- Human error of the dispatcher for enough crew briefing
- Lack of attention of the copilot to warn the pilot about displaced area

4. SAFETY RECOMMENDATIONS:

The safety & accident investigation Department of I.R of ran Civil Aviation Organization issues the following recommendations:

- Mahan Air should investigate those irregularities identified in this report.
- Mahan Air should analyze the Flight Rules and AIP for consistency with the ICAO regulations in the Procedures for Air Navigation Services - Aircraft Operations (PANS-OPS –Doc 8168 OPS/611) as to visual maneuvering during approach to land. To eliminate the identified inconsistencies.
- Mahan Air should consider revising and, if necessary, amending or supplementing Flight Operation Instructions for other aerodromes and FOMs for any designated airports.
- Mahan Air should consider revising operation procedure to confirm of crew briefing in the Dispatch an flights
- The General Civil Aviation Authority of Armenia should concern about findings of this report to make better supervision to the airports in the country to reach high levels of safety.