AAIU Report No: 1998/005
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Type of Aircraft:	Ilyushin IL-62M,
Registration:	No. 86512
No & Type of Engines:	Four (4), Soloviev D30 KU
Owner:	Aeroflot
Year of Manufacture:	1981
Crew:	5 Cockpit Crew, 6 Cabin Attendants
Persons on Board:	101
Injuries:	None Reported
Location:	Shannon Airport, Co. Clare, Ireland
Date & Time (UTC):	14th. September 1996, 0758 hrs.

Synopsis

On 13th. September 1996 an Ilyushin IL-62M aircraft of Aeroflot, Russian International Airlines, callsign AFL328, (hereafter referred to as 328), departed Chicago O'Hare Airport for a scheduled flight to Shannon Airport.

As it came into Shannon controlled airspace 328 was cleared directly to the airfield where the Approach Radar Controller gave the aircraft radar vectors to enable it to carry out an Instrument Landing System (ILS) approach to Runway (Rwy) 24. The winds were light South-easterly, with visibility varying between 800 metres and 1600 metres. This ILS approach was unsuccessful and at approximately 200 feet agl the pilot decided to go- around again. Members of the public residing in the Clenagh area observed the aircraft during this go-around manoeuvre. The aircraft then carried out a second and successful approach and landing to Rwy 24. Following a crew change the aircraft continued on its journey to Moscow.

Notification of Incident

On 14th. September 1996 at 0820 and 0836 hours respectively, ATC Shannon logged two noise complaints from members of the public who reside in the townland of Clenagh, Newmarket-on-Fergus, Co. Clare.

Their independent complaints were that a large aircraft had flown low and noisily in their immediate vicinity at about 0800 hours that morning. The townland of Clenagh is a rural area approximately 1½ nautical miles Northwest of the threshold of Rwy 24.

As a result of these noise complaints the ATS Watch Manager requested a report from the Approach Radar Controller and the Tower Controller, both of which were submitted later that morning. These reports were passed to ATS management on Monday 16th. September 1996 in a routine manner. Later that week, in following up on the original noise complaints, the radar tapes of the approach of 328 were examined by ATS management. Following this examination ATS management reported on the matter to the headquarters of the Irish Aviation Authority (IAA) at about 1500 hours on Friday 20th. September 1996.

The IAA, in turn, advised the Air Accident Investigation Unit (AAIU) of the Department of Transport, at about 1200 hours on Monday 23rd. September 1996. Having studied the available information the AAIU concluded that a serious incident had occurred, as defined in ICAO Annex 13 (controlled flight into terrain only marginally avoided).

A formal investigation, ordered by the Chief Aeronautical Officer, was commenced on Wednesday 25th. September 1996.

1. Factual Information

1.1 History of the Flight

328, an IL-62M, departed Chicago O'Hare Airport on 13th. September 1996 for Shannon Airport where there was a crew change and the flight continued to Moscow Sheremetyevo Airport. This was a routine scheduled flight. There were no training or instructional aircrew on board.

328 made first contact with the Shannon Upper Airspace Controller at 0721 hours on the 14th. September 1996, who cleared the aircraft directly to Shannon and gave it permission to descend to Flight Level 60. In turn, this Controller handed 328 on to the Shannon (Low Level) Controller who advised the aircraft that it was number one for an ILS approach to Rwy 24.

On handover from this Controller the aircraft was vectored at 33 miles from the Northwest sector by the Approach Radar Controller for an ILS approach to Rwy 24. At 0749 hours 328 acknowledged the QNH of 1023 hectopascals and was advised that it was No. 1, with no delay. 328 was the only aircraft being handled by the Approach Controller at this time.

At 0758 hours 328, carried out an overshoot following an unsuccessful ILS approach to runway 24, Shannon Airport.

The high joining speed during the vectors to the localiser, which were later noted by the Approach Controller in his first written report, were not commented on then, or at any later stage in the approach phase.

An extract from the ATC transcript follows, doubtful words are indicated by a question mark:-

0754.40	**APP**	***AFL328 turn right heading 120, descend 'til 2100 feet.***
0754.49	**AFL328**	***Heading 120 descending 2100.***
0755.08	**APP**	***AFL328 continue in the right turn now heading 140.***
	AFL328	***140.***
0755.34	**APP**	***AFL328 right again heading 180.***
	AFL328	***180.***
0755.48	**APP**	***AFL328 continue in the right turn heading 230 to intercept.***
0755.51	**AFL328**	***Continue to the right to intercept 24, AFL328.***
0756.20	**APP**	***328 you're 7½ miles from touchdown, you're slightly through the localiser, continue right on to heading 260 to re-establish.***
0756.27	**AFL328**	***260, AFL328.***
0756.30	**APP**	***Affirm descend 'til 1500 feet.***
0756.32	**AFL328**	***Down 1500, ILS established, AFL328.***
0756.50	**APP**	***328 continue right again heading 280.***
0756.53	**AFL328**	***280 to our right.***
0756.55	**APP**	***Affirm and descend 'til 1000 feet.***
0756.57	**AFL328**	***Down 1000, AFL328.***
0757.05	**APP**	***AFL328 you're 5 miles from touchdown and you're 1 mile left of final track at this time, report established.***
0757.10	**AFL328**	***(?) call established AFL328.***
0757.35	**APP**	***AFL328 did you capture the localiser?***
0757.39	**AFL328**	***Negative AFL328***
0757.41	**APP**	***AFL328 Shannon Roger, OK sir roll out please again, roll out right, can you turn left now to re-establish?***
0757.50	**AFL328**	***I turn left OK.***
0757.52	**APP**	***OK Sir you're too high at this time and you're only 2 miles from touchdown, turn right, turn right this time heading 030 and climb 'til 2100 feet.***
0758.01	**AFL328**	***To the right.***
0758.10	**AFL328** ***(1¼ miles)***	***AFL328 request circling for second (?)***
0758.15	**APP** ***(1 mile)***	***That's affirm sir turn right heading 030 and I'll bring you back on final.***
0758.28	**APP** ***(½ mile)***	***AFL328 Shannon.***
0758.30	**AFL328**	***Go ahead please.***
0758.31	**APP** ***(¼ mile)***	***OK Sir ah can you see the runway now?***
0758.36	**AFL328**	***Go around again***
0758.37	**APP**	***Roger, roger, climb 'til 2100 feet, turn right heading 030.***
0758.44	**AFL328**	***030, 2100.***
0759.52	**AFL328**	***328 maintaining 2100.***
0759.55	**APP**	***Shannon roger.***

The **Radar Tape** study indicates that:-

- 328 crossed through the localiser on two occasions having failed to establish at any stage on the approach;
- 328 first crossed the localiser at 7½ miles, from Northwest to South, at 287 kts;
- 328 was then cleared to descend from 1500 feet to 1000 feet;
- 328 secondly crossed the localiser at 5 miles, heading due West, at 250 kts;
- between 5 miles and 2 miles, 328 continued to descend while reducing his airspeed and turning towards but not capturing the localiser;
- at 2 miles and 800 feet the Approach Radar Controller made the first of three requests to 328 to turn right onto 030º and climb to 2100 feet;
- at this first such request, at 2 miles, the aircraft turned, not right but left, and continued to fly parallel to Rwy 24, 1 to 1½ nautical miles Northwest of the centre-line;
- at 1¼ miles, 328 requested circling for a second approach and was given a heading of 030º. However, 328 remained parallel at 1 mile off the centre-line, and continued descending. 328 did not acknowledge this clearance;
- at ¼ mile and 200 feet, the Approach Radar Controller asked if 328 could see the Rwy? 328 replied go around again. The Controller repeated his clearance, which was complied with on this occasion.

The **Noise Complaints** indicate that:-

- the members of the public, who made these complaints, confirmed that they, and their family members, had visual sighting of a large passenger aircraft as it passed over their roof tops, causing severe noise and vibration and disappearing in a Southwest direction from Clenagh;
- the members of the public confirmed that their initial view of the aircraft was horizontally through the ground floor windows of their bungalow type houses;
- the members of the public, who are not unaware of normal aircraft activity in the environs of Shannon Airport, feared that a crash was imminent.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Others
Fatal	None	None	None
Serious	None	None	None
Minor/None	None	None	

1.3 Damage to Aircraft

None.

1.4 Other Damage

None.

1.5 Personnel Information

The cockpit crew consisted of one:-

- Captain
- First Officer
- Navigator
- Flight Engineer
- Radio Operator (also the interpreter)

Captain's Licence:	Russian, Civil Aviation Pilot License	
Captain's Age:	48 years	
Captain's Flying Experience:	Total Time	11,376 hrs.
	Total Time On Type	5,800 hrs.
	Total Time previous 90 days	12 3 hrs.
	Total Time previous 28 days	45 hrs.
First Officer	Total Time On Type	200 hrs.

The crew were properly licensed and medically fit to conduct the flight.

The Approach Radar Controller was properly qualified and authorised by the IAA to carry out his duties.

1.6 Aircraft Information

The aircraft had a valid Certificate of Airworthiness and had been maintained in compliance with the company's Regulations.

The Captain made no report or comment to the Approach Radar Controller of any cockpit instrument malfunction during his first approach to Rwy 24.

He did not make any subsequent report on this, or any other matter, on landing at Shannon Airport.

1.7 Meteorological Information

Automatic Terminal Information Service (ATIS) Broadcast (repeated automatically between 0708.09 and 0808.52 on frequency 130.95MHz).

"This is Shannon Information Alpha Zero Seven Hundred. ILS Rwy Two Four, transition level flight level six zero, one five zero degrees true, zero four knots, visibility one four zero zero metres to Northeast and East, two five zero zero metres otherwise in mist".

Met Report 0730 hrs, 14th. September 1996

Surface Wind	140º/04
Visibility	800m to SE, S, SW
	1600m otherwise
Weather	Fog
Cloud	BKN 200'

Met Report 0800 hrs, 14th. September 1996

Surface Wind	150º/05
Visibility	700m generally
	1500m to N
Weather	Fog
Cloud	BKN 200'

1.8 Aids to Navigation

The ILS to Rwy 24 was operating and fully serviceable.

The RVR equipment on Rwy 24 was operating and fully serviceable.

The ILS to Rwy 24 at Shannon Airport has three Remote Status Indicators (RSI's) which are monitored independently and whose function is to warn of any malfunction in the system. Any such malfunction would be signalled both by a visual and audio alarm.

For the approach of 328 the RSI operation was noted as normal.

There is no Standard Instrument Arrival (STAR) procedure in operation at Shannon Airport.

1.9 Communications

Normal communications for this approach were carried out on frequency 121.4 MHz.

The Radar Approach Controller's messages were relayed to the Captain via the Radio Operator who, in turn, relayed the Captain's replies to the Controller.

The Radio Operator has no executive function in this particular cockpit layout.

This three-way communication chain can lead to delays in response to ATC calls.

1.10 Aerodrome Information

Not applicable.

1.11 Flight Recorders

Cockpit Voice Recorder (CVR) - Not available.

State of Occurrence was not in a position to inspect the aircraft concerned due to the time lapse between the incident and the commencement of the investigation.

Flight Data Recorder (FDR) - One Fitted.
The data, which is routinely retained by the Operator on approximately 80% of its flight operations, was supplied to the investigation.

1.12 Wreckage and Impact Damage

Not applicable.

1.13 Medical and Pathological Information

Not applicable.

1.14 Fire

Not applicable.

1.15 Survival Aspects

Not applicable.

1.16 Tests and Research

Not applicable.

1.17 Additional Information

The Operator advised that the aircraft was equipped with a Ground Proximity Warning System (GPWS).

However, the investigation was unable to establish if the go-around was initiated as a result of a GPWS warning.

2. Analysis

Normal Aeroflot procedures require that the Captain carries out a cockpit crew briefing before commencing the descent, as in this case for the ILS approach to Rwy 24. These procedures include that preparations for landing are to be accomplished on the base leg, that is the selection of landing gear down, flaps, spoilers, are to be carried out in wings level flight. The Captain, who was the handling pilot, did not give this briefing. What followed was a "rushed approach" in operational circumstances that did not merit such urgency.

328 maintained a high airspeed while descending on the extended base leg and, initially went through the localiser at 7½ miles and 287 kts., and then, at 5 miles and 250 kts. In the company procedures the aircraft is required to be prepared for landing, gear down, flaps extended and to be on the localiser at 5 miles and 150 kts.

In addition, when cleared only to 1,000 feet, 328 continued descending while carrying out vectored and unvectored turns in attempts to lock on to the localiser. This constant turning delayed the pre-landing preparations and, it was from this point, where 328 began to fly parallel to the runway with wings level, that the checks were carried out.

As a result, 328 never got closer than 1 mile abeam the localiser and descended to at least 200 feet agl, as shown on the Radar Tape and the FDR readout, which was provided subsequently by Aeroflot. In reality, the aircraft was descending to its decision height, whilst being 1-1½ miles Northwest of the runway centre-line. In his statement the Captain confirmed that he never saw the ground in the weather conditions prevailing, and, that he ordered a go around at his decision height of 200 feet.

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The ILS is a pilot interpreted aid which permits an aircraft to be landed procedurally, i.e. without radar positioning assistance. In practice, however, it is not unusual for controllers to assist pilots with radar vectors to the localiser, where they establish and carry out routine landings. This is what normally happens when both pilots and controllers are operating within, and following defined procedures laid down for their respective tasks.

In this instance, 328 carried out an unorthodox approach where company procedures were not followed by the pilot. The excessive speeds on base leg and attempts to lock on the localiser, while observed by the Approach Radar Controller, were not commented on by him at any stage, nor were any appropriate allowances made. The continuing non-compliance by the pilot to his first two requests to turn right onto 030 were unprecedented in the controllers operational experience. This led him to think that the aircraft had ground visual contact and was self-positioning to the runway. Thus, the approach continued to be treated as normal. At ¼ mile and 200 feet the controller asked 328 if he could see the runway? It was then that 328 initiated his go around.

However, as the Radar Tape shows, at ¼ mile and 200 feet the aircraft was already diverging from its parallel course and at least 1 mile West of the centre line of Rwy 24, in the general direction of Clenagh.

3. Human Factors Investigation

The Human Factors investigation is required to distinguish carefully between hypothesis and genuine evidence. In this incident the absence of a cockpit voice recording made it impossible to evaluate the interaction between the members of the cockpit crew (known as the Cross Cockpit Gradient) as the situation developed and their reaction, in turn, as they responded or understood the Approach Radar Controller's transmissions.

Aeroflot advised that cockpit voice recordings on this type of aircraft are only retained on an ad hoc basis, for flight safety purposes. There was no recording on this occasion.

As both the aircraft and ATC equipment were functioning normally, the procedural conduct of the approach should be addressed by both Aeroflot and the IAA, respectively, from a human factors point of view.

4. Conclusions

4.1 There is no evidence of any defect or malfunction in the aircraft which could have contributed to the incident.

4.2 There is no evidence of any defect or malfunction in the ILS or RVR equipment of Rwy 24 which could have contributed to the incident.

4.3 The Captain and his crew, by not complying with his company's set down procedures for an ILS approach, failed to establish on the localiser for Rwy 24 and continued descending without permission to at least 200 feet agl, in a rural area where there is some high ground at 108 feet.

4.4 The Captain and his crew, failed to comply with two of the Approach Radar Controllers requests to turn and climb.

4.5 The unfolding chain of events, as presented by this abnormal approach, were not appreciated by the Approach Radar Controller at the time.

4.6 The report, written by the Approach Radar Controller on the morning of 14th. September 1996, was understated and incomplete. This led to significant delays in the notification of the incident to the IAA and subsequently to the AAIU, thereby delaying the commencement of the formal investigation.

4.7 The fears expressed by the members of the public and their families in the Clenagh area were fully justified.

4.8 Controlled flight into terrain was only narrowly avoided.

5. Safety Recommendations

Given the importance of CRM in the context of air safety and accident prevention it is recommended:-

5.1 that the Operator should examine the possibility of giving all aircrew engaged in international flights Cockpit Resource Management (CRM) training, where appropriate. (SR 34 of 1998)

Under the current qualification system potential ATCO's undergo an IAA approved course, as required by ICAO Annex 1, which includes training in both theoretical and practical handling of emergency and/or abnormal situations. Once fully qualified, an ATCO is not subject to further formal competency checks and heretofore this situation would last indefinitely. (However, it is noted that the IAA will introduce a licensing system in 1998 for all State controllers). The only course undertaken in a non-specific period of time is a Refresher Course, which is of one weeks duration and is neither assessment based nor judgmental. This Refresher Course is considered to be a minimalist approach in the context of the requirements for non-State employed ATCO's. It is recommended:-

5.2 that the IAA give priority to initiating, resourcing and implementing a Continuation and Emergency Training program on an annual basis, for all State employed ATCO's. (SR 35 of 1998)

6. Response to Safety Recommendation(s)

Recommendation No. 35 of 1998:-

The IAA stated that continuation training and assessment on a structured formal basis will be incorporated in the their licensing procedures for Controllers, for implementation in 1998.