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MINISTÉRIO DAS OBRAS PÚBLICAS, TRANSPORTES E COMUNICAÇÕES
GABINETE DE PREVENÇÃO E INVESTIGAÇÃO DE ACIDENTES COM AERONAVES

AIRCRAFT INCIDENT SUMMARY REPORT

Date/Time: 2010 / 05 / 29 @ 16:16 UTC[1]	**Proc. Nr.:** **06 / SUM / 2010**
Operator: Norwegian Airshuttle ASA Brussels Airlines	**Type of Incid.:** Loss of Separation
Id. of aircraft: Boeing B-737/800, registration **LN-DYA,** flight **NAX-1782** Boeing B-737/400, registration unknown, flight **BEL-52F**	
Local: Faro Airport (LPFR)	
Type of flight: Passengers Transport	**Phase of flight:** Landing
People on board: Crew / Pax: 6/NA	**Injuries:** Nil
Aircraft Damage: Nil	
Other Damage: Nil	

Synopsys: The aircraft was flying from Oslo (Gardermoen) (ENGM) to Faro (LPFR), operating a passenger's transport flight (NAX-1782), and received radar vectors, in order to intercept localizer, for landing at Faro runway 28.

About to capture localizer, with traffic 6NM ahead (BEE-8HW), TWR requested to reduce speed to 160kt, intending to intercalate a departure between both landing aircrafts. At about 2000ft RA, NAX-1782 was instructed to reduce to minimum approach speed, but, when the preceding aircraft landed and BEL-52F was cleared to line up, it was about 3NM far from threshold.

NAX-1782 got clearance to land only at 50ft RA, crossing the threshold, with BEL-52F becoming airborne 1NM ahead.

GPIAA
Homologo, nos termos do nº 3 do artº 26º do D. L. 318/99, de 11 de Agosto de 1999
16.MAY.2011
O Director,
Fernando Ferreira dos Reis

[1] - All times in this report, unless other specified, are UTC (Universal Coordinated Time). By that date, local time in mainland Portugal was equal to UTC + 1 hour.

1. Factual Information

1,1 History of the Flight

Norwegian Company "*Norwegian Airshuttle ASA*" flight NAX-1782 (*call sign "Nor Shuttle" 1782*) from Oslo (ENGM), in Norway, with destination Faro (LPFR), in Portugal, was operated on a Boeing B-737/800, registration LN-DYA, with six crew and a non declared number of passengers on board.

The weather in Faro was fine, with sky clear and good visibility, westerly moderate wind (*250/11*) and temperature of 23ºC, being runway 28 in service for take-off and landing operations.

NAX-1782 was radar vectored to intercept localizer for runway 28 and at 16:11:50, intercepting the localizer, contacted Faro Tower (TWR) for the first time, being instructed to "*continue the approach*". Later (16:12:20), asked for its airspeed, the flight was instructed to keep 160kt on final and, at 16:13:05, it was requested to reduce to minimum approach speed.

At 16:12:50, flight BEL-52F, a Brussels Airlines' Boeing B-737/400, was instructed to line up behind landing Jersey's Embraer E-190 aircraft (BEE-8HW), which was ± 4NM ahead of NAX-1782.

Meanwhile, even keeping minimum approach speed, NAX-1782 was gaining distance on BEE-8HW and, by 16:14:18, TWR informed NAX-1782 to expect late landing clearance because there would be traffic departing between him and preceding flight.

At 16:14:40 BEL-52F was instructed to expedite line up and, on sequence (16:15:11), BEE-8HW was instructed to expedite vacating runway via taxiway "D" (*by that time NAX-1782 was full established on ILS and about 3NM from threshold, passing 1000ft*).

BEL-52F was cleared for take-off at 16:15:31 and readback clearance terminated at 16:15:49, when take-off roll started.

By 16:16:01 NAX-1782 was instructed to continue the approach, getting landing clearance by 16:16:22, almost 50ft above threshold. When PNF terminated readback the aircraft was touching down.

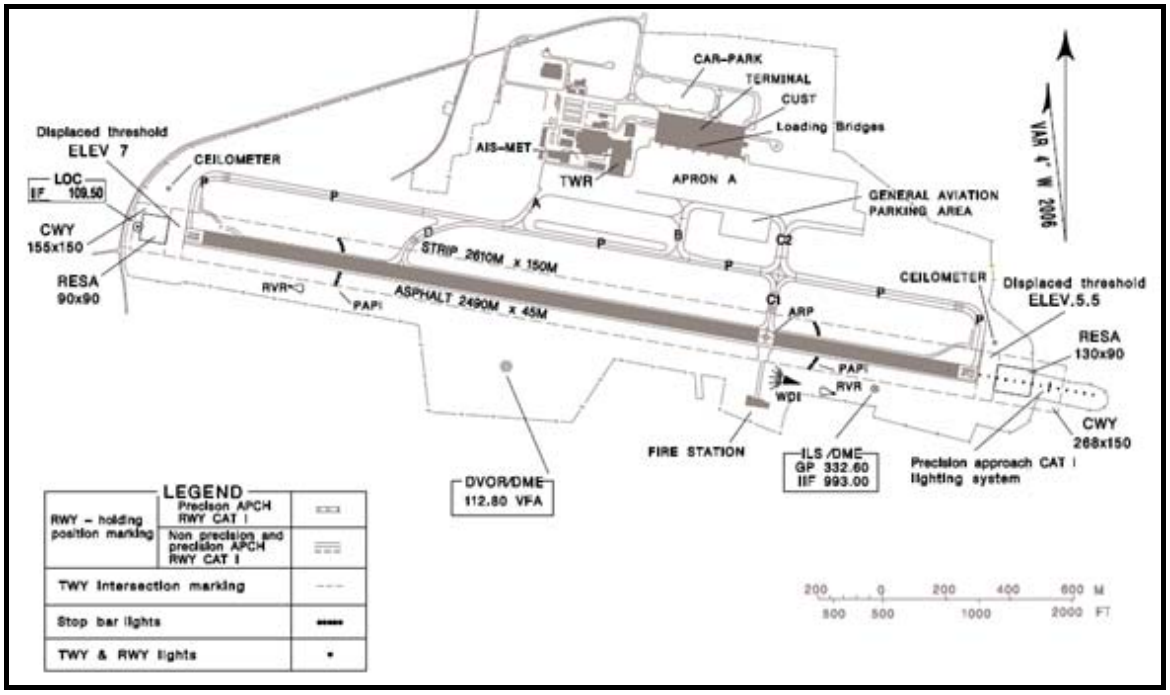
"*Nor Shuttle*" touchdown occurred at 16:16:44, with BEL-52F passing 100ft, climbing, ±1NM ahead.

1.2 Faro Airport Information & Procedures

1.2.1 Airport Layout & Runway Dimensions

Faro airport is classified as an international airport and is part of AIP Portugal list of aerodromes. All particular information related to it is referred on chapter AD-2.

There's only one landing strip, located between airport buildings and the sea (*picture nr 1*).



Picture Nr 1

Runway designation is RW10 & RW28, equipped for night and instruments operation, with following dimensions and landing aids available:

RWY	TORA	TODA	ASDA	LDA	AIDS
10	2490	2758	2490	2445	THR & RWY centre/edge/end Lights; PAPI 3º; NDB; DME; DVOR
28	2490	2645	2490	2445	APCH, THR & RWY centre/edge/end Lights; PAPI 3º; NDB; DME; DVOR; ILS/DME ; RVR

1.2.2 Operational Procedures

Special procedures for aircraft's operation are referred on chapters AD-2.20 to AD-2.23.

AD 2.20 LPFR Local traffic regulations	AD 2.22 LPFR Flight procedures
AD 2.21 LPFR Noise abatement procedures	AD 2.23 LPFR Additional information

There are no significant changes from ICAO standard procedures and the most important, relating arrival aircrafts are those expressed in 2.22.3.2:

2.22.3.2 RUNWAY 28

2.22.3.2.1 GENERAL REMARKS

NIL

1.5.5.2.2 **SPEED ADJUSTMENT:**

See ENR Section 1.5, sub-section 1.5.5 – Radar procedure within Lisboa, Faro, Porto and Madeira TMAs

Reverting to AIP Portugal ENR section 1.5, the following procedures apply:

1.5.5 RADAR PROCEDURE WITHIN LISBOA, PORTO, FARO AND MADEIRA TMA'S

1.5.5.1.1 Within LISBOA FIR TMAs, unless otherwise advised by ATC, speed adjustment under Radar Control on Arrivals to Alverca (LPAG*), Cascais (LPCS AD 2.), Faro (LPFR AD 2), Lisboa (LPPT AD 2), Madeira (LPMA AD 2), Montijo (LPMT), Porto (LPPR AD 2) and Porto Santo (LPPS AD 2) shall be in accordance with the following:

1. *Maximum IAS 280KT between FL245 and FL100;*
2. *Maximum IAS 250KT at and below FL100;*
3. *Maximum IAS 220KT at and below FL070;*
4. *Maximum IAS 200KT at and below 4000FT;*
5. *Maximum IAS between 180KT and 160KT when established on the final approach segment and thereafter 160KT until 4NM from Threshold*

Additionally, ATC may request specific speeds for accurate spaces.

Pilots are requested to comply with speed adjustments as promptly as feasible within their own operational constraints, advising ATC if circumstances necessitate a change of speed for aircraft performance reasons.

1.5.5.2 Radar vectoring and sequencing

1.5.5.2.1 Normally, aircraft will be vectored and sequenced from any point of a STAR procedure to the appropriate final approach track, so as to ensure an expeditious flow of traffic. Radar vectors and flight levels/altitudes will be issued, as required, for spacing, and separating the aircraft, so that correct landing intervals are maintained, taking into account aircraft characteristics.

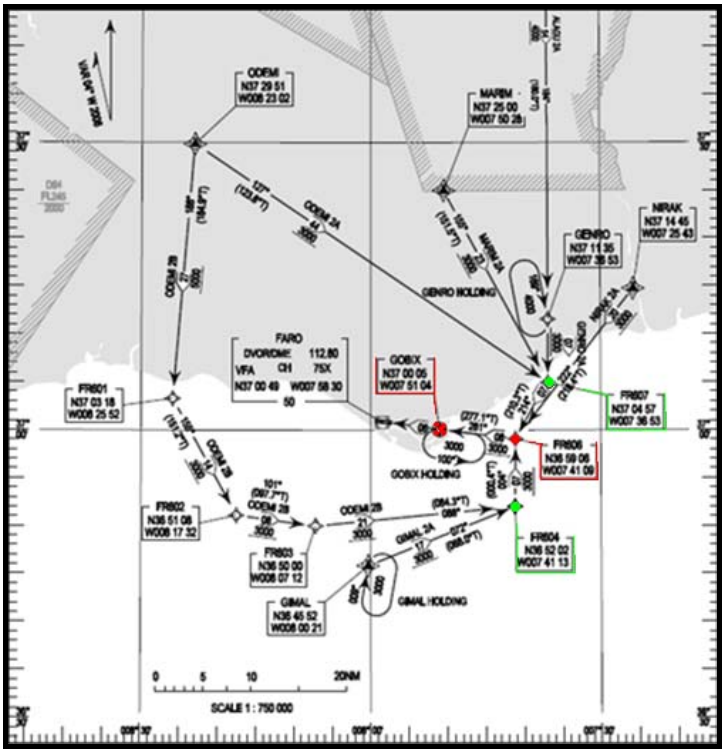
1.5.5.2.2 Within Faro TMA radar vectoring will be provided only at or above 3000FT. Below that altitude only radar monitoring of air traffic will be provided.

1.2.3 Standard Arrival (STAR) Procedures

AIP Portugal Chapter 2.22.3 shows standard procedures to be followed when approaching Faro aerodrome and depicts STAR for different runways.

According with ATC clearance delivered, aircraft proceeding to runway 28 will follow one of the routes indicated on opposite chart (*picture nr 2*) and descript on table shown bellow, converging for IAF (GOBIX), via FR606 point, from intermediate points FR607, for those approaching from North, or FR604, for flights approaching from South.

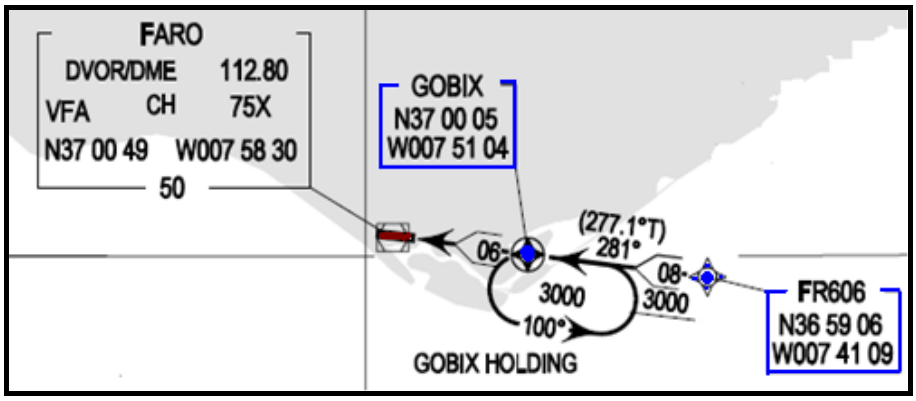
ATC may change these routings, issuing radar vectors, for better traffic separation and management (*§1.5.5.2.1 above*).



Picture Nr 2

FMS RNAV ARRIVAL (STAR) DESCRIPTON:					RWY 28
STAR Designator	**Significant Points**	**Magnetic Track**	**Distance (NM)**	**MSA (ft)**	**Remarks**
ALAGU2A GENRO2A	ALAGU GENRO FR607 FR606	 184 214	 054 007 07	 4000 3000 3000	Clearance Limit: **GOBIX** (IAF)
MARIM2A	MARIM FR607 FR606	 155 214	 23 07	 3000	
ODEMI2A	ODEMI FR607 FR606	 127 214	 44 07	 3000	
NIRAK2A	NIRAK FR606	 222	 20	 3000	
ODEMI2B	ODEMI FR601 FR602 FR603 FR604 FR606	 188 155 101 088 004	 027 14 08 21 07	 5000 3000 3000 3000 3000	
GIMAL2A	GIMAL FR604 FR606	 072 004	 017 07	 3000	
ALL	**FR606 GOBIX**	**281**	**08**	**3000**	

Final sector (*picture nr 3*) is common for all STAR and usually takes the aircraft to ILS course and final approach path for landing.



Picture Nr 3

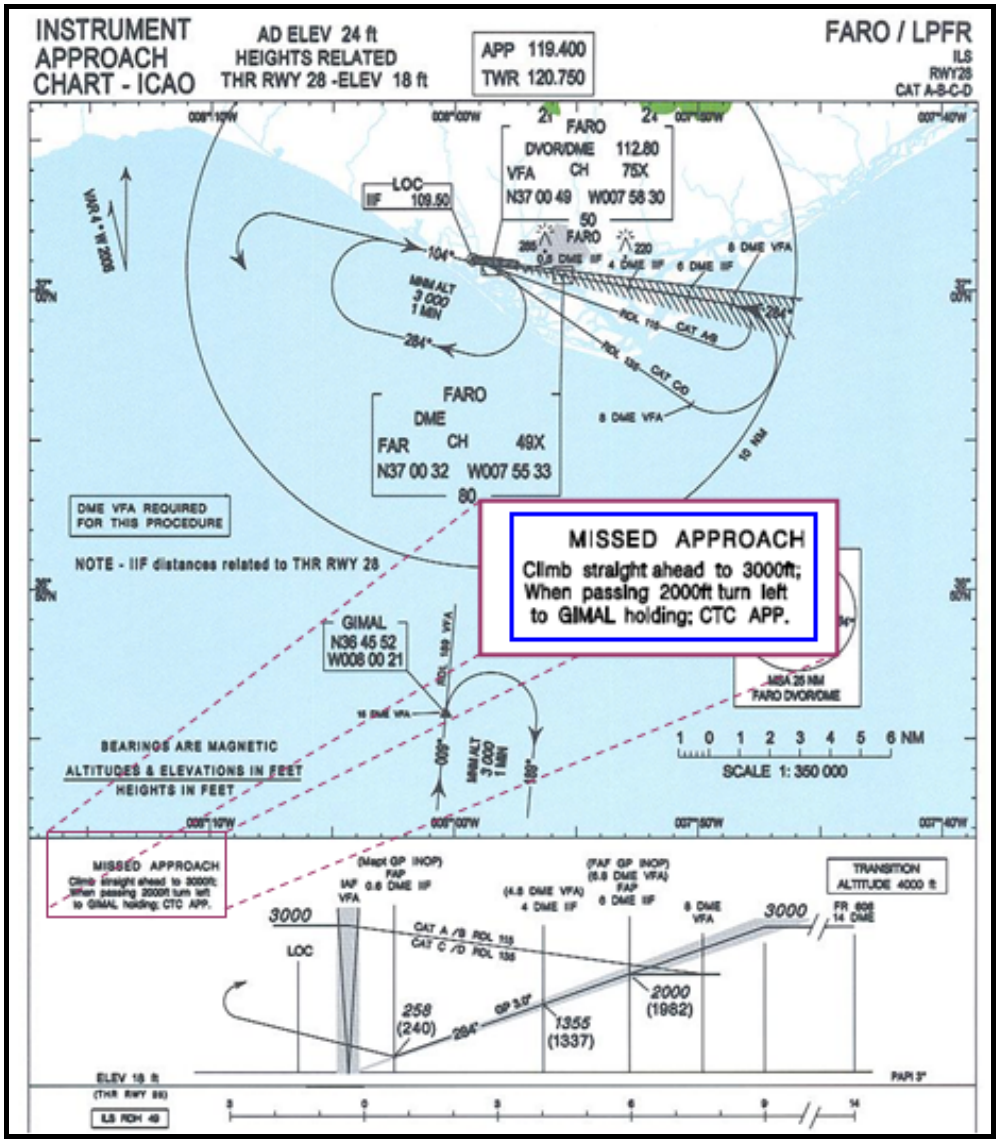
Radar vectoring, uses to position the aircraft on this final course, in preparation for an ILS, VOR/DME, NDB or visual approach procedure for RWY 28.

1.2.4 Runway 28 ILS Approach Procedures

To complement the above descript procedures, there's a final approach procedure for landing, with electronic guidance aids for lateral & vertical profile computation, the Instrument Landing System (ILS), allowing aircraft landing with marginal weather and reduced visibility.

Following radar vectors or proceeding from FR606 & GOBIX, maintaining altitude 3000ft, aircraft must intercept localizer course (284º) and, by 9NM (from the field) should intercept and follow the glide path, down to minimum altitude (variable with aircraft category).

In case a landing can not be performed, a missed approach should be initiated and chart procedure followed, unless ATC gives other instructions. Faro ILS Chart shows respective procedure (*see insert on picture nr 4*).



Picture Nr 4

1.2.5 Standard Departure Procedures

Aircraft departing on RWY 28 should follow standard procedures depicted in AIP Portugal Chapter 2.22.1.2 bellow.

2.22.1.2. RUNWAY 28

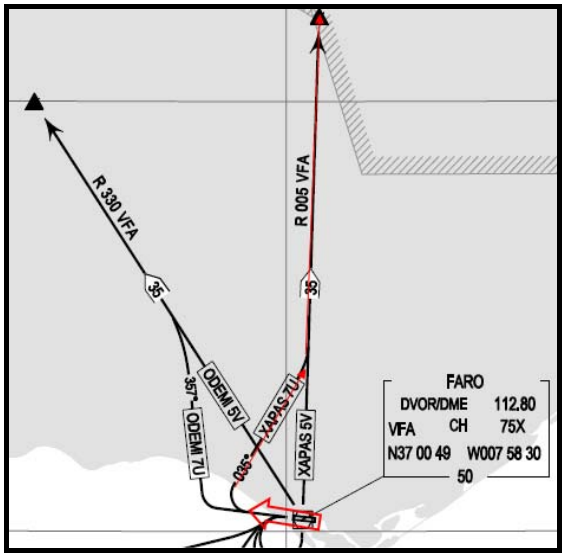
2.22.1.2.1 GENERAL REMARKS:
NIL

2.22.1.2.2 NOISE ABATEMENT PROCEDURES:
In accordance with AD 1.1 para 1.1.6.1.

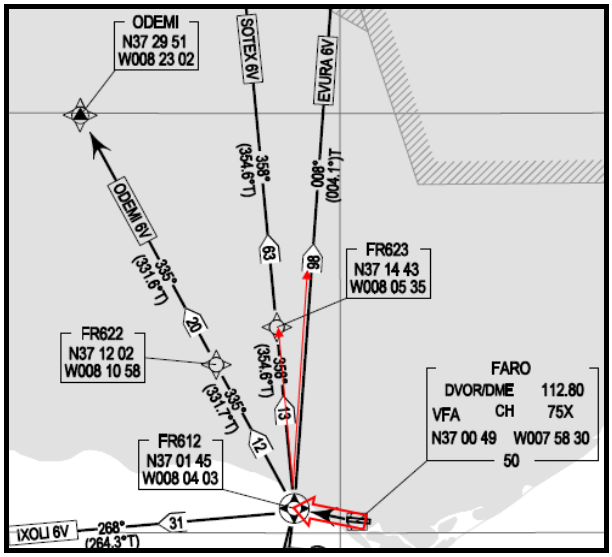
2.22.1.2.3 RADAR VECTORING:
Radar Vectoring involving deviation from SID may be used by Faro Approach to expedite traffic.

Traffic flying north must use Standard Instrument Departures (SID) or RNAV SID as shown on table bellow, depending on equipment installed on board and time of departure, according with assigned SID.

RWY 28 STANDARD INSTRUMENT DEPARTURE (SID) DESCRIPTION: (*see picture nr 5*)				
Designator	**Route**	**After Take-off**		**Remarks**
		Climb to	**Contact**	
XAPAS7U	Climb on Runway heading. When passing 3000FT QNH but not before 4NM VFA DVOR/DME, turn right track 035º to intercept and proceed on Radial 005 VFA DVOR/DME to XAPAS.	FL060	FARO APPROACH 119.40 MHZ	To be used BTN 0800 to 2200. Alternative XAPAS 5V



Picture Nr 5



Picture Nr 6

RWY 28 FMS RNAV DEPARTURE (SID) DESCRIPTION: (*see picture nr 6*)				
Designator	**Route**	**After Take-off**		**Remarks**
		Climb to	**Contact**	
SOTEX 6V	Climb on Runway heading direct to FR612. Turn right to FR623 - SOTEX	FL060	FARO APPROACH 119.40 MHZ	
EVURA6V	Climb on Runway heading direct to FR612. Turn right direct to EVURA	FL060	FARO APPROACH 119.40 MHZ	

In both cases, FMS RNAV Departure or Standard Departure, aircraft must keep runway heading until passing 3000ft or FR612.

1.3 Separation Minima Between Aircraft - ICAO Regulations & Procedures

1.3.1 General

ICAO Doc 4444 – ATM/501 deals with Procedures for Air Navigation Services / Air Traffic Management and it's the main tool for flight procedures and operations, in conjunction with other relevant documents like Doc 7030, Doc 8168 and Doc 9426, between others.

In this chapter, Doc 4444 – ATM/501 fifteenth edition, will be the main source of reference.

Note: Highlights to following regulations are author's responsibility.

5.2 Provisions for the Separation of Controlled Traffic

5.2.1.1 Vertical or horizontal separation shall be provided:

a) between all flights in Class A and B airspaces;
b) between IFR flights in Class C, D and E airspaces;
c) between IFR flights and VFR flights in Class C airspace;
d between IFR flights and special VFR flights; and
e) between special VFR flights, when so prescribed by the appropriate ATS authority; except,
……

5.2.1.2 No clearance shall be given to execute any manoeuvre that would reduce the spacing between two aircraft to less than the separation minimum applicable in the circumstances.

1.3.2 Separation in the Vicinity of Aerodromes

5.7 Separation of Departing Aircraft from Arriving Aircraft

5.7.1 Except as otherwise prescribed by the appropriate ATS authority, the following separation shall be applied when take-off clearance is based on the position of an arriving aircraft:

5.7.1.1 If an arriving aircraft is making a complete instrument approach, a departing aircraft may take off:

a) in any direction until an arriving aircraft has started its procedure turn or base turn leading to final approach;
b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach after the arriving aircraft has started procedure turn or base turn leading to final approach, provided that the takeoff will be made at least 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway (see Figure 5-38).

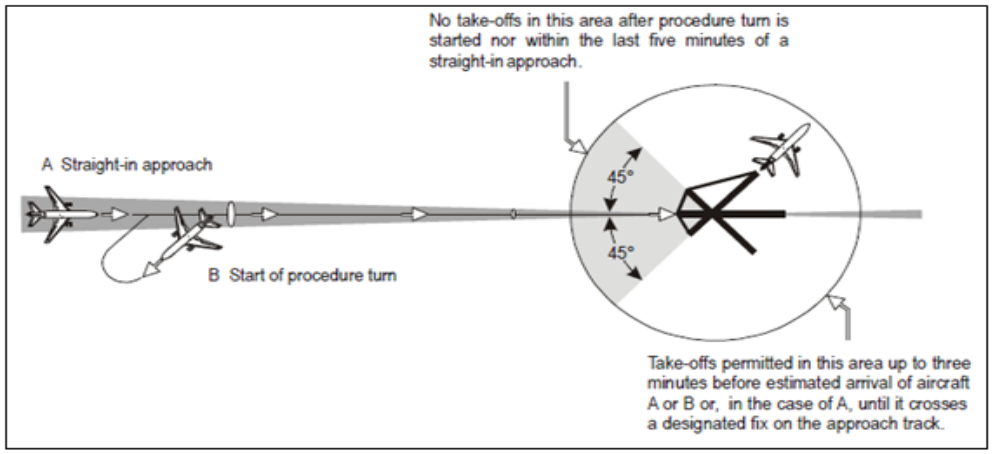


Figure 5-38. Separation of departing aircraft from arriving aircraft (see 5.7.1.1 b) and 5.7.1.2 b))

5.7.1.2 If an arriving aircraft is making a straight-in approach, a departing aircraft may take off:

a) in any direction until 5 minutes before the arriving aircraft is estimated to be over the instrument runway;
b) in a direction which is different by at least 45 degrees from the reciprocal of the direction of approach of the arriving aircraft:
1) until 3 minutes before the arriving aircraft is estimated to be over the beginning of the instrument runway (see Figure 5-38), or
2) before the arriving aircraft crosses a designated fix on the approach track; the location of such fix to be determined by the appropriate ATS authority after consultation with the operators.

6.1 Reduction in Separation Minima in the Vicinity of Aerodromes

In addition to the circumstances mentioned in Chapter 5, 5.11.1, the separation minima detailed in Chapter 5, 5.4.1 and 5.4.2, may be reduced in the vicinity of aerodromes if:

a) adequate separation can be provided by the aerodrome controller when each aircraft is continuously visible to this controller; or

b) each aircraft is continuously visible to flight crews of the other aircraft concerned and the pilots thereof report that they can maintain their own separation; or

c) in the case of one aircraft following another, the flight crew of the succeeding aircraft reports that the other aircraft is in sight and separation can be maintained.

6.5.6 Approach sequence

6.5.6.1 General

6.5.6.1.1 The approach sequence shall be established in a manner which will facilitate arrival of the maximum number of aircraft with the least average delay.

6.5.6.1.2 Succeeding aircraft shall be cleared for approach:

a) when the preceding aircraft has reported that it is able to complete its approach without encountering instrument meteorological conditions; or

b) when the preceding aircraft is in communication with and sighted by the aerodrome control tower, and reasonable assurance exists that a normal landing can be accomplished; or

c) when timed approaches are used, the preceding aircraft has passed the defined point inbound, and reasonable assurance exists that a normal landing can be accomplished;
Note.— See 6.5.6.2.1 concerning timed approach procedures.

d) when the use of an ATS surveillance system confirms that the required longitudinal spacing between succeeding aircraft has been established.

6.5.6.1.3 In establishing the approach sequence, the need for increased longitudinal spacing between arriving aircraft due to wake turbulence shall be taken into account.

6.5.6.2 Sequencing and Spacing of Instrument Approaches

6.5.6.2.2 In determining the time interval or longitudinal distance to be applied between successive approaching aircraft, the relative speeds between succeeding aircraft, the distance from the specified point to the runway, the need to apply wake turbulence separation, runway occupancy times, the prevailing meteorological conditions as well as any condition which may affect runway occupancy times shall be considered. When an ATS surveillance system is used to establish an approach sequence, the minimum distance to be established between succeeding aircraft shall be specified in local instructions. Local instructions shall additionally specify the circumstances under which any increased longitudinal distance between approaches may be required as well as the minima to be used under such circumstances.

Note 1.— Guidance material on factors to be taken into account when determining separation for timed approaches is contained in the Air Traffic Services Planning Manual *(Doc 9426).*

Note 2.— Wake turbulence categories and wake turbulence separation minima are contained in Chapter 4, Section 4.9, Chapter 5, Section 5.8 and Chapter 8, Section 8.7.

Note 3.— Detailed characteristics of wake vortices and their effect on aircraft are contained in the Air Traffic Services Planning Manual *(Doc 9426), Part II, Section 5.*

1.3.3 Procedures for Aerodrome Control Service

7.8 Order of Priority for Arriving and Departing Aircraft

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.

7.9 Control of Departing Aircraft

7.9.1 Departure sequence

……

7.9.2 Separation of departing aircraft

…….

7.9.3 Take-off clearance

7.9.3.1 Take-off clearance may be issued to an aircraft when there is reasonable assurance that the separation in 7.9.2, or prescribed in accordance with 7.11, will exist when the aircraft commences take-off.

7.9.3.4 In the interest of expediting traffic, a clearance for immediate take-off may be issued to an aircraft before it enters the runway. On acceptance of such clearance the aircraft shall taxi out to the runway and take off in one continuous movement.

7.10 Control of Arriving Aircraft

7.10.1 Separation of landing aircraft and preceding landing and departing aircraft using the same runway

Except as provided in 7.11 and Chapter 5, Section 5.8, a landing aircraft will not normally be permitted to cross the runway threshold on its final approach until the preceding departing aircraft has crossed the end of the runway-in-use, or has started a turn, or until all preceding landing aircraft are clear of the runway-in-use.

Note 1.— See Figure 7-3.

Note 2.— Wake turbulence categories of aircraft and longitudinal separation minima are contained in Chapter 4, Section 4.9 and Chapter 5, Section 5.8, respectively.

Note 3.— See 7.6.3.1.2.2.

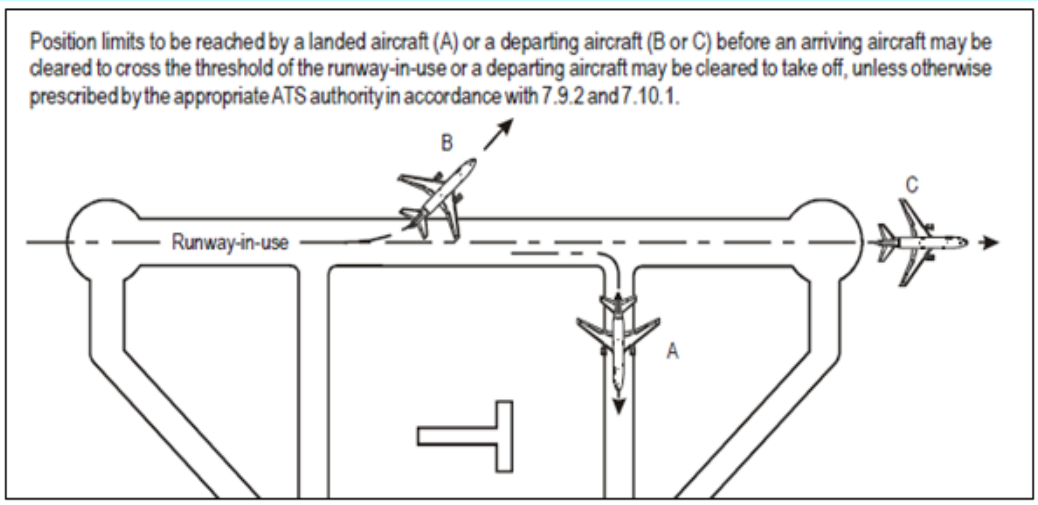


Figure 7-3. Separation between departing and arriving aircraft (see 7.9.2 and 7.10.1)

7.10.2 Clearance to land

An aircraft may be cleared to land when there is reasonable assurance that the separation in 7.10.1, or prescribed in accordance with 7.11 will exist when the aircraft crosses the runway threshold, provided that a clearance to land shall not be issued until a preceding landing aircraft has crossed the runway threshold. To reduce the potential for misunderstanding, the landing clearance shall include the designator of the landing runway.

1.3.4 Reduced Runway Separation Minima

7.11 Reduced Runway Separation Minima Between Aircraft Using the Same Runway

7.11.1 *Provided that an appropriate, documented safety assessment has shown that an acceptable level of safety can be met, lower minima than those in 7.9.2 and 7.10.1 may be prescribed by the appropriate ATS authority, after consultation with the operators. The safety assessment shall be carried out for each runway for which the reduced minima are intended, taking into account factors such as:*

a) runway length;
b) aerodrome layout; and
c) types/categories of aircraft involved.

7.11.2 *All applicable procedures related to the application of reduced runway separation minima shall be published in the Aeronautical Information Publication as well as in local air traffic control instructions. Controllers shall be provided with appropriate and adequate training in the use of the procedures.*

7.11.3 Reduced runway separation minima shall only be applied during the hours of daylight from 30 minutes after local sunrise to 30 minutes before local sunset.

7.11.4 *For the purpose of reduced runway separation, aircraft shall be classified as follows:*

a) Category 1 aircraft: single-engine propeller …….;
b) Category 2 aircraft: single-engine propeller aircraft …….;
c) Category 3 aircraft: all other aircraft.

7.11.5 Reduced runway separation minima shall not apply between a departing aircraft and a preceding landing aircraft.

7.11.6 Reduced runway separation minima shall be subject to the following conditions:

a) wake turbulence separation minima shall be applied;
b) visibility shall be at least 5 km and ceiling shall not be lower than 300 m (1 000 ft);
c) tailwind component shall not exceed 5 kt;
d) there shall be available means, such as suitable landmarks, to assist the controller in assessing the distances between aircraft. A surface surveillance system that provides the air traffic controller with position information on aircraft may be utilized, provided that approval for operational use of such equipment includes a safety assessment to ensure that all requisite operational and performance requirements are met;
e) minimum separation continues to exist between two departing aircraft immediately after take-off of the second aircraft;
f) traffic information shall be provided to the flight crew of the succeeding aircraft concerned; and
g) the braking action shall not be adversely affected by runway contaminants such as ice, slush, snow and water.

7.11.7 *Reduced runway separation minima which may be applied at an aerodrome shall be determined for each separate runway.* ***The separation to be applied shall in no case be less than the following minima:***

a) landing aircraft:

1) a succeeding landing Category 1 aircraft ….:
2) a succeeding landing Category 2 aircraft ……..:
3) a succeeding landing aircraft may cross the runway threshold when a preceding Category 3 aircraft:

i) has landed and has passed a point at least 2 400 m from the threshold of the runway, is in motion and will vacate the runway without backtracking; or
ii) is airborne and has passed a point at least 2 400 m from the threshold of the runway;

b) departing aircraft:

……

1.4 Communications

All communications between Faro TWR and NAX-1782, like with other flights, were clear, concise and understandable and got correct readback, when appropriate.

The flight established contact with Faro TWR at 16:11:50, after being released from APP, on sequence of radar vectoring for RW 28 Localizer interception and was instructed to reduce speed to 160kt. By 16:13:05 It was asked to reduce to Minimum Approach Speed.

At 16:14:18, established on approach profile, NAX-1782 was advised to expect late landing clearance, as the TWR Controller intended to allow take-off of BEL-52F, between NAX-1782 and number 1 (BEE-8HW, 4NM ahead) landings.

As soon as nr 1 touched the ground, BEL-52F was instructed to expedite line-up on RW 28 (16:14:14) and BEE-8HW was told to expedite vacating the runway via taxiway "D" (16:15:11), followed by departure clearance for BEL-52F, which terminated its readback at 16:15:49, commencing take-off run immediately.

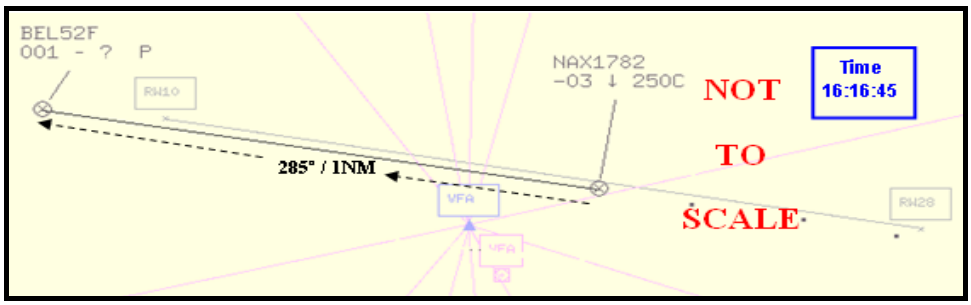
At 16:16:01 TWR informed NAX-1782 to continue the approach and at 16:16:22 issued respective landing clearance. At that moment the aircraft was approaching runway threshold, with preceding aircraft lifting off (1 750m ahead, approximately).

1.5 Radar Snapshots

As announced on AIP Portugal § 1.5.5.2.2, "*within Faro TMA radar vectoring will be provided only at or above 3000FT. Below that altitude only radar monitoring of air traffic will be provided*".

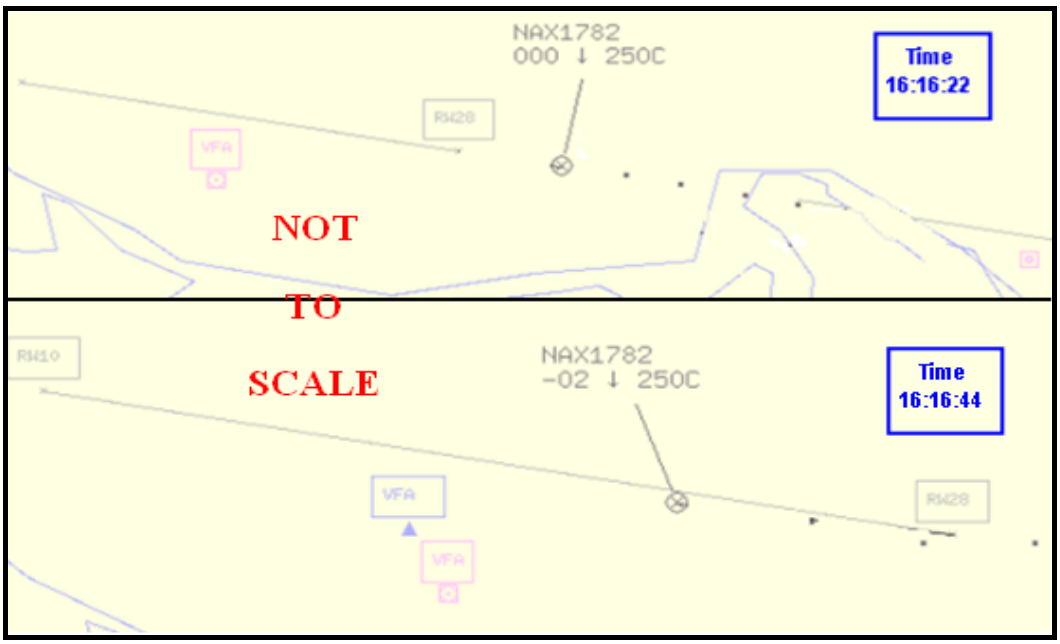
Radar snapshots, covering approach track of NAX-1782 and take-off sequence of BEL-52F, were asked for but we were informed that, due restricted coverage, it was impossible, some times, to get the information required and such images were not validated and could not be used for separation evaluation purposes.

The first image where both aircrafts are present on a snapshot relate to time 16:16:45 (*picture nr 7*) and show the first one on ground and the other airborne (passing ±100ft). By that time NAX-1782 had covered ≥800m on runway, from runway threshold.



Picture Nr 7

When landing clearance for NAX-1782 was issued (16:16:22), supposedly after BEL-52F take-off, NAX-1782 was near runway threshold, below 100ft (*picture nr 8*).



Picture Nr 8

2. Analysis

2.1 Flight NAX-1782 Approach & Landing Sequence

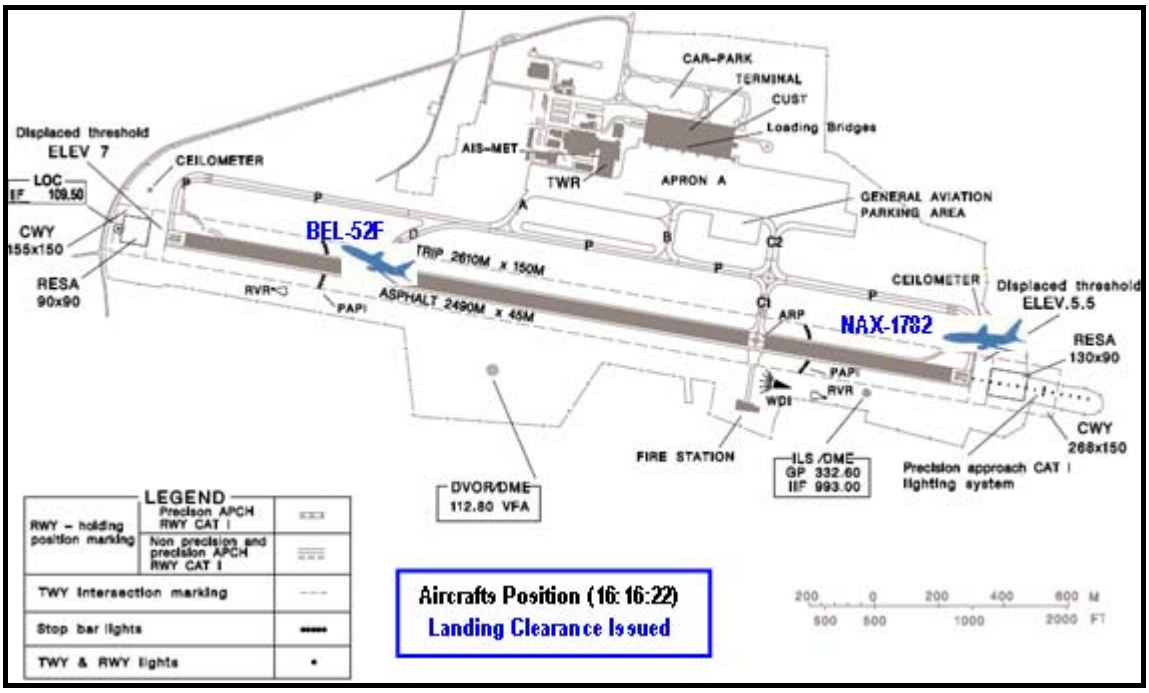
Being radar vectored for RWY28 ILS Localizer interception, NAX-1782 followed APP Controller requirements for speed reduction, in order to be ready for approach as soon as ILS was captured, maintaining speed 210kts with Flaps 5º.

When transferred to TWR Controller and requested to reduce to 160kts, flaps 15º were selected and speed reduced accordingly. Asked for minimum approach speed, when established on ILS, landing configuration was selected and speed reduced to 138kts (V_{APP}).

From that point (2000ft and ±6NM from threshold) onward no more speed reduction could be made, but preceding aircraft (an Embraer E-190, ±4NM ahead) had a lower approach speed, which caused NAX-1782 to gain distance on it, becoming ±3NM behind, when it landed (16:15:00).

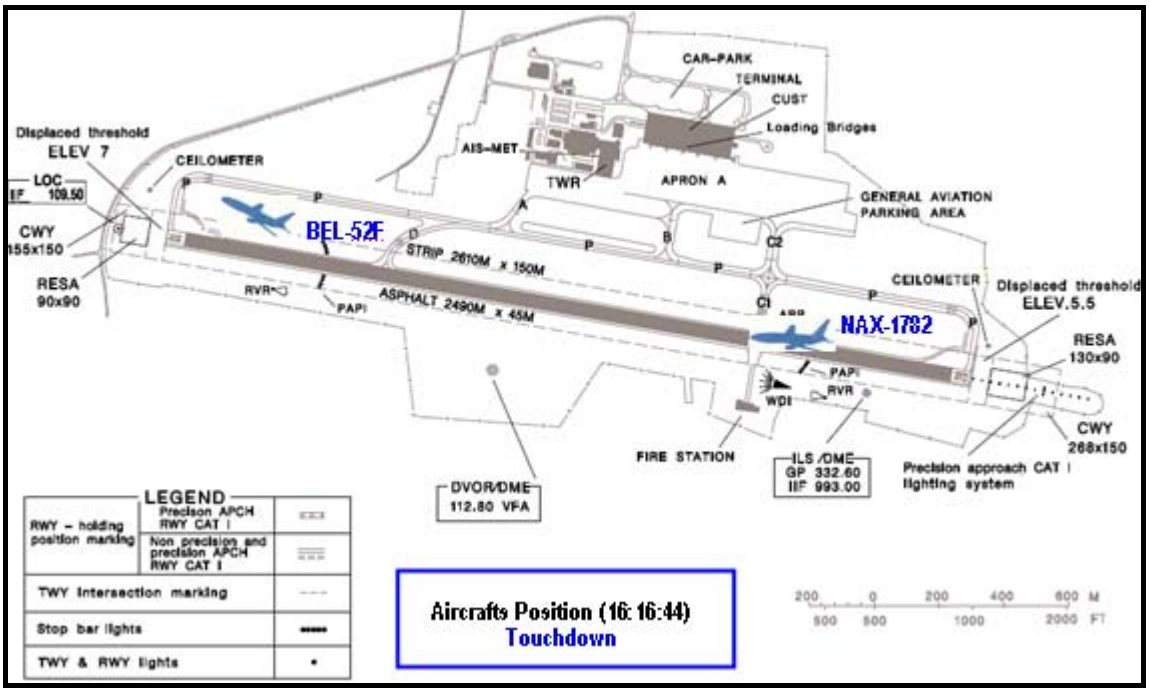
During BEE-8HW braking, BEL-52F has been instructed to expedite line-up and was cleared to take-off as soon the runway became cleared (16:15:31).

Starting take-off run at 16:15:50, BEL-52F became airborne at 16:16:22, when TWR cleared NAX-1782 to land on RWY28 (*picture nr 9*).



Picture Nr 9

When landing clearance was issued NAX-1782 was approaching runway threshold and, when PNF finished the readback, the aircraft was touching-down. Distance between aircrafts was ±1750m, well bellow minimum referred in § 7.11.7 and § 7.10.1 (*picture nr 10*).



Picture Nr 10

If NAX-1782 had to make a go-around, for any reason, it should proceed straight ahead (runway heading) until reaching 2000ft, before it could start a left turn to GIMAL. This procedure would put it on same course with BEL-52F, which had just become airborne and, before turning right, should maintain runway heading until 3000ft or 4NM VFA DVOR/DME (*XAPAS7U SID*) or should maintain runway heading to FR612 (*FMS RNAV SID*) and would keep lower speed than NAX-1782.

Anticipating that possibility, NAX-1782's Captain briefed F/O, in case of go-around to execute an immediate left turn to the sea, instead of following standard procedure.

2.2 ATM Coordination & Aircraft Separation Procedures

Intending to increase traffic flow and accommodate more flights coming in & out of Faro airport, ATM instituted radar vectors as a normal guidance procedure, especially for arriving aircrafts.

ICAO Doc 4444, § 7.11, allows the State to reduce runway separation minima to values down to 2400m (7.11.7), if some conditions are met (§ 7.11.1 to § 7.11.6)

Before that minima can be applied, AIP Portugal shall refer those minimum values to be used and related procedures to be followed by pilots and controllers (*§ 7.11.2*).

Checking AIP Portugal, that information couldn't be found, which means that none of those required conditions have been fulfilled by Faro Airport Authority or by ATM provider (*NAV*

Portugal E.P.E.), and Faro airport have to apply minimum separation as referred in § 7.9.2 and § 7.10.1 of ICAO Doc 4444.

Even if the minimum separation was respected when NAX-1782 became established on ILS, speed difference between arriving aircrafts caused that distance to shortened and, when instructions for line-up were passed to BEL-52F (*after BEE-8HW landing*), minimum separation was no more granted between this aircraft and landing NAX-1782 (*less than 2NM from threshold*), which crossed runway threshold with departing traffic lifting-off, near taxiway “D”.

3. Conclusions

3.1 Findings

1st Flight NAX-1782 was radar vectored for RWY28 ILS Localizer interception and reduced speed procedures were applied;

2nd Flight BEE-8HW was approaching RWY28, for landing, ahead of NAX-1782;

3rd When NAX-1782 intercepted Localizer, distance between aircrafts was ±6NM;

4th Faro TWR Controller decided to allow take-off of flight BEL-52F between landing of BEE-8HW and NAX-1782;

5th Even keeping minimum approach speed, NAX-1782 was gaining distance on BEE-8HW and, when this one landed, the separation was ±3NM;

6th Once BEL-52F could not be cleared for take-off before BEE-8HW vacate the runway, NAX-1782 arrived over RWY threshold when BEL-52F lift-off, being the separation between those two aircrafts less than minimum separation required;

7th In case of missed approach, NAX-1782 go-around track would conflict with BEL-52F departure track**;**

8th AIP Portugal didn't refer separation minima values and procedures to be applied in Faro airport;

9th Faro radar coverage limitation didn't provide required information for the TWR Controller to make a correct assessment of aircraft's position;

10th Faro airport didn't comply with ICAO Recommendations & Practices in order to be allowed to use aircraft separation minima as stated in Doc 4444, § 7.11.7;

11th Faro airport control service must apply separation minima as referred in ICAO Doc 4444 § 7.9.2 and § 7.10.1.

3.2 Causes of the Incident

The incident was due to a misjudgement of Faro TWR Controller who allowed take-off of one aircraft between two successive landings, without making the precise assessment of aircraft's position and relative separation, infringing the minimum separation between arriving & departing aircrafts, as stated in ICAO Doc 4444 – PANS/ATM, §7.10.1 and even §7.11.7 a) 3) ii), this one not implemented at that time.

4. Preventive Action Proposals

Recognizing the convenience to apply aircraft's reduced separation minima, in certain periods of heavy traffic at Faro airport;

Considering that a correct assessment of aircraft's position would lead the Controller to postpone take-off of BEL-52F to after NAX-1782 touchdown, avoiding separation infringement;

It's suggested:

To NAV Portugal, E.P.E.,

"To instruct Faro Controllers for the need to provide normal separation between aircraft, and introducing this Incident Report as a "study case" in its regular training programme for Air Traffic Controllers". (PAP Nr 03/2011)

Lisbon, 13th of May, 2011

The Investigator In Charge,

A. Alves