

JIHOČESKÁ UNIVERZITA V ČESKÝCH BUDĚJOVICÍCH

FILOZOFICKÁ FAKULTA

ÚSTAV ANGLISTIKY

BAKALÁŘSKÁ PRÁCE

A CASE STUDY OF SPEECH IN INTERACTION: ANALYSING PILOT-
ATC COMMUNICATION DURING EMERGENCY SITUATIONS

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Ročník: 3.

2024

I confirm that this thesis is my own work written using solely the sources and literature properly quoted and acknowledged as works cited.

V Českých Budějovicích dne 2.5.2024

.....

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Acknowledgement

I would like to thank my supervisor Mgr. Helena Lohrová, Ph.D. for her expert guidance, patience, support, and helpful advice throughout the course of my thesis. Her invaluable input and insightful feedback have been instrumental in the process of writing this thesis. I would also like to thank my mom for her unconditional support.

Anotace

Tato bakalářská práce si klade za cíl analyzovat interakce mezi piloty a řídicími letového provozu (ATC) během nouzových situací. Výzkum se zaměřuje na rysy, které jsou typické pro řeč pilotů a ATC a ukazuje, jak je komunikace dle protokolu vedena jejími mluvčími a jak se vyvíjí v nouzových situacích. S využitím konverzační analýzy (CA) jako hlavního lingvistického metodologického přístupu tato práce zkoumá komunikaci dle protokolu a komunikaci spontánní v interakcích pilotů a ATC. Analýza se specificky zaměřuje na přechod mezi komunikací dle protokolu a komunikací spontánní v interakci pilotů a řídicích letového provozu a ukazuje, jak a kdy piloti a ATC přecházejí mezi těmito dvěma formami diskurzu. Tím, že se tato práce zabývá kritickými otázkami bezpečnosti ve vysoce stresových situacích, kde komunikace hraje nezastupitelnou roli, přispívá k hlubšímu pochopení efektivních komunikačních strategií v kritických situacích v letectví.

Klíčová slova: komunikace v letectví, konverzační analýza, interakce mezi piloty a ATC, avialingvistika, nouzové situace, institucionální interakce.

Abstract

This thesis aims to analyse the talk in interactions between pilots and Air Traffic Controllers (ATCOs) during emergency situations. By focusing on features which are typical in pilot-ATC speech, the research demonstrates how scripted talk is conducted by its speakers and how it evolves during emergencies. Using Conversation Analysis (CA) as the main linguistic methodological approach, this thesis examines scripted and non-scripted interactions between pilots and ATCOs. With a specific focus on the transition between scripted and non-scripted speech in a pilot-ATC interaction, the analysis demonstrates how and when do pilots and ATCOs navigate between these two forms of discourse. By addressing critical questions of safety in high-stress situations where communication plays an indispensable role, this thesis contributes to a deeper understanding of effective communication strategies in aviation emergencies.

Key Words: Aviation Communication, Conversation Analysis, Pilot-ATC Interaction, Avialinguistics, Emergency, Institutional Talk

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1. Introduction

Over the past three decades, the aviation industry has rapidly grown. Flying, once a privilege for few, has become accessible to everyone. The industry's expansion inevitably raised concerns about safety. Every little incident can cause a catastrophe up in the air and that is why international regulations have been created. Several institutions ensure that the correct procedures are obeyed. One of them is the International Air Transport Association (IATA) which regulates the policies of airlines. There are also several European regulations which have been enshrined in the law. Every airline must follow these regulations.

The communication between Air Traffic Control (ATC) and pilots is structured by both unwritten and written regulations. When in training, pilots must learn not only how to operate an aircraft but also how to communicate efficiently with the air traffic controller (ATCO). Clear communication is the key to passing on information. This acquired skill of structured communication is often referred to as 'scripted talk'. However, in the event of an emergency, there may be a shift to 'non-scripted talk'. This shift can manifest as confusion or misunderstanding, consuming valuable time that pilots need to resolve the situation.

Hence communication in aviation is crucial for safe operations, especially during emergencies. All aviation workers – pilots, ATCOs and ground staff must follow exact interaction to maintain safety and fast operation. These days airlines face a great amount of pressure from their customers and competitors to be faster, better, and always on time. But when it comes to safety, this cannot affect the decisions being made. That is why airlines would rather lose money than make a mistake that could endanger their staff and customers.

In this undergraduate dissertation, a case study is conducted to analyse the interaction between pilots and ATCOs during emergencies. By examining transcripts from selected flights, the aim is to identify recurring patterns and shifts in communication. Specifically, this thesis focuses on linguistic features such as radio terminology, turn-taking, repair and clarification,

and the occurrence of mistakes within these interactions. Using transcripts from emergency flights, this thesis illustrates how these interactions are structured and how they adapt to different situations. This thesis seeks to provide linguistic insights into what unfolds during an aircraft emergency, with a primary focus on the nuances of speech and interaction. The goal is to uncover key factors that contribute to errors made by pilots and ATCOs, especially in high-stress emergency situations where accuracy is of paramount importance.

The methodology employed in this thesis is Conversation Analysis (CA). Applying CA to the examination of pilot-ATCO transcripts, this thesis can identify the main features of the talk in interaction between pilots and ATCOs, the structure of conversational sequences, turn-taking practices, and instances of repair. While the typical structure of sequences and turn-taking remains consistent across flights, unexpected scenarios may necessitate alterations. Among the most prevalent linguistic features that will be analysed are repair and clarification requests, which frequently surface in the transcripts of emergency flights. To assemble this dataset, audio recordings from which transcripts were generated will be drawn upon, as well as transcripts extracted from official reports of incidents which have been investigated.

The research question this thesis addresses is: How and when do pilots and ATCOs transition from scripted communication to non-scripted communication during emergencies, and what implication does this shift have on resolving the emergency? This thesis aims to contribute to the understanding of how communication dynamics can affect aviation safety and to fill the gap by offering a comprehensive linguistic analysis of aviation language.

2. Aviation Communication

2.1. Aviation English

Communication in aviation refers to the transmission and reception of information through spoken or written exchanges between multiple individuals, such as pilots, air traffic controllers, ground crew, and other relevant personnel. It is one of the most important tools in aviation. It not only sets up the rules, but it also helps individuals to follow them in a way that ensures safety measures are obeyed. Professional spoken communication in aviation functions as an agent that allows its speakers to perform their tasks and goals. In aviation, it plays a crucial role in helping pilots to achieve their actions safely.

There are two terms when it comes to communication in the aviation workplace – **Aviation Communication and Aeronautical Communication**. While these terms are being interchanged, they do not have the same meaning (Borowska 103). According to Borowska, Aviation Communication is a much broader concept, and it is understood to combine professional and institutional talk, whereas Aeronautical Communication mainly contains aeronautical terms (103).

Aviation Communication can be divided into several subtypes. For instance, there is written communication in the forms of manuals, aircraft documents or flight plans; verbal communication as the main channel for communication of an airplane in flight and there is also non-verbal communication which uses body language to communicate (Borowska 102). Take for instance marshallers signalling commands to pilots (Borowska 102).

It became very clear that English needs to be the language used for aeronautical communication as Americans and British were pioneers in commercial aviation (Borowska 49). For the purpose of communication in aviation, English is used internationally. In 1951 English became the international language of aviation by the decision of the International Civil Aviation

Organization (ICAO) and since then Aviation English has become the official *lingua franca* of global aviation (Borowska 29,37).

As with any other category of language, it can be said that Aviation English (AE) is a sublanguage of English as according to Borowska it shares specialised sublanguage features such as cognitive function, specific vocabulary, professional work tool, specific communicative objectives, natural language completion and natural language syntax (80). Linguists started to acknowledge Aviation English as an independent area of study with the expansion of commercial aviation in the late 1980s (Borowska 46). According to Borowska, Aviation Language (AL) can be referred to as:

“Special language for aviation purposes that is realised in the different forms of the sublanguages or tools, constituting its subsets based on particular aviation domains. Those subsets may share common lexicon and grammar structures, but are treated as separate sublanguages or tools of Aviation Language with their own characteristic features” (Borowska 64).

There are many sublanguages of AL, each of them used with a slightly different intention and objective. For instance, a very important sublanguage for this thesis is Radiotelephony English (RE), which often falls under the term Aeronautical English (AeE) mainly used for pilot-ATCO interactions (Borowska, 67).

RE is a language used within the range of communication via radio. In aviation that is crucial, because it is the only way for pilots to communicate with either the airport ground services or other aircrafts in flight. This is related to military personnel, civil aviation or jargon used by operational personnel (Borowska 38). Via RE ATCOs give instructions to pilots. In some situations, it is upon pilot's assessment if they will comply with given instruction as they are responsible for the aircraft (Borowska 67).

As of nowadays, new fields of linguistics are being developed. It became clear that errors still appear in pilot-ATC communication and that is considered to be a safety hazard.

Hence, more research and observation need to be done with the aim of finding the cause of this as well as solutions on how to avoid such unnecessary mistakes.

With connection to aviation a new linguistic category was established. Avialinguistics is a field of study that connects aviation and applied linguistics (Borowska 51), and it examines communication, language use, and discourse of aviation language (Borowska 50). It observes aeronautical utterances, and it also analyses the question of safety in routine and non-routine interactions by pilots and air traffic control (ATC) (Borowska 50). Avialinguistics emerged from the work of Professor Anna Borowska. Borowska merged the two separate sciences into one which can analyse the use of Aviation English of both native and non-native speakers who are professional users of AE. It also deals with language teaching, training, and learning (Borowska 55-56). It is therefore a subcategory of linguistics.

2.2. History of Aviation Safety Measures

Radiocommunication was a part of aviation from the beginning. It was used by the military and even then, it was obvious that clear communication is the key to safe operations. From the early 1920s military alphabet was used with certain words for spelling (Borowska 27). Over time the alphabet was changed so that it would satisfy the needs of both native speakers (NS) and non-native speakers (NNS). The current alphabet is recommended by the ICAO, and it is set on clear differences in sound and the ability of both NS and NNS to distinguish the words from each other (see Table 1) (Borowska 29-20).

Table 1: Aviation Alphabet according to Icao, Annex 10, Volume II

A – Alpha	N – November
B – Bravo	O – Oscar
C – Charlie	P – Papa
D – Delta	Q – Quebec

E – Echo	R – Romeo
F – Foxtrot	S – Sierra
G – Golf	T – Tango
H – Hotel	U – Uniform
I – India	V – Victor
J – Juliett	W – Whiskey
K – Kilo	X - X-ray
L – Lima	Y – Yankee
M – Mike	Z – Zulu

(“Alphabet - Radiotelephony”)

There are several institutions that create regulations in aviation. Some of them need to be obeyed and some can be altered according to the laws of each country. The most prominent institution is the International Civil Aviation Organization (ICAO) which was established in 1947 as a result of the Convention on International Civil Aviation held by NATO in 1944 (Borowska 29).

The ICAO aims to ensure aviation safety, enhance security measures, promote environmental protection, and foster the sustainable development of air transport since its formation (Chowdhury Fink 76). It enhances safety even more after the terrorist attacks on September 11, 2001 (Chowdhury Fink 76).

Since its beginnings, ICAO has held many conventions to find solutions for current issues. One of the first conventions was the Tokyo Convention which was held in response to the increased hijacking of aircrafts in the 1960s (Chowdhury Fink 76). Another major convention was the Convention for Suppression of Unlawful Acts against the Safety of Civil Aviation also known as the Montreal Convention which amends the Airports Protocol of 1988, and it states that:

“Any person commits an offence if he unlawfully and intentionally:

- (a) performs an act of violence against a person on board an aircraft in flight if that act is likely to endanger the safety of that aircraft; or
- (b) destroys an aircraft in service or causes damage to such an aircraft which renders it incapable of flight or which is likely to endanger its safety in flight; or
- (c) places or causes to be placed on an aircraft in service, by any means whatsoever, a device or substance which is likely to destroy that aircraft, or to cause damage to it which renders it incapable of flight, or to cause damage to it which is likely to endanger its safety in flight; or
- (d) destroys or damages air navigation facilities or interferes with their operation, if any such act is likely to endanger the safety of aircraft in flight; or
- (e) communicates information which he knows to be false, thereby endangering the safety of an aircraft in flight” (“International Civil Aviation Organization (Icao), Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation”).

The ICAO is an important organization in aviation today. It helps to set boundaries for law in civil aviation and it determines lawful and unlawful behaviour towards the process of airport operation (“International Civil Aviation Organization (Icao), Convention for the Suppression of Unlawful Acts Against the Safety of Civil Aviation”). For all aviation staff, the regulations set by ICAO are known as they are a part of their training materials.

Since 1958 in the United States of America the regulations, handbooks, and manuals are issued by the Federal Aviation Administration (FAA) (“A Brief History Of The Faa”). Sometimes the regulations of FAA are not in compliance with ICAO’s regulations, which can result in conflict. As of course, U.S. airlines fly internationally, sometimes this can be seen as a problem. For instance, the proposed standardised phraseology by the ICAO conflicts with FAA’s proposed phraseology that should be used between pilots and ATCOs (Borowska 32). The outcome of this can be a challenge for involved parties in terms of understanding correctly. This is especially difficult when an accent plays a role in one’s speech.

With commercial aviation, the International Air Transport Association (IATA) is of great importance. Its role is to promote a safe, sustainable, and efficient air transport industry and to assist airlines in creating a safe environment (“Vision and Mission”).

All of these institutions were created in order to set rules that all personnel and even passengers need to follow. These rules have one main goal and that is to create an environment in which the procedures lead to the safety of everyone. This is important to note within the domain of pilot and ATCO relationship as their communication is the essence of safe flights.

2.3. Pilot-ATCO relationship

In this thesis, a conversation between pilots and ATCOs will be examined because clear communication is crucial in emergency situations. The analysis of pilot-ATC interactions is an examination of talk at work as both parties use particular utterances to perform their work tasks and meet their objectives. According to Drew and Heritage, institutional talk can be conducted even via telephone or radio and its importance lies in the professional identities of involved participants, rather than in the place setting (3,4).

The language which pilots and ATC use to conduct their utterances is called Aeronautical English (AeE). According to Borowska, AeE covers Aeronautical Standard Phraseology (SP) as well as Plain Aeronautical English (PAE) which is used through Radiotelephony English (67). SP is a closed system of phrases and words used especially in aviation with its own specific meaning (Borowska 77). This must be learned during training, otherwise pilots and controllers would not understand each other. SP consists of specific closed terms and phrases used to utter clear messages between personnel (Borowska 77). If anyone not familiar with SP would listen to radiotelephony transmissions, they would simply not understand.

SP has been developed to efficiently fulfil the needs of aviation communication. Therefore, words and phrases are selected for the purpose of easy understanding. Avoiding ambiguity is also implemented as well as having to prioritise two-/three-syllable words as they are easier to understand than one-syllable words (Borowska 112). Grice's Cooperative Principle

and its four maxims – quality, quantity, relation, and manner are also applicable in SP, as it is important for both pilot and controller to forward only the information that is relevant, in a quantity that is sufficient without being ambiguous (Grice 26-27).

An utter emphasis is placed on decoding the conveyed message properly, but there are some factors which make this difficult. Misunderstanding can happen due to technical issues (e.g. lost signal), different knowledge of pilot and controller, or by making linguistic errors (Borowska 111). A problem also often occurs when a speaker has a very thick accent. This applies to NNS but also to NS as seen in an extract below, where the Irish pilot is not clear in pronunciation and therefore the American controller cannot decode the conveyed message.

Data Sample 1: American controller requests clarification due to pilot's thick Irish accent –

Transcript 3

11 21:55:15 Pilot EI106: we'll get eh we'll get back to [ya] just eh give us a few seconds ** whats the problem (unintelligible - thick accent)

12 21:55:21 ATC: sorry say that again

According to Borowska, participants of conversation should follow several rules in selecting right words and phrases:

- a) "Avoiding errors - words and phrases should be selected according to their smooth transmissibility over radio" (79).
- b) "Prefixes should be avoided as it can lead to misunderstandings. Instead, clear negatives and positives should be used" (79).
- c) "Briefness is not as important as being clear with messages and instructions" (79).
- d) "Simple language should be used to ensure that both NNS and NS will understand" (79).

Another subcategory of Aeronautical English is Plain Aeronautical English (PAE). Using PAE is a common routine in Aviation as it helps to create language easier to understand which is overall the most significant part of message exchange (Borowska 91). According to

Borowska, PAE is used mainly in non-routine situations, where a better description of a situation needs to be done to further ease problem identification (91).

The primary language used for routine situations is SP. But when a non-routine situation arises, there is a need for the use of plain language. In this case, where phraseology is not helpful enough, PAE is applied (*Doc 9835, Manual On The Implementation Of Icao Language Proficiency Requirements*). Plain English is therefore a simplified version of general English that can be used to provide safe communication (Borowska 90).

The ICAO provides guidance on training pilots and ATCOs and has set language testing criteria and checklists that commissions and airlines should follow when testing pilots and ATCOs (*Doc 9835, Manual On The Implementation Of Icao Language Proficiency Requirements*). According to the ICAO, pilots and ATCOs, both NS of English and NNS need to prove their comprehension in an English Proficiency test to a minimum of level 4 to make sure that there will be no ambiguities or errors in interaction (“Language Proficiency”).

While communicating, pilots change their transmission several times during the flight because each area that they are flying across is directed by a different ATCO. Each controller has more aircrafts on duty in his area to manage and communicate with. That is also why on one frequency, multiple pilots can hear each other when speaking with the ATCO (see Data Sample 2). Therefore, it is significant for both parties to identify who is speaking and to whom the message is being conveyed. On the radio transmission, only one person can speak at a time, which is helpful for avoiding overlapping.

Data Sample 2: Several flights on one frequency – Transcript 6

50 16:11:13 ATCO: Speedbird twenty two seventy six heavy wind three six zero at five. Runway seven left at alpha eight. Cleared for takeoff.

52 16:11:19 Pilot BA2276: cleared for takeoff. Zero seven left. Speedbird twenty two seventy six heavy.

67 16:12:36 ATCO: [Skywest 4778 runway 7L at A8 line up and wait for wake turbulence]
69 16:12:41 Pilot 4778: [Skywest 4778 acknowledged line up and wait]
72 16:12:47 Pilot 356: [Spiritwing 356 inbound for 7R]
74 16:12:50 ATCO: [Spirit 356 following a 717 cleared to land 7R]

As seen in Data Sample 3, when a pilot-initiated interaction begins, the pilot calls given station first (initial callup), after that he identifies his aircraft identification (callsign) and lastly, states the request. When the ATCO initiates interaction with pilots of a particular flight, it should start with him stating the flight for which the message is intended and after that giving instructions (see Data Sample 4). The basic structure of pilot-controller communication is contacting apron control when in an airport and contacting approach control when in flight as they help the pilots with navigation (Borowska 76).

Data Sample 3: Pilot-initiated utterance – Transcript 1

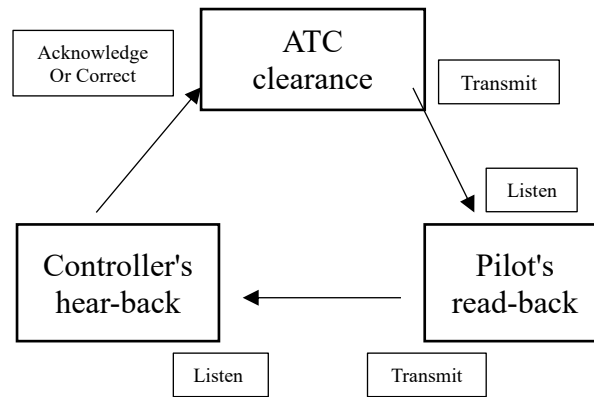
04 12:29:50 Pilot A728: eh Boston eh seven twenty eight heavy we have an issue eh with an ODOUR on the airplane now everything's normal everything is A okey\ We call it the dirty socks by all\ With that being said we need to turn this airplane around and we need to go back to Philadelphia\ We are NOT declaring an EMERGENCY we would appreciate expert * hand but we are NOT declaring an emergency * and we'd like to CHANGE our destination to Phily

Data Sample 4: ATC-initiated utterance – Transcript 1

17 12:30:46 ATC1: American seven twenty eight traffic [twelfe] oclock two zero miles out of your direction\ company eh Boeing seven fifty six one thousand feet eh above you

Pilot-controller interactions are strongly structured, and they follow the same pattern (see Table 2). This structure usually changes only in emergency situations when factors like stress, mental resilience and fast decision-making affect pilots and controllers.

Table 2: The pilot-controller communication loop



(European Action Plan For Air Ground Communications Safety 23)

As was already mentioned, a situation when pilot does not have to listen to ATCO's instruction can arise. Usually, that is due to pilot's actual knowledge of the situation. In emergencies, it is upon the pilots to assess a situation and make the best decision possible (Borowska 67). Below, a situation which pilot assessed in a way that ditching¹ was the best solution, is seen.

Data Sample 5: Ignoring ATCO's instruction – Transcript 5

284 15:29:21 **ATC:** Cactus fifteen twenty nine turn right two eight zero, you can land runway one at Teterboro.
 286 15:29:25 **Pilot US1549:** we can't do it.
 288 15:29:27 **ATC:** kay which runway would you like at Teterboro?
 290 15:29:28 **Pilot US1549:** we're gonna be in the Hudson.

2.4. Aviation Terminology and Glossary

As was already mentioned, the language used in aviation has its specific meaning and purpose. Spelling is produced using the aviation alphabet in a way that the instructions are comprehensible. When directions, altitudes or flight levels are stated, the numbers are pronounced in a specific way. Take for instance number nine, which is pronounced as niner,

¹ Ditching = landing on water

number five pronounced as fife, or number three, which is pronounced as tree. In Aviation English, the pronunciation of larger numerals is different than in general English (see Table 3).

Table 3: Pronunciation of larger numerals

500	“five hundred”
4500	“four thousand five hundred”
10,000	“one zero thousand”
13,500	“one three thousand five hundred”
V12	“Victor twelve”
J533	“J five thirty-three”
10	“one zero”
122.1	“one two two point one”
(magnetic course) 005	“zero zero five”
(true course) 050	“zero five zero true”
(magnetic bearing) 360	“three six zero”
(magnetic heading) 100	“one zero zero”
(wind direction) 220	“two two zero”

(“Radio Communications Phraseology And Techniques – P-8740-47”)

Take for instance this sequence of utterances, where both pilot and ATCO divide numerals into separate words for a better understanding. Instead of saying numerals in thousands, they use the numbers separately – e.g. temperature [tree] [tree] two point tree instead of temperature is three hundred thirty two point three (see Data Sample 6).

Data Sample 6: Use of numerals – Transcript 2

34 22:36:39 ATC: American twenty sixty five sure thing. The ah great junction the wind [tree] one zero one one, visibility one zero, sky clear, temperature [tree] [tree] two point [tree], altimeter two [niner] [niner] seven

35 22:36:52 Pilot AA2065: ah altimeter's two nine nine [niner] seven at [tree] ten we've got the rest of the weather. Ah we're little closer to the airport here so we might need that later * so we can runnin- eh finish running the checklist on American [tweny] ah sixty five

These alterations in vocabulary often help pilots and ATCOs to correctly hear instructions, which is why most aviation personnel use them. Such modifications can be considered as scripted talk because they are seen as the staple in the aviation industry, and everyone involved understands them. Not only numerals are used in a certain way, but also other words are utilised with a specific meaning.

Standardized phraseology is used in pilot-ATC communication with its specific words and phrases which are unique for this institutional talk. It would not be possible to state every aviation phrase or meaning of all technical terms in this thesis but for a better understanding, basic word choices that appear in used transcripts are explained in the below table.

Table 4: Aviation Glossary

Standby	Hold/Wait
Roger	Copy/Understood
Affirmative	Yes
Negative	No
Mayday, Mayday, Mayday	Declaring a life-threatening emergency
Pan Pan, Pan Pan, Pan Pan	Declaring a not life-threatening emergency
ILS	Instrument Landing System
RNAV	Visual approach, method of IFR
IFR	Instrument Flight Rules
Vectors (for instance Manta)	Navigation by radar

Altimeter	Measures flight level of altitude
Fuel left (in pound or hours)	Remaining fuel, important because it adds weight to the aircraft
Souls on board	Number of passengers and crew on board
Heavy aircraft	Aircraft weight over 300 000 pounds
My aircraft	Captain takes control of an aircraft
Your aircraft	First Officer acknowledges Captain's taking over aircraft control
Evacuate, Evacuate	Callsign for crew to start the evacuation process

(“Pilot/Controller Glossary”)

For instance, take utterance between the Captain of flight American 728 and the ATCO in Data Sample 7. Firstly, pilot announces himself and waits for the ATCO’s answer. From the transcript it is seen that the ATCO is currently busy and he tells the pilot to wait with the term “standby”. When he is again able to interact with the pilot, he encourages him to “go ahead”.

Data Sample 7: Use of Standby – Transcript 1

01 12:29:38 Pilot A728: eeh Boston American seven two eight
02 12:29:44 ATC1: American seven two eight standby
03 12:29:48 ATC1: American seven two eight go ahead

In another excerpt the instance of declaring a life-threatening emergency can be seen with the callsign of repeating mayday three times.

Data Sample 8: Use of Mayday – Transcript 4

01 16:58:24 Pilot U1888: calling for approach United eighteen eighty eight, mayday mayday mayday inbound for Lincoln, eeh planning on landing south and I think it's half point the weather, we have been *
02 16:58:35 ATC: United eighteen eighty eight, * approach to maintain four thousand, expect the hour of one eight

Other instances can be seen in transcript of flight US1549, when the Captain takes control over the aircraft by saying “my aircraft” and First Officer acknowledges it by uttering “your aircraft”.

Data Sample 9: Taking control of the aircraft by uttering a specific phrase – Transcript 5

231 15:27:23.2 Captain US1549: my aircraft.

232 15:27:24 First Officer US1549: your aircraft.

All phrases are used in Aviation English for a specific purpose and are set by both FAA in the U.S. and by ICAO for its member states. Some phrases set by ICAO and FAA may vary (Jones 240). In this institutional interaction, it is utterly important for all participants to use these phrases correctly as they are introduced for the purpose of easy understanding which leads to maintaining the safety of everyone involved.

As was already mentioned, communication in aviation differs from other types of institutional talk as many of its utterances are scripted in a way that helps to establish mutual understanding. Yet there are still situations when scripted talk is shifted into non-scripted one. This shift usually happens when there is an irregularity in flight, which not a lot of published works focus on.

3. Literature Review

This chapter offers an overview of the current literature available in the field of Avialinguistics, work in interaction and Conversation Analysis. Avialinguistic is a relatively new discipline, which focuses on communication in aviation. This linguistic area is connected to work in interaction, as it examines, how people undertaking a task make their utterances. What this thesis primarily focuses on are the instances of miscommunication, which are examined through the method of Conversation Analysis (CA).

3.1. Avialinguistics

Avialinguistics is a field of linguistic study introduced by Professor Anna Borowska, which focuses on language and communication in the aviation industry. It provides insight as to how language plays a critical role in ensuring safe and effective communication among pilots, air traffic controllers and ground personnel. Borowska examines theory against examples of real-life interactions and investigates the language used in various aviation contexts (19).

The study of Avialinguistics is essential for enhancing aviation safety, efficiency, and standardization as there are still not many studies examining the purpose of Aeronautical English in a linguistics context (Borowska 50). Borowska's work not only focuses on communication in emergency situations, but also sets up the groundwork for analysing language in aviation as a separate linguistic branch. Avialinguistics uses observation and subsequent analysis of routine and non-routine pilot-ATCO interactions (Borowska 50).

In this work, Borowska uses her knowledge of applied linguistics as a foundation for creating a new field. She explains the connection between aviation and linguistics which is crucial for her study. Only by using information from both of these fields was she able to conduct Avialinguistics as both theoretical and practical model (Borowska 56).

Moreover, on specific data of interaction between pilots and ATCOs, Borowska presents phraseology used in flight, aviation terminology and both standard and non-standard situations in her analysis of data from several flights. Additionally, she focuses on the errors made in aviation language, aviation language learning, teaching and training and also on aviation discourse, and language awareness in cultural differences (59-60). Her unique approach to aviation communication and the analysis of actual interaction of professional aviation speakers make her work my primary source.

3.1.1. Radio Communication

As the focus of this thesis is placed on the interactions of pilots and ATCOs, it is utterly important to note how they communicate. This thesis uses a dataset which is based on real life interactions between pilots and ATCOs, and it is therefore important to understand radio communication. As I have already described in Chapter 2, pilots and ATCOs communicate via radio transmission, where they must be on a specific frequency, which they change during the flight according to the sector they are in. The interaction between the flightdeck and ATC takes place to help the pilots with navigation and also when emergency situations happen.

The use of radio transmissions helps to avoid overlapping as only one participant can speak at a time. On the other hand, sometimes a buzz can be heard, or the connection can be interrupted. This of course does not happen very often as it is utterly important for the flightdeck to maintain contact with the ground personnel.

Due to radio transmission being the only way of communication in this work setting, the involved parties should focus on clear and loud pronunciation. Furthermore, features such as jargon or slang should be avoided as the other party may not understand. It is therefore crucial to only use such features as aviation phrases, radio terminology, aircraft call-signs and aviation alphabet to ensure understanding on both sides of the radio transmission (Federal Aviation

Administration). The phraseology used in aviation, especially ATC-pilot communication, varies from others as it has a clear structure which needs to be followed.

An important source, which focuses on analyzing interactions made through radio transmission, is Garcia's case study that revolves around flight 1549. Garcia studies the differences in pilot-ATC interactions and how it changes in an emergency. She analyses the errors in conversation on this particular case and shows that non-scripted conversation is not always the wrong choice. In this particular dataset, Garcia found that a hybrid utterance combining scripted and nonscripted features was used (Garcia 68). In this thesis, I conduct a similar analysis but on a bigger dataset from several flights that were in an emergency.

3.1.2. Problematic Communication

Emergency situations are often marked with instances of errors. These errors lead to a non-scripted talk which is what this thesis analyses. Understanding the circumstances of aviation as a field bound by different procedures and protocols is crucial for this thesis.

Issues in communication in pilot-ATC interactions are now being researched and some of the results indicate that communication problems are more dominant in pilot-initiated exchanges than in those initiated by ATCs (Howard 370). Howard mentions that the increased amount of information leads to a higher likelihood of communication problems, which is why the maxim of quantity should not be violated (370).

Instances of miscommunication persist, even though English is the universal language for global aviation (Jones 233). Jones states that pilot errors are often attributed to language confusion as cultural differences also play a role in miscommunication (233). Certain phrases can mean different things in different cultures. Jones elaborates on different reasons why there were aircraft crashes. Some of the reasons are that the controller was not able to speak

conversational English, confusion between dialects occurred, tower instructions were ignored, or one party formulated aviation phrases poorly (Jones 236-237).

As most of the data that were chosen for this thesis are from flights in, to or from the USA, it is helpful to comprehend inaccuracies in the use of standard phraseology in the United States. Jones states that the routine phrases of the FAA are not united as several non-singular expressions occur and that can lead to an error (240). As an example, he specifies that to check already given information, participants can use either *say*, *verify*, or *confirm* (Jones, 240).

According to Jones, there are more than forty instances of different phrases between the FAA and the ICAO regulations (240). These differences in terminology should be eliminated as now pilots from the United States must use different terminology when flying elsewhere and the same goes for the others. (Jones 240). Jones thinks that improvement could be made by uniting phraseology regulated by the FAA and the ICAO, replacing current measuring in feet with metric units, and foreign personnel getting more training in the English language (243).

3.2. Conversation Analysis

As this thesis focuses on scripted and non-scripted utterances in pilot-ATC interactions, a summary of the used analysing method needs to be done. Conversation analysis (CA) is a methodology that focuses on the systematic analysis of structure, organization and utterances of naturally spoken interaction between people. According to Paul ten Have CA can be either taken as an analysis of normal conversation or it can be restricted as analytical work initiated by Harvey Sacks (ten Have 5). As Clift states, it examines the purpose of language, relations between different linguistic features and the role of meaning and context (Clift 1). Clift establishes two main foundations of CA: action and sequence, where action is what participants do with words and sequence is the series of carried out actions (2).

Phenomenons such as repair and clarification, turn-taking and transition also occur in CA, which is why CA is the methodology used for data analysis in this thesis. An organization of repair introduces various aspects to clarify where self-repair takes place over other-repair, and it is apparent that self-repair is more common (Schegloff, et al. 361). As seen in this thesis' dataset, in pilot-ATC interaction, self-repair is prominent as the speaker often realizes his mistake and corrects himself immediately. Repair is an important topic of the analysis conducted in this thesis as it is widely seen in pilot-ATC interactions, and it can lead to the use of non-scripted utterances.

Sequence organization as a part of CA is enacted by turn-taking, where parties take turns in talk according to their needs or wishes (Schegloff 2). It therefore analyzes sequences and turns in an interaction. As my dataset is based on radio transmission between pilots and ATCs where participants cannot overlap, turn-taking is based on the needs of participants to either get information or confirm already said facts. Therefore, turns are taken in order to perform a task.

3.3. Talk as Functional Component of Aviation Work

Pilot-ATC interactions, which are analysed in this thesis, can be characterised as work interactions because they serve a specific task. Every participant is performing their duty and therefore the talk conducted is serving the purpose of goal achieving. The institutional talk used in aviation also serves safety purposes.

Paul Drew and John Heritage have assembled how the application of conversation analysis investigates language and interaction within an institutional context. Their findings provide an exploration of an institution's emergency operations managed through interaction. When there is an emergency call, dispatchers (in our case Air Traffic Controllers) need to follow specific policies and protocols in order to maintain the safety of everyone involved (Drew and Heritage 419).

As institutional talk is goal-oriented, it always takes place with a particular purpose. Speakers organize their utterances according to what target they endeavour (Drew and Heritage 22). It is crucial to realize that pilots, crew and ATCOs are performing their work duties. When an emergency occurs in flight, all participants know what procedure they need to follow as they were trained on what action to take in a similar situation. For instance, when there is a technical issue with the aircraft, the first thing that the pilots will do is read the instructions in the manual and proceed with the checklist. There is a manual, checklist, procedure, or protocol for everyone involved when an emergency is declared on the aircraft (see Data Sample 10).

Data Sample 10: Instances of using manual in an emergency – Transcript 5

238 15:27:28 Captain US1549: get the QRH... [Quick Reference Handbook] loss of thrust on both engines.

240 15:27:32.9 Captain US1549: mayday mayday mayday. uh this is uh Cactus fifteen thirty nine hit birds, we've lost thrust (in/on) both engines we're turning back towards LaGuardia.

Transcript 8

49 11:05:32 Pilot WN1380: okay have you got the aircraft?

50 11:05:38 Pilot WN1380: okay have you got the aircraft?

51 11:05:40 Pilot WN1380: completely?

52 11:05:44 Pilot WN1380: and I'm going to go through Q-R-H * * * from the back.

One of the current resources for crew interaction is the Crew Resource Management (CRM). CRM is a well-established concept in aviation, which analyses the effectiveness of crew and flightdeck, their training and other practices involved (Kanki, Helmreich and Anca 3). It is an approach that grew over the years and it may help with the understanding of how a team of professionals work, especially when put in a critical situation.

As was already mentioned, pilots and ATCOs are prepared for various situations and scenarios which could happen. Yet, there still appear to be errors in their interaction, which can

be partially attributed to the psychological element. In the analysis of this thesis, the concept of human factor will be furthermore discussed.

4. Methodology

This chapter focuses on Conversation Analysis as the chosen method of data examination. As this thesis deals with the dynamic interactions between pilots and ATCOs, it is important to note several aspects of CA. This includes repair and clarification requests, errors in communication, sequence and turn-taking strategies, and what can influence the transition from scripted to non-scripted utterances. This chapter also unveils the selection of data and the method of collecting them from different sources. Its aim is to lay the foundation for the use of CA as a tool for data analysis from critical aviation communication and to introduce analysed data.

4.1. Conversation Analysis

The methodology used for analysing pilot-ATC utterances in this thesis is Conversation Analysis (CA). Since this thesis analyses real interactions between two parties, CA can help unveil used utterances in greater depth. CA was founded by Harvey Sacks to help analyse talk in interaction (Hutchby and Wooffitt 11). It could be defined as a systematic analysis of recorded human interaction in naturally occurring situations (Hutchby and Wooffitt 12). Thus, it analyses situations which happen naturally in real life. CA therefore analyses human utterances in a conversation, and it analyses social activities performed by these utterances (Hutchby and Wooffitt 11). As Hutchby and Wooffitt emphasize, CA extends beyond the analysis of language structure alone, examining the intricate organization within activities (12). Moreover, CA combines the analysis of talk with an analysis of the purpose for such utterances.

Many phenomena can be distinguished within CA as a field of study. One of them is turn-taking. Turn-taking is an important aspect of every conversation. Analysing turns in a conversation highlights how turns are taken in an interaction. Turns in aviation interactions are unique because they do not indicate which speaker is more talkative or active as these speakers

communicate in order to perform a task. Therefore, these turns depend on the need to communicate in order to get information or solve a problem. Transitions are another phenomenon of CA and in pilot-ATC talk they are usually made with the participants hearing a sound of the radio that signifies the end of one's turn. Another phenomenon of CA is overlapping, where one speaker talks while the other talks at the same time, which is common in the transition (ten Have 103). Overlapping does not occur in aviation interactions as it is not possible to do so through radio transmission.

This thesis also focuses on repair and clarification. Repair is a practice in which participants can recognize a mistake they made and a correction of something that has been said is made (Sidnell 110). According to Sidnell, repair can be divided into self-initiated repair and other-initiated repair (110). Self-initiated repair is made when the speaker realizes his mistake and corrects himself, while other-initiated repair is made when the listener realizes the speakers' mistake and corrects him (Sidnell 110). Repair does not only correct mistakes that have been made but it also replaces used words. Clarification is a part of conversational repair and it is seen multiple times throughout this thesis' dataset. It is crucial to hear uttered information correctly in aviation for everyone's safety. That is why repetition of information takes a great part of the turns.

Part of the analysis in this thesis involves identifying errors made by participants during interactions. When in an emergency, depending on how big the crisis is, pilots and ATCs tend to make more mistakes. For instance, not clarifying who is speaking, making pauses, and generally being nervous. The transcripts contain numerous hesitation markers. Some of these markers indicate the speaker attempting to recall information or promptly address a problem. An immediate response is crucial for these sequences. These errors prompt participants to transition from scripted to non-scripted talk, as evidenced in the analysis presented in this thesis.

4.2. Data Collection

The dataset for this thesis was collected using two methods. The first method was listening to the audio recordings of different flights that were in an emergency and choosing specific flights for this thesis. Hundreds of audio recordings were found available online and flights which clearly exhibited scripted and non-scripted talk were selected. The audio recordings were transcribed into a written form. The transcription of audio recordings was conducted by repeated listening. This was done in a computer program which allowed the audio to be played at lower speed. That helped with understanding some of the phrases or words and it also made the participant's pronunciation clearer. The second method used for data collection was reading several investigation reports made by investigating authorities. From dozens of reports, flights in which pilots and ATCOs used scripted and non-scripted talk were selected. To know more details about the selected flights, information was gathered through an examination of different sources and articles. Used transcripts do not contain full markings according to the Jeffersonian transcription conventions. In this thesis, lean transcription was used since it serves as the standard method for transcribing the contents of interactions. This simplified form of transcription helps to better focus on the professional content of communication. It is also useful for understanding the principles of Aviation Communication as a professional genre and for the identification of critical moments in pilot-ATC interactions.

Data from flights which were in an emergency were examined, and from them, those flights which demonstrated a greater interaction between pilots and ATCOs were chosen. The data for this thesis were deliberately selected from flights which did not end up in a crash. This was done because data from plane crashes do not contain a great amount of interaction between pilots and ATCOs. Therefore, data from plane crashes would not contain enough samples to analyse.

In this thesis, eight transcripts were used from eight different flights to showcase how and why a shift from scripted to non-scripted talk is made. Transcripts 1-4 were made using the first method of listening and transcribing and transcripts 5-8 were used from already mentioned investigation reports. These two sets of transcripts are both sorted by their dates. Flights were selected based on their specific utterances, them being in an emergency and the ability to showcase the errors made. On this dataset, CA is used to analyse occurrences in pilot-ATC interaction and to see the way in which these utterances are made.

As transcripts 5-8 had a format already set, minor changes in highlighting air to ground communication were made. These four transcripts from investigation reports contain several audio recordings from different sources. For instance, the transcripts not only contain the talk between pilots and ATCOs but also between a Captain and First Officer in the cockpit, between pilots and crew and between other airport services. To make the communication between pilots and ATC more visible in the transcripts (see Appendix), their utterances were highlighted in green. A detailed description of the mentioned dataset is presented in Table 5.

Table 5: Dataset Description

Number of Transcript	Flight number and date	Main speakers	Length in utterances	Content of Flight
1.	AA728 – 31 Jul 2019	Pilot, ATCO1, ATCO2, ATCO3 and ATCO4	92	Odour in cabin; resulted in an emergency landing
2.	AA2065 – 06 Aug 2022	Pilot, ATCO1 and ATCO2	62	Engine shut down in flight; diverted to different airport

3.	EI106 – 23 Dec 2022	Pilot and ATCO1	39	Engine failure after takeoff; aircraft returned to the departure airport
4.	UA1888 – 07 Feb 2023	Pilot and ATCO1, ATCO2	27	Failure of right engine after takeoff; diverted to different airport
5.	US1545 – 15 Jan 2009	Captain, First Officer, and ATC	331	Bird strike which resulted in failure of both engines; ditching in the Hudson River
6.	BA2276 – 08 Sep 2015	Captain, First Officer, and ATC	199	Engine failure and fire before takeoff; resulted in evacuation on the runway
7.	AA383 – 28 Oct 2016	Captain, First Officer, and ATC	91	Engine failure and fire during take-off; resulted in evacuation on runway
8.	WN1380 – 17 Apr 2018	Captain, First Officer, and ATC	318	Engine failure – part of engine blew up and broke a window; diverted to a different airport; one dead passenger

These flights all experienced an emergency where the pilots had to act fast. All eight flights are from the US, but in transcript no.3, the pilot is from Ireland and therefore has an accent, which is difficult to understand for the American controller. Most of the flights had experienced engine failure which resulted in them either diverting to a different airport, returning to the airport of departure, or stopping the takeoff. In every flight, there is a moment when pilots realize that there is something wrong and from that moment, their interaction changes. Moreover, it is possible to divide these transcripts into a moment before an emergency

occurs and a moment after the issue has arisen to see how participants change their utterances from scripted to non-scripted ones. This is further analysed in the following chapter.

5. Data Analysis

This chapter provides the Conversation Analysis undertaken on the dataset of eight flights that were in an emergency, and it explores several topics. Using CA as the linguistic approach, interactions between pilots and ATCOs are analysed in a way which identifies recurring patterns and shifts in communication. The focus is primarily placed on key factors such as turn-taking, errors, repair and clarification requests, confirmation of understanding and aviation terminology. Only by identifying these factors as recurrent patterns, shift from scripted to non-scripted speech can be found. Moreover, emphasis is placed on the moment of transition from scripted to non-scripted talk, by what this is determined and what consequence this has on resolving the emergency. The analysis was conducted focusing on several already mentioned aspects which are divided into categories and analysed separately. Ultimately, the analysis examines these data aspects to determine if they can be the source for the transition from scripted to non-scripted utterances.

Transcripts used for this analysis do not adhere to Jeffersonian detailed transcription conventions. Instead, a lean transcription protocol was employed to facilitate the transcription of extended interactional sequences, necessary for analysing the turn-by-turn development of talk in the course of the flight and its progression through an emergency situation. A simplified style of coding was used for easier illustration of the key information exchanges in the pilot-ATC talk. The analysis presents excerpts from the transcripts, categorised into discursive illustration of the same type to identify patterns in pilot-ATC speech, particularly shifts between scripted and non-scripted talk in emergencies. Some transcription codes found in the thesis dataset (see Appendix) were developed to highlight conversation phenomena evident in radio transmission communication. Transcripts 1-4 primarily use transcription conventions to denote participants' speech patterns (see Table 6), while Transcripts 5-8 follow conventions outlined

in the investigation reports. Throughout this chapter, different elements in the excerpts are highlighted by underlining in the transcription text.

Table 6: Transcription conventions

*	Unintelligible word
()	Insertion
[]	Difference in pronunciation
/	Question with a risen tone
\	End of utterance with a lowering tone
CAPITALS	Emphasis on utterance

5.1. Turn-taking

Turns in pilot-ATC speech typically follow a consistent pattern, with participants taking turns according to the needs of the task at hand. One perception of turn-taking is that it reflects a polite and well-interaction style (Sidnell 36). This phenomenon is standardised, and it applies both to scripted and non-scripted talk. Proper practice dictates that participants begin with an initial call-up during which pilots mention the ATC they are addressing followed by their flight's callsign (see Data Sample 11). Following the initial call-up, participants typically proceed to ask questions or provide instructions. When a pilot gives readback² to the ATCO, he utters his flight's callsign at the end of the utterance.

Data Sample 11: Correct structure of call-ups – Transcript 1

01 12:29:38 Pilot A728: eeh Boston American seven two eight
 02 12:29:44 ATCO1: American seven two eight standby
 03 12:29:48 ATCO1: American seven two eight go ahead

² Readback is the confirmation of understanding given to the ATC by the pilot. It is performed after the ATC gives flight instructions to the pilot. Hence, the pilot receives these instructions by giving readback.

After the initial call-up, the structure changes in a way where participants say only the flight's callsign and proceed to instructions or information in the same utterance. This helps the participants to communicate in a faster, more efficient way (see Data Sample 12). The pilot announces their course as emergency aircraft and the ATCO gives him further instructions. The importance of pilot-ATC talk is placed on repeating the callsign of the aircraft with every new utterance to make the speaker or recipient known to all aircrafts on the same radio frequency. The flight's callsign is placed after ATC callsign as the second information when initiating a conversation on new radio frequency. When initiating later request, it is placed as the first information in an utterance. But when pilot gives readback to the ATC, it is placed as the last information of an utterance (see turn 06 in Data Sample 14).

Data Sample 12: Correct structure of communication – Transcript 2

01 22:33:32 ATCO1: American twenty six five zero

02 22:33:34 Pilot AA2065: American twenty sixty five at twenty seven. Um emergency aircraft making right turn to eh grand junction neat LOWER course for * maintain three

03 22:33:42 ATCO1: American twenty six five maintain eh ONE THREE thousand grand junction altimeter two nine [o] [niner] seven

Crucial detail in pilot-ATC turn-taking is the fact that turns are taken via radio transmission. This is also the reason for the non-appearance of overlapping of turns. An interesting aspect of turn-taking in these interactions are that there are not only the two potential participants (pilot and ATC) as a part of their conversation. Due to radio transmission sector protocols, pilots from different flights can hear each other's conversation with the ATCO, as they are all on the same frequency when they all fly in the same air space. Hence, they are alerted to locality of other aircraft and can react to ATC directions or other pilots' information requests (see Data Sample 13).

Data Sample 13: Turn-taking in pilot-ATC speech – Transcript 5

290 15:29:28 Pilot US1549: we're gonna be in the Hudson.

291 15:29:33 ATCO: I'm sorry say again Cactus?

313 15:30:09 Pilot 4718: two one zero uh forty seven eighteen. I think he said he's goin in the Hudson.

This excerpt not only presents the phenomenon of turn-taking in pilot-ATC talk, but it also shows the aspect of omitting the callsign in an emergency (see turns 290 and 291). In turn 291 ATC seeks for clarification or confirmation as they cannot comprehend such information. This is provided by pilot of a different aircraft in turn 313.

5.2. Scripted Talk

Since aviation uses different structures and terminology, the so-called scripted talk can be distinguished particularly in pilot-ATC communication. Aviation terminology, which includes phrases and words set by ICAO and FAA, as well as the word order is a part of scripted talk because it is used primarily in normal situations. The correct structure with the right words is what makes an utterance a scripted one. Scripted talk in some amount can be seen in all the transcripts. Usually, it is conducted prior to an emergency, but in some transcripts even after that.

An essential aspect of scripted pilot-ATCO discourse involves providing instructions followed by their repetition to ensure comprehension. Two main methods are employed to confirm understanding. Firstly, recipients often repeat the message verbatim, as demonstrated in Data Samples 14, 15, and 16, where ATCOs issue instructions regarding flight altitude or routing. Alternatively, confirmation may be indicated by the use of 'roger,' signifying comprehension in Aviation English (AE), as observed in Data Samples 17 and 18. Another

aspect which can be found in Data Sample 15 is the misuse of numeral nine (see turn 30 and 31). This should be pronounced as ‘niner’ for better understanding.

Data Sample 14: Repeating the message – Transcript 1

05 12:29:19 ATCO1: American seven two eight eh no problem equipt
left hand turn and proceed direct to Sierra Echo Yankee and I’ll
have further routing for you shortly as well as eh a descent eh so
again left hand turn direct to Sierra Echo Yankee

06 12:29:35 Pilot A728: A left hand turn direct Sierra Echo Yankee
for now American seven two eight thank you

Data Sample 15: Repeating the message – Transcript 2

30 22:36:14 ATCO2: American twenty sixty five Denver approach final
visual approach runway two nine descend and maintain one zero
thousand

31 22:36:20 Pilot AA2065: eh at eh ten thousand expecting the
visual for two nine um American twenty sixty five

32 22:36:27 ATCO2: American twenty sixty five ** oscar turn at
great junction and the altimeter’s [tree] zero zero zero and do you
want me to read the weather

33 22:36:35 Pilot AA2065: [tree] zero zero zero go ahead with the
weather for American twenty sixty five

Data Sample 16: Repeating the message – Transcript 3

31 21:57:24 ATCO1: Shemrock one zero six heavy fly heading zero
[niner] zero

33 21:57:27 Pilot EI106: heading zero [niner] zero and we’re ready
to be back two [niner] zero for an approach on Shemrock one zero six
heavy

34 21:57:33 ATCO1: Shemrock one zero six heavy roger turn left
heading zero [FIFE] zero

35 21:57:36 Pilot EI106: left turn zero five zero Shemrock one zero
six heavy

Data Sample 17: Use of Roger – Transcript 6

153 16:14:27 Pilot BA2276: Speedbird twenty two seventy six heavy we are evacuating on the runway. We have a fire. I repeat we are evacuating.

158 16:14:34 ATCO: Speedbird twenty two seventy six heavy roger.

Data Sample 18: Use of Roger – Transcript 7

27 14:31:50 Pilot AA383: American three eighty three heavy stopping on the runway.

28 14:31:52 ATCO: roger roger. Fire.

Sometimes in an emergency, pilots are too busy to respond and that is when ATCO either repeats the message and waits for confirmation of understanding or asks pilots for this confirmation. The repetition of said instructions is crucial for the safety of the flight and that is why it needs to be done even in emergencies. In Data Sample 19 ATCO1 repeats the message to get readback from the pilot. In Data Sample 20 pilot asks for information repeatedly and in Data Sample 21 ATCO asks the pilot for readback.

Data Sample 19: ATCO repeats a message to get confirmation – Transcript 3

31 21:57:20 ATCO1: Shemrock one zero six heavy turn left heading zero [niner] zero

32 21:57:24 ATCO1: Shemrock one zero six heavy fly heading zero [niner] zero

Data Sample 20: Pilot asks for information – Transcript 8

84 11:08:12 Pilot WN1380: center Southwest thirteen eighty declaring an emergency going through seventeen thousand need your local altimeter.

85 11:08:18 Pilot WN1380: * altimeter?

Data Sample 21: ATCO asks pilot for confirmation – Transcript 8

31 11:04:21 ATCO: Southwest thirteen eighty cleared direct VINSE V-I-N-S-E.

34 11:04:38 ATCO: Southwest thirteen eighty New York?

Words and phrases in AE are used in a specific way which helps pilots and ATCOs with better understanding and it also provides a clear pattern which participants follow. Earlier in this thesis, the use of numerals according to ICAO was presented. Numerals should be used as separate words for clear pronunciation (see Data Sample 22).

Data Sample 22: Correct use of numerals in flight – Transcript 8

18 10:57:36 ATCO: Southwest thirteen eighty climb and maintain flight level three eight zero.

19 10:57:43 Pilot WN1380: Southwest thirteen eighty up to flight level three eight zero.

Scripted talk should be the primary medium in aviation communication to maintain safety and prevent misunderstandings. Yet still, this talk is shifted into a non-scripted one when an emergency arises. This is also determined by many recurring points and phases in a conversation. Analysis of this aspect is presented in the following subchapter.

5.3. Non-scripted Talk

The type of talk which differs from the scripted one is often referred to as non-scripted. Non-scripted talk is analysed in this thesis to determine if errors are made and how can this contribute to improving communication and understanding between ATC and flight crews. Scripted talk is composed of correct use of aviation words, phrases and structure, non-scripted talk on the other hand is composed of subjective language which may be descriptive and accurate, making decisive decisions e.g. “*we’re gonna be in the Hudson*”, but contains the potential for errors, confusion, repair, clarification, and other features such as not following

structure or using basic conversation elements. In emergency situations, a higher congestion of non-scripted talk is observed. These is for several reasons which are subsequently analysed in this chapter.

5.3.1. Errors in Pilot-ATC Speech

In pilot-ATC talk, especially in emergency situations, it is crucial to maintain clear and effective communication. However, as the analysis of the data demonstrates, errors are present in the communications between ATC and crews. The most common instances are uttering errors such as the wrong aircraft identification callsign number or omitting the aircraft's callsign altogether. Other instances of verbal communication are stuttering, hesitation markers, and not providing a clear pronunciation. In excerpt 23, an instance of unclear pronunciation can be identified. In this transcript, the American Captain of the flight speaks colloquially in a large amounts of his utterances and therefore uses words like "sometin" and "tryna".

Data Sample 23: Unclear pronunciation of the pilot – Transcript 1

08 12:29:49 Pilot A728: Eh at this time it's just cabin right now to the back eh cabin around row twenytwo ehh and again it's just it's we are not declaring an emergency at this time ehhhh if this starts to spread or [sometin] like that then we might change our mind but right now we're just eh just [tryna] get the same back and get it on the ground

In the third transcript, an interesting observation emerges. The Captain of the flight comes from Ireland, and as a result, speaks with an accent. In such cases, where a participant's accent is pronounced, efforts are typically made to articulate clearly during communication. However, in this emergency scenario, the ATCO found it challenging to understand the pilot, prompting a request for clarification (see Data Sample 24).

Data Sample 24: Accent in Pilot-ATC talk – Transcript 3

7 21:54:57 Pilot EI106: heading one [niner] zero *(mumble) for Shemrock one zero six

11 21:55:15 Pilot EI106: we'll get eh we'll get back to [ya] just eh give us a few seconds ** whats the problem (unintelligible - thick accent)

12 21:55:21 ATCO1: sorry say that again

13 21:55:22 Pilot EI106: we'll get back to [ya] in a couple of minutes ** exactly what the problem was on departure

Unclear pronunciation is not the only issue in pilot-ATC difficulties. What has been observed in non-scripted speech is adding unnecessary words which would never occur in AE. In Data Sample 25 this can be seen when ATCO1 says 'telling you to' when giving instructions.

Data Sample 25: Adding unnecessary words – Transcript 2

07 22:34:03 ATCO1: twenty sixty five telling you to set up for an approach there [aaand] just let me know if you need anything any assistance ah ah at the airport please

In several transcripts, a change in using numerals is conducted by either the pilot or ATCO. As was already discussed, numerals should be pronounced separately for participants' better understanding. See Data Sample 26 where different pronunciation of numerals is presented. ATCO2 gives instructions to 'maintain one zero thousand' and the pilot confirms understanding with different pronunciation of 'ten thousand'. This is also seen later in the same transcript when the pilot utters 'eighteen one' instead of 'one eight point one'.

Data Sample 24: Change in the use of numerals – Transcript 2

30 22:36:14 ATCO2: American twenty sixty five Denver approach final visual approach runway two nine descend and maintain one zero thousand

31 22:36:20 Pilot AA2065: eh at eh ten thousand expecting the visual for two nine um American twenty sixty five

61 22:39:25 ATCO2: thirty five contact grand junction tower on one eight point one have a good day
62 22:39:30 Pilot AA2065: eighteen one American twenty sixty [fife]

An example of misuse of numeral nine can be found in the second transcript. Instead of using the standard aviation numerals ‘niner’ and ‘fife’, the pilot uses ‘nine’ and ‘five’ (see below excerpt 27). Since the standard aviation numerals help with the pronunciation, this is seen as an error.

Data Sample 25: Misuse of ‘niner’ – Transcript 2

06 22:34:00 Pilot AA2065: uh two nine nine nine seven down to thirteen thous- at American uh twenty sixty five

The most frequent aspect of the non-scripted speech observed in this thesis’ dataset is omitting the callsign. From the analysis, it can be suspected that this is attributed to human factors. According to the FAA, “human error can be identified as factor in two-thirds to three-fourths of recent aviation accidents and incidents, including several recent high-profile cases (“The Role Of Human Factors In The Faa”). Since multiple flights are covered by one ATCO on one frequency, it is crucial to use callsign to indicate either who is speaking or to whom the message is for. Since participants are under pressure in an emergency, mistakes are being made in omitting callsign when speaking. This may be a consequence of stress affecting the psyche as seen in the dataset. If the callsign is omitted, in some cases, the speaker or receiver is identifiable as participants in emergencies communicate more closely and answer each other’s questions (see turns 135, 138 and 139 in Data Sample 28). Therefore, this does not have to be a problem as it can help with time efficiency in solving a difficult situation. See turns 254, 262, 264, 269 and 270 in Data Sample 29, where participants understand who the speaker or the receiver is due to previous conversations or asked questions.

Data Sample 26: Omitting callsign – Transcript 8

134 133 11:11:02 ATCO: thirteen eighty Philly.
135 11:11:04 Pilot WN1380: go ahead.
136 11:11:05 ATCO: Southwest thirteen eighty * * * descend and descend and maintain six thousand.
137 11:11:10 RDO-1: Southwest thirteen eighty down to six thousand.
138 11:11:13 APR: when you get a chance I need ah fuel remaining and souls on board.
139 11:11:16 RDO-1: okay one hundred and forty nine souls on board. Five hours of fuel

Data Sample 27: Omitting callsign – Transcript 5

252 15:28:05 ATCO: Cactus fifteen twenty nine, if we can get it for you do you want to try to land runway one three?
254 15:28:10.6 Pilot US1549: we're unable. we may end up in the Hudson.
261 15:28:31 ATCO: arrright Cactus fifteen forty nine its gonna be left traffic for runway three one.
262 15:28:35 Pilot US1549: unable.
264 15:28:36 ATCO: okay, what do you need to land?
268 15:28:46 ATCO: Cactus fifteen (twenty) nine runway four's available if you wanna make left traffic to runway four.
269 15:28:49.9 Pilot US1549: I'm not sure we can make any runway. uh what's over to our right anything in New Jersey maybe Teterboro?
270 15:28:55 ATCO: ok yeah, off your right side is Teterboro airport.

Other errors that are found in this thesis' dataset are mistakes in callsigns. It is either omitting a part of the callsign or making an error in the number. For instance, see Data Sample 30 where in turn 55 ATCO3 omits 'American' prior to the flight number. In an excerpt from transcript 2, the error is seen in ATCO1 uttering 'six five' instead of 'American twenty sixty five' (see Data Sample 31).

Data Sample 28: Error in callsign – Transcript 1

55 12:35:16 ATCO3: seven twenty eight [fife] miles from focus to *
two [fife] zero maintain two thousand ** localizer clear to ILS
runway two two left approach

Data Sample 29: Error in callsign – Transcript 2

16 22:35:13 ATCO1: six five eh to get eh time eh fuel onboard and
number of souls

Another common element which affects participant's ability to avoid mistakes is confusion. In an emergency, participants must think rapidly to find the best solution to a problem and they have to react fast. This sometimes leads to confusion in what information they need to share. Hence, for a confused pilot or ATC, it is more frequent to make an error. In Data Sample 32, ATCO1 is confused and therefore uses the wrong flight number in his utterance. Instead of "Shemrock one zero six heavy", he utters "one zero seven heavy".

Data Sample 30: Error in callsign – Transcript 3

5 21:54:45 Pilot EI106: eeh departures Shemrock one zero six heavy
engine trouble here and we're gonna *** (mumble)

6 21:54:51 ATCO1: one zero seven heavy radar contact fly heading
one [niner] zero and maintain FIVE thousand

A similar problem can be seen in Data Sample 33, where the pilot uses the wrong flight number under the pressure of an emergency situation. Instead of "Cactus fifteen forty nine", he utters "Cactus fifteen thirty nine".

Data Sample 31: Error in flight number – Transcript 5

240 15:27:32.9 Pilot US1549: mayday mayday mayday. uh this is uh
Cactus fifteen thirty nine hit birds, we've lost thrust (in/on) both
engines we're turning back towards LaGuardia.

Confusion can not only lead to an error but also to the participant's uncertainty. For instance, turn 190 in Data Sample 34 in which the ATCO is unsure whether the pilot has requested an extended landing even though this information was confirmed to the ATCO earlier in the transcript (turn 181).

Data Sample 32: Uncertainty leads to clarification request – Transcript 8

179 11:13:44 ATCO: and Southwest thirteen eighty you going to go right in or do you need extended final?

181 11:13:48 Pilot WN1380: extended final.

182 11:13:50 ATCO: thank you.

190 11:14:14 ATCO: thirteen eighty you're on approach frequency one two eight point four. You're where you should be. Maintain four thousand and ah do you need any further assistance from me? What type of final do you want? I heard short. Or a long.

191 11:14:24 Pilot WN1380: yeah, we're gonna need a long final.

In many cases, uncertainty can also be a reason for hesitation markers and stutter. This happens when participants need to reply quickly and because of that they stutter or speak haltingly. See Data Sample 35 which presents hesitation markers by both pilot and ATC. Stutter can be seen in situations where participants are under pressure. This is usually conducted by both pilots and ATCOs (see Data Sample 36 and 37).

Data Sample 33: Uncertainty leads to hesitation marker – Transcript 4

03 16:58:43 Pilot U1888: I descend to maintain four thousand, we're not of eeeeh one three thousand, we expect ILS one eight United eighteen eighty eight

17 17:00:19 Pilot U1888: United eighteen eighty eight eh we are on Lincoln eh Nebraska side

20 17:00:32 ATCO2: United eeh eighteen eighty eight remain the aircraft, come down ILS thank you one eight

Data Sample 34: Pilot stutter – Transcript 6

144 16:14:11 Pilot BA2276: look. There's all fire and smoke
[stammer]. **Look-look** to your right.

Data Sample 35: ATC stutter – Transcript 1

75 12:37:01 ATCO4: the only information we have is nine flight
attendants are no- not feeling well

As demonstrated in this chapter, errors made in pilot-ATC communication can differ, but they always lead to a non-scripted utterance. In most cases participant's error stays unseen and it does not affect the safety. However, a situation, in which an error may be fatal, always hands like a spectre. That is why continuing emphasis must always be placed on training both pilots and ATC for problem solving in different scenarios of emergencies.

5.3.2. Repair and Clarification

A recurrent phenomenon in this thesis' dataset is repair and clarification. The most frequent type of repair identified in the eight analysed transcripts is self-initiated self-repair when the participant realizes their error and corrects it. For instance, see turn 30 in Data Sample 38, where the pilot corrects himself after uttering an error. In Data Sample 39, self-repair occurs when ATCO2 realizes he already knows the information which he intended to ask for. In another excerpt from Transcript 4, ATCO1 corrects the flight heading (see Data Sample 40).

Data Sample 36: Self-initiated self-repair – Transcript 1

30 12:32:08 Pilot A728: we know that we have all (pause) eh ten -
(pause) all nine flight attendants are eh ill\ This place

Data Sample 37: Self-initiated self-repair – Transcript 2

41 22:37:36 ATCO2: umm requesting fuel in time and souls on board I
think we've already got it

Data Sample 38: Self-initiated self-repair – Transcript 4

10 16:59:24 ATCO1: United eighteen eighty eight no problem, fly heading zero one * fly heading one zero zero

The occurrence of other-repair is significantly reduced in this thesis' dataset. Self-initiated other-repair in Data Sample 41 where the pilot corrects the ATCO on the number of people on this flight. In addition to that, other-initiated self-repair is also presented in turns 267 and 268 in Data Sample 42.

Data Sample 39: Self-initiated other-repair – Transcript 8

90 11:08:38 ATCO: I'm sorry how many souls on board?

91 11:08:40 Pilot WN1380: one four niner.

92 11:08:43 ATCO: forty nine?

93 11:08:44 Pilot WN1380: one hundred forty nine.

Data Sample 40: Other-initiated self-repair – Transcript 8

264 11:18:45 Pilot WN1380: Phila tower Southwest ah thirteen eighty landing on ah two seven right.

267 11:18:53 ATCO: Southwest thirteen eighty wanna land two seven right?

269 11:18:57 Pilot WN1380: ah two seven left I'm sorry two seven left.

Furthermore, clarification requests are frequently observed in this thesis' dataset. In pilot-ATC communication they are aware that they need to be as certain as possible when making crucial decisions. This element further increases in emergency situations. For instance, Data Sample 43 in which ATCO3 makes sure that everyone on the same frequency understands for whom the message was intended. Moreover, as turns unfold clarification requests emerge. See Data Samples 44 and 45, where participants are asking for a repetition of information.

Data Sample 41: Clarification to all flights on the same frequency – Transcript 1

52 12:34:45 ATCO3: okay and just confirm I think to answer that that was only for American seven twenty eight [tree] one zero

53 12:34:51 Pilot A728: yeah American seven two eight heavy [tree] one zero on the heavy

Data Sample 42: Clarification request – Transcript 1

58 12:35:34 Pilot A728: one two eight eh I'm sorry say that again

59 12:35:36 ATCO3: one TWO EIGHT POINT eight for American seven two eight heavy

60 12:35:39 Pilot A728: one two eight point eight American seven two eight heavy you got that

Data Sample 43: Clarification request – Transcript 2

04 22:33:50 Pilot AA2065: uh say again the altitude for twenty sixty five one eight busy time

05 22:33:53 ATCO1: twenty sixty five maintain one three thousand THIRTEEN grand junction altimeter two nine [o] [niner] seven

19 22:35:30 ATCO1: twenty sixty five one more time how much fuel onboard please

20 22:35:33 Pilot AA2065: eleven thousand two hundred

26 22:35:55 Pilot AA2065: and what was that frequency for American twenty sixty five/

27 22:35:58 ATCO1: twenty six five gon- be eeh Denver approach one one [niner] point seven - nineteen seven

When a critical problem appears in an emergency, participants may be in shock or disbelief and this can also be a reason for them to make clarification requests. This is seen in Data Sample 46 where the ATCO request clarification from the pilot and a pilot of a different flight repeats the message for him. In a different excerpt from Transcript 8, disbelief resulting

in the repetition of information is presented (see Data Sample 47). In this excerpt, an engine blew up and part of it broke a window.

Data Sample 44: Disbelief leads to clarification request – Transcript 5

290 15:29:28 Pilot US1549: we're gonna be in the Hudson.
291 15:29:33 ATCO: I'm sorry say again Cactus?
313 15:30:09 Pilot 4718: two one zero uh forty seven eighteen. I think he said he's goin in the Hudson.

Data Sample 45: Disbelief leads to clarification request – Transcript 8

237 11:17:04 Pilot WN1380: okay could you have the ah medical meet us there on the runway as well we've got ah injured passengers.
238 11:17:12 ATCO: injured passengers okay and are you is your airplane physically on fire?
239 11:17:16 Pilot WN1380: no it's not on fire but part of it's missing.
240 11:17:22 Pilot WN1380: they said there's a hole and ahm someone went out.
241 11:17:27 ATCO: ahm, I'm sorry you said there was a hole and somebody went out?

As transcripts 5-8 also present pilot to pilot talk, clarification request from Captain to First Officer is seen. The need for certainty is key element not only in pilot-ATC talk but also at pilot-pilot talk (see Data Sample 48).

Data Sample 46: Clarification request between two pilots – Transcript 8

49 11:05:32 Pilot WN1380: okay have you got the aircraft?
50 11:05:38 Pilot WN1380: okay have you got the aircraft?
51 11:05:40 Pilot WN1380: completely?

Since there is always a need for maintaining safety in aviation, correct information needs to be presented by both pilots and ATCOs. In case an error is made, participants use repair and clarification to remedy it. Scripted talk is affected by human error in an emergency where is

most likely for the participants to feel under pressure. Non-scripted talk is usually conducted by mistake, not on purpose. The transition from scripted to non-scripted talk is analysed in the next subchapter.

5.4. Transition from scripted to non-scripted speech

In this analysis, a recurring transition type was found. The transition from scripted talk into non-scripted talk often happens when the emergency starts. After the initial recognition, participants try to move back from non-scripted talk into a scripted one. Often, they move between these two types of speech. In some utterances, it seems that they are uncertain on how to express themselves in scripted speech. Therefore, a lack of pilot-ATC training in communication in an emergency can be inferred.

In Transcript 1, the transition can be seen in turn 4, where the pilot uses an overly descriptive method in his utterance. After this initial call, the pilot moves to scripted talk, but in turn 26 he again moves into the non-scripted one (see Data Sample 49). At the end of this transcript, after the aircraft landed, the whole conversation moves to only non-scripted talk.

Data Sample 47: Transition from scripted to non-scripted talk – Transcript 1

01 12:29:38 Pilot A728: eeh Boston American seven two eight
02 12:29:44 ATCO1: American seven two eight standby
03 12:29:48 ATCO1: American seven two eight go ahead
04 12:29:50 Pilot A728: eh Boston eh seven twenty eight heavy we have an issue eh with an ODOUR on the airplane now everything's normal everything is A okey\ We call it the dirty socks by all\ With that being said we need to turn this airplane around and we need to go back to Philadelphia\ We are NOT declaring an EMERGENCY we would appreciate expert * hand but we are NOT declaring an emergency * and we'd like to CHANGE our destination to Phily
25 12:31:24 ATCO2: Boston American seven twenty eight
26 12:31:28 Pilot A728: Yes sir American seven twenty eight is declaring a medical emergency we have sick passengers sick flight

attendants in the back we all breath [polluton] * we're all A OKAY
the airplane is in good shape we'd like to get on the ground as
quickly as possible and we think Boston is the place to go

In Transcript 2, the transition is often seen in turns where the participant needs to conduct a more complicated utterance in a short amount of time (see turns 7 and 8 in Data Sample 50). Throughout this transcript, the phenomenon of mixed scripted and non-scripted utterances is largely seen. This will be analysed in the following subchapter as sometimes this phenomenon can be efficient in emergencies.

Data Sample 48: Transition from scripted to non-scripted talk – Transcript 2

06 22:34:00 Pilot AA2065: uh two nine nine nine seven down to thirteen thous- at American uh twenty sixty five

07 22:34:03 ATCO1: twenty sixty five telling you to set up for an approach there [aaand] just let me know if you need anything any assistance ah ah at the airport please

08 22:34:11 Pilot AA2065: we'll definetely need the eeh eh what do you call it the eh fire equipment just so they can check us when we land and eh we'll get back to you shortly, we're just tryina finish our checklist right now

Transcript 3 is overall filled with scripted talk but there are some fascinating instances of non-scripted talk. Take a look at turn 10 in Data Sample 51 where in the initial realization of an issue, non-scripted talk is used by both pilot and ATCO1.

Data Sample 49: Transition from scripted to non-scripted talk – Transcript 3

9 21:55:04 Pilot EI106: ** at the moment at eh we're on a level five * takeoff heading one [niner] zero

10 21:55:12 ATCO1: Shemrock one zero six heavy eh whatever you need just eh let me know

13 21:55:22 Pilot EI106: we'll get back to [ya] in a couple of minutes ** exactly what the problem was on departure

14 21:55:26 ATCO1: okay very good thank you

In Transcript 4, non-scripted polite phrases are used. See Data Sample 52 where in turn 9 pilot gives confirmation of understanding by saying “appreciate sir thank you” instead of saying “roger” or repeating the instructions. Turns 5 and 7 presented in the excerpt below were also uttered in non-scripted speech.

Data Sample 50: Transition from scripted to non-scripted talk – Transcript 4

05 16:58:54 Pilot U1888: ** pass on the eight to Sierra, we're pretty busy

06 16:58:59 ATCO1: United eighteen eighty eight no problem eh you ready to copy/

07 16:59:01 Pilot U1888: we're good

08 16:59:03 ATCO1: United eighteen eighty eight information Sierra start out at Lincoln, wind two two zero at one three, visibility is one zero mile, sight distance clear, temperature eight two point minus two, MOH altimeter's two [niner] eight [niner]

09 16:59:21 Pilot U1888: United eighteen eighty eight eh appreciate sir thank you

Transcript 5 is unique in this dataset due to its landing circumstances. Flights from transcripts 1-4 and 6-8 all landed safely at an airport, while pilots of the flight from Transcript 5 performed an emergency landing in water. This was due to the fact that both engines had failed and the aircraft was slowly losing airspeed. The conversation used was therefore influenced by these circumstances. Yet pilots managed to communicate with ATC efficiently and make a decision which saved everyone onboard. The pilots were very experienced and fortunately resistant to stress which helped them in solving the emergency. See Data Sample 53 where there is a two-way conversation in non-scripted talk due to the severity of the emergency. In this transcript, not only pilot-ATC talk is presented and therefore important moments of conversation in the cockpit can be seen. In turn 279, the Captain makes an announcement to the passengers and crew so they would prepare for the emergency landing. Different phenomena

can be seen in this excerpt. At first the ATCO uses scripted talk but that changes in turn 264 when he realizes, how critical the situation is. The pilot does not use the flight's callsign and performs non-scripted talk.

Data Sample 51: Transition from scripted to non-scripted talk – Transcript 5

252 15:28:05 ATCO: Cactus fifteen twenty nine, if we can get it for you do you want to try to land runway one three?

254 15:28:10.6 Pilot US1549: we're unable. we may end up in the Hudson.

264 15:28:36 ATCO: okay, what do you need to land?

268 15:28:46 ATCO: Cactus fifteen (twenty) nine runway four's available if you wanna make left traffic to runway four.

269 15:28:49.9 Pilot US1549: I'm not sure we can make any runway. uh what's over to our right anything in New Jersey maybe Teterboro?

270 15:28:55 ATCO: ok yeah, off your right side is Teterboro airport.

273 15:29:02 ATCO: you wanna try and go to Teterboro?

274 15:29:03 Pilot US1549: yes.

279 15:29:11 Captain US1549: this is the Captain brace for impact.

Another instance of non-scripted talk is seen in Transcript 6 where the non-scripted pilot-pilot talk influences pilot's speech in interaction with ATC (see Data Sample 54).

Data Sample 52: Transition from scripted to non-scripted talk – Transcript 6

142 16:14:07 Captain BA2276: I think there's too much fire. I think we've got to get out.

143 16:14:08 First Officer BA2276: well. It says it's gone out. Can we see anything?

144 16:14:11 Captain BA2276: look. There's all fire and smoke [stammer]. Look-look to your right.

145 16:14:13 **First Officer BA2276:** okay. Wh--
146 16:14:15 **Captain BA2276:** no. we've got to evacuate.
148 16:14:18 **First Officer BA2276:** ah tower. Speedbird twenty two
seventy six heavy.
149 16:14:21 **ATCO:** Speedbird twenty two seventy six heavy go ahead.
153 16:14:27 **First Officer BA2276:** Speedbird twenty two seventy six
heavy we are evacuating on the runway. We have a fire. I repeat we
are evacuating.

In Transcript 7, the transition to non-scripted talk occurs after the initial call (turn 27) of the emergency (see Data Sample 55). From this point, scripted talk is not used for the rest of the pilot-ATC interaction.

Data Sample 53: Transition from scripted to non-scripted talk – Transcript 7

27 14:31:50 **Pilot AA383:** American three eighty three heavy stopping
on the runway.
28 14:31:52 **ATCO:** roger roger. Fire.
30 14:31:56 **Pilot AA383:** do you see any smoke or fire?
32 14:31:58 **ATCO:** yeah fire off the right wing.
33 14:31:59 **Pilot AA383:** okay send out the trucks.
35 14:32:02 **ATCO:** sending em.

The pattern of the shift from scripted to non-scripted talk after announcing an emergency is also seen in Transcript 8. In this excerpt, features of basic conversation can be seen and that is the main reason for this interaction to be marked as non-scripted (Data Sample 56). Later in the transcript, attempts to move to scripted talk are seen in ATCO giving instructions. Nonetheless when more described information is needed in this unusual situation, a shift to non-scripted speech again occurs.

Data Sample 54: Transition from scripted to non-scripted talk – Transcript 8

37 11:04:50 ATCO: Southwest thirteen eighty if you're trying to get me all I hear is static.

38 11:04:54 Pilot WN1380: Southwest thirteen eighty has an engine fire descending.

68 11:06:55 ATCO: * Southwest thirteen eighty ah understand so there's a fire you're single engine cause of fire?

69 11:07:02 Pilot WN1380: actually we're no fire now but we are single engine.

76 11:07:37 ATCO: Southwest thirteen eighty just so I can understand you said that you are still single engine and ah what else?

77 11:07:45 Pilot WN1380: okay Southwest thirteen eighty- eighty we're single engine, that's it.

78 11:07:51 ATCO: okay single engine. Maintain one one eleven thousand do you need anything standing by on the ground?

79 11:07:55 Pilot WN1380: yes could ah you tell em roll the trucks it's on the ah engine number one captain's side.

There are several reasons for the shifts from scripted to non-scripted speech in emergency situations. As seen in the excerpts, one of them is the low preparedness of pilots and ATC when making non-standard AE utterances. Other reasons may be using overly descriptive phrases, basic conversation features such as politeness or having no time while solving a problem. What is seen throughout this thesis' dataset is a mix of scripted and non-scripted speech, which is sometimes the most helpful tool in pilot-ATC communication.

5.5. Combination of scripted and non-scripted speech

Different discrepancies were observed in the analysis with the use of CA. Most results of the findings imply that combining scripted and non-scripted speech in one utterance may be of great help to pilots and ATCOs. This element helps with efficiency and time consumption in emergencies. See instances of these mixed types of speech below.

Data Sample 55: Combination of scripted and non-scripted speech – Transcript 1

54 12:34:57 ATCO3: two [fife] sir (pause) and you are aware that medical comin in down (pause) International nine and B point one (pause) two [fife] Charlie turnin on to a ten mile final

Data Sample 56: Combination of scripted and non-scripted speech – Transcript 2

09 22:34:22 ATCO1: American twenty sixty five no problem I'll get that set up for it

22 22:35:36 ATCO1: twenty sixty five can take [theee] Denver approach one one [niner] point seve- SEVEN let them know what you need

24 22:35:46 ATCO1: [tree] forteen we were gonna give it *** more room turn right by heading at [tree] zero zero

Data Sample 57: Combination of scripted and non-scripted speech – Transcript 3

5 21:54:45 Pilot EI106: eeh departures Shemrock one zero six heavy engine trouble here and we're gonna *** (mumble)

27 21:56:55 ATCO1: Shemrock one zero six heavy fly heading one three zero descending on a uh very extended eh down one there oxygen * if you want to descend at all you can maintain five

Data Sample 58: Combination of scripted and non-scripted speech – Transcript 4

01 16:58:24 Pilot U1888: calling for approach United eighteen eighty eight, mayday mayday mayday inbound for Lincoln, eeh planning on landing south and I think it's half point the weather, we have been *

Data Sample 59: Combination of scripted and non-scripted speech – Transcript 5

240 15:27:32.9 Pilot US1549: mayday mayday mayday. uh this is uh Cactus fifteen thirty nine hit birds, we've lost thrust (in/on) both engines we're turning back towards LaGuardia.

261 15:28:31 ATCO: arright Cactus fifteen forty nine its gonna be left traffic for runway three one.

Data Sample 60: Combination of scripted and non-scripted speech – Transcript 8

47 11:05:21 Pilot WN1380: okay heading two five zero we're looking at ah Philly * * *.

78 11:07:51 ATCO: okay single engine. Maintain one one eleven thousand do you need anything standing by on the ground?

201 11:14:50 ATCO: Southwest thirteen eighty you'll be landing two seven left, two seven left today. And ah you just let me know when you need to turn base ah I ah right now I only have one person in front of you which is a Southwest * I'm sure he'll pull off if you need to go.

As presented in data samples, combining scripted and non-scripted speech is coherent and logical in most situations. Therefore, uttering non-scripted talk does not ultimately have to be seen as an error. In emergencies, safety is paramount. Integrating this combined speech into pilot and ATC training should be considered, to ensure safety is maintained during emergencies and applied as needed. If such integration proves effective in assisting participants with safety protocols, it should become a standard practice within training programmes.

6. Discussion

The analysis has provided insights into the way that pilot-ATC communication is conducted. As there are still not many works that analyse pilot-ATC talk in emergency situations, this analysis found novel and interesting aspects of their speech. Applying the methodology of CA, different types of linguistic phenomena were found in the dataset. The shift from scripted to non-scripted speech was found in every transcript and its examination highlights several reasons for its recurrent appearance throughout the dataset.

Firstly, the scripted talk was defined by applying known theory to the data analysis. This illustrated how participants use scripted talk in real life situations and it set the foundation for applying CA. The analysis helped to unravel what words and phrases are used and what the structure is like in pilot-ATC speech. In several excerpts, different elements such as confirmation of understanding, clarification requests etc. were present.

Secondly, key factors of non-scripted talk were examined. Analysis of errors, hesitation markers, as well as stutter, revealed aspects which had contributed to this. Solving tasks or problems under pressure leads to participants making more mistakes in their speech. Usually, there is some kind of awareness to this and that is why participants often realize their errors and correct them by using repair. A great amount of self-repair was found in the dataset as opposed to other-repair. Since there are many cases in which one of the participants is unsure about certain information, clarification requests were seen in the majority of the presented datasets. This concept of requesting further information to ensure clarity is becoming a pattern in pilot-ATC interaction.

Thirdly, the shift from scripted to non-scripted talk was examined. The results show a pattern in which non-scripted talk began after the initial recognition of an emergency. Presented excerpts further demonstrate that after this, participants tried to revert their speech to scripted talk. This shift was often interrupted as participants were unfamiliar with how to pass on certain

types of information which require more description. This matter showed that participants were not prepared for such communication needs during emergencies. Therefore, even if the endeavour is seen in pilot-ATC scripted talk, participants move back and forth between these two types of speech.

In addition, an interesting element in the pilot-ATC talk was found. Since participants were attempting to move from non-scripted speech into a scripted one, a combination of these two types of talk was established. Interestingly, the mixture of scripted and non-scripted aspects was seen in a single utterance, thus this presented a new element in AE. As seen in the transcripts, when participants used this type of speech combination, it helped them in resolving the emergency. Therefore, it can be presupposed that this use will be more noticed by aviation specialists in the future.

In conclusion, the importance to adhere to given scripted talk is evident. However, in emergencies, a situation can arise when there is a need to use altered non-scripted talk. The most plausible way of doing this, is by combining scripted and non-scripted speech. As presented in various excerpts, this seems to be more efficient for problem solving in flight. Moreover, there are several aspects of non-scripted speech which should be avoided. For instance, this includes errors in giving information and overly describing problems which is time consuming. All things considered, this analysis provided a suggestion for training pilots and ATCOs to use combined scripted and non-scripted speech in emergency situations and apply it in real life emergencies.

7. Conclusion

This thesis aimed to identify pilot-ATC talk in emergencies and to find nuances of scripted and non-scripted speech alike. This was performed through CA as the main linguistic methodological approach. Communication in aviation was presented as a specific category of linguistics which helped focus on AE, flight terminology, sequences of talk, and the transition from scripted to non-scripted speech. An analysis was conducted on a dataset of eight flights which were in emergency situations where pilots had to react quickly to maintain safe operations.

Effective communication is paramount in the aviation industry. It is used as a tool for performing institutional tasks. It needs to be conducted in a standardised way to maintain the safety of passengers and crew members alike. This links to the pilot-ATC relationship in which both parties must communicate clearly and in a way which helps them to perform their tasks efficiently. This relationship can be paralleled to the collaboration between a driver and their co-pilot in motorcar races. In racing, the co-pilot is the one reading instructions, in aviation the ATCO gives instructions to the pilots. Therefore, without ATC, pilots would not be able to perform their tasks. When an emergency occurs, communication dynamics within the pilot-ATC relationship significantly change.

This thesis has examined the intricacies of aviation communication, aviation language and its features. It presented Aviation English, terminology used in flight and the measures used to ensure safety taken in the past. Pilot-ATC relationship and their communication used in normal situations as well as in emergencies was researched. *Avialinguistics* as the main source for this thesis was presented along with several other sources, which helped in creating a foundation for the analysis. CA was presented as the main linguistic methodology used in this thesis along with its features that were found in this thesis' dataset. Before conducting the

analysis, radio communication, which sometimes can be seen as problematic, was researched, and thoroughly examined.

The used dataset was presented, and the process of data collection was explained. Analysis of transcripts from eight flights was conducted in order to find different deviations in scripted aviation talk. Scripted speech as the correct institutional talk along with its features such as callsign, readback, structure, phraseology, and turn-taking was presented. Non-scripted speech was found as said deviation in the dataset.

There are several crucial findings of this thesis. Firstly, non-scripted speech was filled with instances of errors, caused by the human factor, self-repair, and clarification requests as recurring devices in pilot-ATC talk. Secondly, focus was placed on the difference between scripted and non-scripted pilot-ATC talk and on the transition between the two forms of speech. As a result of this, the transition between these two types of speech confirmed to have a pattern of shifting the speech to a mixed scripted and non-scripted talk. Non-scripted talk usually starts after the initial recognition of an emergency or the realisation of a critical situation. Participants often realize this shift and try move their speech back to the scripted form of talk but that does not always meet the needs of the situation. This results in the use of a new element which was seen through all transcripts and that is the combination of scripted and non-scripted talk. In summary, the findings of the analysis revealed that a mixture of these two forms of speech was often used, and it served the participants in a way which helped with resolving the emergency more effectively.

For this thesis, eight transcripts were selected to answer this thesis' question. To further ground and confirm the findings of this thesis, a more robust study scrutinizing more flights which had been in emergency situations would need to be conducted. The scope of this thesis did not wholly fulfil the potential of CA as the data did not permit the full utilization of CA's

capabilities. Additionally, the analysis was structured in a way which limited the use of all CA's aspects.

In conclusion, this study explored the nuanced aspects of language in the specialised domain of aviation communication, providing valuable insights for the field of linguistics. The findings confirm that aviation communication is a complex subject which needs more research. This thesis suggests further exploration of pilot-ATC speech in emergency situations, closer examination of mixed scripted and non-scripted situations and their usefulness in emergencies. Considering the continuous need for safe operations, this could lead to aviation specialists taking the initiative and encouraging the ICAO, the FAA, and airlines to train pilots and ATCOs for mixed scripted and non-scripted interactions in different emergency situations. This could serve as an innovation in the aviation industry which would help prevent misunderstandings and unsafe situations in flight.

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Appendix

1. Transcript of flight AA728- 31 Jul 2019:

Flight American 728 was a scheduled flight from Philadelphia to London Heathrow which was diverted to Boston due to odour in cabin. The odour was discribed as "dirty socks" which often equates to the smell of oil fumes (afacwa.org).

LEGEND

* Unintelligible word

() Insertion

[] Difference in pronunciation

/ Question with a risen tone

\ End of utterance with a lowering tone

CAPSLOCK Emphasis on utterance

01 12:29:38 Pilot A728: eeh Boston American seven two eight

02 12:29:44 ATCO1: American seven two eight standby

03 12:29:48 ATCO1: American seven two eight go ahead

04 12:29:50 Pilot A728: eh Boston eh seven twenty eight heavy we have an issue eh with an ODOUR on the airplane now everything's normal everything is A okey\ We call it the dirty socks by all\ With that being said we need to turn this airplane around and we need to go back to Philadelphia\ We are NOT declaring an EMERGENCY we would appreciate expert * hand but we are NOT declaring an emergency * and we'd like to CHANGE our destination to Phily

05 12:29:19 ATCO1: American seven two eight eh no problem equipt left hand turn and proceed direct to Sierra Echo Yankee and I'll have further routing for you shortly as well as eh a descent eh so again left hand turn direct to Sierra Echo Yankee

06 12:29:35 Pilot A728: A left hand turn direct Sierra Echo Yankee for now American seven two eight thank you

07 12:29:42 ATCO1: American seven twenty eight ehh just a quick question is the odor cabin or cockpit or every cabin

08 12:29:49 Pilot A728: Eh at this time it's just cabin right now to the back eh cabin around row twenytwo ehh and again it's just it's we are not declaring an emergency at this time ehhhh if this

starts to spread or [sometin] like that then we might change our mind but right now we're just eh just[tryna] get the same back and get it on the ground

09 12:30:07 ATCO1: You got it, no problem thank you very much

10 12:30:11 ATCO1: American seven twenty eight I have the drafts to the routes for you when you're ready to * it

11 12:30:14 Pilot A728: go ahead sir

12 12:30:15 ATCO1: direction you are clear direct to Manta then Jay one twenty one Brick and then then Gems [tree] arrival at Philadelphia Manta Jay one twenty one Brick seven [tree]

13 12:30:27 Pilot A728: okey direct Manta this time Jay one twenty one Brick and emm Gems [tree] to Philadelphia American seven two eight thank you sir

14 12:30:34 ATCO1: ** for long to see if we can get eh some sort of direct down the line but Manta's the best I can do right now

15 12:30:39 Pilot A728: That's fine any any thing we can get we'll appreciate

16 12:30:41 ATCO1: Roger

17 12:30:46 ATCO1: American seven twenty eight traffic [twelfe] oclock two zero miles out of your direction\ company eh Boeing seven fifty six one thousand feet eh above you

18 12:30:54 Pilot A728: American seven two eight heavy eh we got the air traffic in sight

19 12:30:57 ATCO1: American eighty eight eh traffic [twelfe] oclock two zero miles opposite your direction company Airbus [tree] thirty [tree] hundred zero one thousand feet below [ya]

20 12:31:04 Pilot A88: American eighty eight roger

21 12:31:06 ATCO1: American seven twenty eight contact Boston central one two eight point seven [fife] goodnight

22 12:31:12 Pilot A728: two eight seven [fife] American seven two eight appreciate your help you have a goodnight sir

23 12:31:15 ATCO1: No problem

24 12:31:17 Pilot A728: eh to Boston American seven two eight heavy level eh fly level [tree] six 0

25 12:31:24 ATCO2: Boston American seven twenty eight

26 12:31:28 Pilot A728: Yes sir American seven twenty eight is declaring a medical emergency we have sick passengers sick flight

attendants in the back we all breath [polluton] * we're all A OKAY
the airplane is in good shape we'd like to get on the ground as
quickly as possible and we think Boston is the place to go

27 12:31:47 Pilot A728: ten two zero zero American seven twenty
eight

28 12:31:52 ATCO2: ehh standby Ill have to get that information

29 12:31:57 Pilot A728: okay we got you on other transmission we
appreciate that and we're going to turn left to two zero zero
American seven twenty eight

30 12:32:08 Pilot A728: we know that we have all (pause) eh ten -
(pause) all nine flight attendants are eh ill\ This place

31 12:32:22 Pilot A728: Calling the Boston airport the radar left
turns American seven twenty eight

32 12:32:28 ATCO2: left turn zero [niner] zero American seven
twenty eight

33 12:32:34 Pilot A728: We are we are feeling no ill or sick\ We
are on ** most the flight and the pilots are A OKEY no symptoms at
all\ As for the flight attendants - headache nausea and coughing
(pause) dizziness and * to get the right term AND dizziness

34 12:32:59 Pilot A728: zero [tree] zero American seven twenty
eight

35 12:33:06 ATCO2: one one thousand two nine nine eight American eh
seven two eight

36 12:33:12 Pilot A728: okey we're gonna expect direct Noley we
already got the setup American seven two eight we'll let you know
when we need to turn in

37 12:33:20 Pilot A728: thirty [tree] zero American seven two eight
appreciate all the help sir

38 12:33:23 Pilot A728: and Boston American seven two eight out of
a [twelfe] point seven for one one thousand eeh B three thir- or
yeah eh we're going direct Noley this time

39 12:33:31 ATCO3: American seven twenty eight Boston approach **
two nine o niner expect direct runway two two left approach descend
and maintain three thousand

40 12:33:31 Pilot A728: okay and eh the eh down to [tree] thousand
two two left ehh two nine nine seven American seven two eight heavy

41 12:33:51 Pilot A728: Boston American seven two eight

42 12:33:53 ATCO3: American seven twenty eight *

43 12:33:55 Pilot A728: yeah hey eh right now we're looking at the eeehhh approach here and it looks like we'll be a lot huh further then ninety degrees to the left the one we turn out here by Noley we'd kinda like to go out to the right just a little bit in and come back in on Noley so we're not turned in such sharp turn backround for the approach

44 12:34:12 ATCO3: okay I was gonna * doing close to the * if you still wanna go to the r- right or did you wanna eem take the turn inbound

45 12:34:19 Pilot A728: No the if we're gonna do that take us focus at that would be fine that'd be much better when we get up here close to the Noley that'd be- that'd work out much better

46 12:34:28 ATCO3: yep I'm gonna have that up here shortly

47 12:34:29 Pilot A728: Thank you

48 12:34:31 ATCO3: American seven twenty eight descend and maintain two thousand

49 12:34:34 Pilot A728: Down to two thousand on American seven two eight

50 12:34:39 ATCO3: American seven twenty eight fly in [tree] one zero back to the final

51 12:34:42 Pilot A728: [tree] one zero on American seven two eight

52 12:34:45 ATCO3: okay and just confirm I think to answer that that was only for American seven twenty eight [tree] one zero

53 12:34:51 Pilot A728: yeah American seven two eight heavy [tree] one zero on the heavy

54 12:34:57 ATCO3: two [fife] sir (pause) and you are aware that medical comin in down (pause) International nine and B point one (pause) two [fife] Charlie turnin on to a ten mile final

55 12:35:16 ATCO3: seven twenty eight [fife] miles from focus to * two [fife] zero maintain two thousand ** localizer clear to ILS runway two two left approach

56 12:35:23 Pilot A728: two fifty heading two thousand * clear to ILS two two left approach American seven two eight heavy

57 12:35:30 ATCO3: American seven twenty eight heavy contact tower one two eight point eight

58 12:35:34 Pilot A728: one two eight eh I'm sorry say that again

59 12:35:36 ATCO3: one TWO EIGHT POINT eight for American seven two eight heavy

60 12:35:39 Pilot A728: one two eight point eight American seven two eight heavy you got that

61 12:35:43 Pilot A728: Boston tower American seven two eight heavy [iseeeh] ILS two two left

62 12:35:52 ATCO4: American seven two eight heavy Boston ILS two two left clear to land

63 12:35:56 Pilot A728: clear to land two two left American seven two eight heavy

64 12:36:01 ATCO4: American seven twenty heavy you got any updates information we can pass along or are you all set

65 12:36:06 Pilot A728: ehh we're all set right now we're just tryna run check list and get it done

66 12:36:08 ATCO4: got it

67 12:36:12 ATCO4: American seven twenty eight heavy eemm (click of tongue) any right turns available there for you Mike one O Bravo Bravo heavy left turn for you ** tax and inbound

68 12:36:22 Pilot A728: Excellent for Bravo uh eh right turns

69 12:36:27 ATCO4: American seven twenty eight heavy tax the inbound on Bravo taxiway to a nonstop all the way inbound on Bravo

70 12:36:34 Pilot A728: two eight

71 12:36:35 ATCO4: American seven twenty eight heavy you're going to gate nine international gate nine which is Bravo Lima all the way

72 12:36:42 Pilot A728: [niner] international American seven two eight thank you

73 12:36:45 ATCO4: there's eh there's people down there waiting for you if you want to ask them or anything I can or you can just wait and tell somebody get down there

74 12:36:52 Pilot A728: yeah uh right now we're just [tryna] get * the plane up right here uhuh in ten minutes pretty much status grows that was before the people and the flight attendants at the back and everything

75 12:37:01 ATCO4: the only information we have is nine flight attendants are no- not feeling well

76 12:37:04 Pilot A728: that's correct we had em an odour in here and in the end eh they were all started to feel sick so we wanted to turn around and come back to * crosspath

77 12:37:11 ATCO4: got it (pause) is there anything else I can do for you/ the the gate staff ** should start seeing person now up there now for [ya]

78 12:37:21 Pilot A728: everything you did for us and eh we're going ahead and getting here and hopefully we got people that pull the gate up here and eh let the medics EMT on it

79 12:37:29 ATCO4: okay yep eh your company called us so they're aware of it aand meds force knows about it so I'm not sure who drives that way though

80 12:37:35 Pilot A728: okay

81 12:37:37 ATCO4: if you have a problem let me know

82 12:37:39 Pilot A728: we'll do that thank you for all your help

83 12:37:40 ATCO4: no problem

84 12:37:43 Pilot A728: eh Boston American seven two eight

85 12:37:45 ATCO4: American seven twenty eight

86 12:37:47 Pilot A728: yes could you contact the eh emergency equipment down here if they have got equipments all we're getting pulled to the gate they got us blocked on the on the left hand side right now

87 12:37:55 ATCO4: two five sir

88 12:37:59 ATCO4: two five tower

89 12:38:02 Pilot A728: I don't even know if there's anybody IN THESE vehicles there's eh people standin all around but the th they got ambulance eehhh EMT RAM meds and than it looks like it's police car

90 12:38:12 ATCO4: okay th they most likely given move in there will come up via side jetway there and come up the eh side that way before they come in the other way but um I'm [tryna] get ahold of meds for for you right now and aa I'll get right back to you

91 12:38:26 Pilot A728: okay yeah no we're not worried about where they're coming from we just need the equipment move so we can get up here TO the jetway

92 12:38:31 ATCO4: got it

(My transcript / audio LiveATC.net)

2. Transcript of flight AA2065 - 06 Aug 2022:

Flight American 2065 was a scheduled flight from Dallas Fort Worth to Salt Lake City which diverted to Grand Junction due to engine shut down in flight.

LEGEND

* Unintelligible word

() Insertion

[] Difference in pronunciation

/ Question with a risen tone

CAPSLOCK Emphasis on utterance

01 22:33:32 ATCO1: American twenty six five zero

02 22:33:34 Pilot AA2065: American twenty sixty five at twenty seven. Um emergency aircraft making right turn to eh grand junction neat LOWER course for * maintain three

03 22:33:42 ATCO1: American twenty six five maintain eh ONE THREE thousand grand junction altimeter two nine [o] [niner] seven

04 22:33:50 Pilot AA2065: uh say again the altitude for twenty sixty five one eight busy time

05 22:33:53 ATCO1: twenty sixty five maintain one three thousand THIRTEEN grand junction altimeter two nine [o] [niner] seven

06 22:34:00 Pilot AA2065: uh two nine nine nine seven down to thirteen thous- at American uh twenty sixty five

07 22:34:03 ATCO1: twenty sixty five telling you to set up for an approach there [aaand] just let me know if you need anything any assistance ah ah at the airport please

08 22:34:11 Pilot AA2065: we'll definitely need the eeh eh what do you call it the eh fire equipment just so they can check us when we land and eh we'll get back to you shortly, we're just tryina finish our checklist right now

09 22:34:22 ATCO1: American twenty sixty five no problem I'll get that set up for it

10 22:34:25 Pilot AA2065: thank [ye]

11 22:34:26 ATCO1: sixty six [sixtyy] [fiiive] ** little ** but maintain * two six zero

12 22:34:32 ATCO1: three fourteen ** maintain one six thousand SIXTEEN for now, we're gonna get an emergency in the grand junction first then we'll get you set up

13 22:34:43 Pilot AA2065: American eh twenty sixty five can you give me the uh weather junction (pause) * fourteen thank you

14 22:34:51 ATCO1: eh American twenty sixty five I'm showing the grand junction zero one five [tree] me-uh weather uh weather observation wind uh [tree] one zero at eleven visibility ten, clear sky, temperature [tree] [tree] two point zero [tree], altimeter two [niner] [niner] seven

15 22:35:11 Pilot AA2065: thank [ye]

16 22:35:13 ATCO1: six five eh to get eh time eh fuel onboard and number of souls

17 22:35:17 Pilot AA2065: fuel at eleven thousand two hundred and forty, we got eh uh souls hundred seventy onboard

18 22:35:23 ATCO1: twenty sixty five roger

19 22:35:30 ATCO1: twenty sixty five one more time how much fuel onboard please

20 22:35:33 Pilot AA2065: eleven thousand two hundred

21 22:35:34 ATCO1: got it

22 22:35:36 ATCO1: twenty sixty five can take [thee] Denver approach one one [niner] point seven - SEVEN let them know what you need

23 22:35:41 Pilot AA2065: nineteen seven seven American twenty sixty five thanks for all the help

24 22:35:46 ATCO1: [tree] fourteen we were gonna give it *** more room turn right by heading at [tree] zero zero

25 22:35:53 Pilot AA2065: right heading three zero zero switchin [tree] fourteen

26 22:35:55 Pilot AA2065: and what was that frequency for American twenty sixty five/

27 22:35:58 ATCO1: twenty six five gon- be eeh Denver approach one one [niner] point seven - nineteen seven

28 22:36:04 Pilot AA2065: nineteen seven thank [ye] sir

29 22:36:07 ATCO2: good evening American twenty sixty five at a seventeen seven descending on one [TREE] thousand, emergency aircraft

30 22:36:14 ATCO2: American twenty sixty five Denver approach final visual approach runway two nine descend and maintain one zero thousand

31 22:36:20 Pilot AA2065: eh at eh ten thousand expecting the visual for two nine um American twenty sixty five

32 22:36:27 ATCO2: American twenty sixty five ** oscar turn at great junction and the altimeter's [tree] zero zero zero and do you want me to read the weather

33 22:36:35 Pilot AA2065: [tree] zero zero zero go ahead with the weather for American twenty sixty five

34 22:36:39 ATCO2: American twenty sixty five sure thing. The ah great junction the wind [tree] one zero one one, visibility one zero, sky clear, temperature [tree] [tree] two point [tree], altimeter two [niner] [niner] seven

35 22:36:52 Pilot AA2065: ah altimeter's two nine nine [niner] seven at [tree] ten we've got the rest of the weather. Ah we're little closer to the airport here so we might need that later * so we can runnin- eh finish running the checklist on American [tweny] ah sixty five

36 22:37:03 ATCO2: American twenty thirty five roger Did you want to do an instrument approach or you want the visual approach

37 22:37:12 Pilot AA2065: We plan the ah RNAV for American eh for two nine for American twenty sixty five

38 22:37:18 ATCO2: American twenty sixty five roger, fly present heading you can expect vectors on the RNAV two nine

39 22:37:25 Pilot AA2065: ah down to ten thousand present heading we'll expect that at American twenty sixty five

40 22:37:31 ATCO2: * any time fifty three fourteen

41 22:37:36 ATCO2: umm requesting fuel in time and souls on board I think we've already got it

42 22:37:41 Pilot AA2065: alright

43 22:37:45 Pilot AA2065: Denver approach at fifty [tree] fourteen lev- leveling one five thousand eh turn grand junction with Oscar

44 22:37:54 ATCO2: at fifty [tree] fourteen Denver approach expected visual approach runway two nine it'll be into * vector we've gotta get this emergency aircraft stand and then eh expect to go on the South runway fifty nine

45 22:38:05 Pilot AA2065: ah roger on the vector ** we can replace to be set up to the RNAV two nine so it should be [tree] fourteen

46 22:38:11 ATCO2: yes fifty [tree] fourteen that's final RNAV runway two nine descend and maintain one zero thousand

47 22:38:18 Pilot AA2065: one zero thousand plan the RNAV two nine thank you very much eh sixty [tree] fourteen

48 22:38:23 ATCO2: American twenty sixty five turn another ten degrees right and then flight direct south at about fifteen miles

49 22:38:29 Pilot AA2065: um alright and I will plan that American twenty sixty five

50 22:38:33 ATCO2: fifty [tree] fourteen fly present heading directly to the Seetl

51 22:38:37 Pilot AA2065: present heading directly to the Seetl fifty [tree] fourteen

52 22:38:40 ATCO2: are you comfortable for making all the turns all the way around to aah * to the final/

53 22:38:47 Pilot AA2065: oh yeah that should be fine for American twenty sixty [fife]

54 22:38:50 ATCO2: American twenty sixty five roger

55 22:38:52 ATCO2: American twenty sixty five proceed direct to Sespa descend and manitain eight thousand five hundred

56 22:38:58 Pilot AA2065: eight thousand [fife] hundred direct to Sespa American twenty sixty [fife]

57 22:39:03 ATCO2: American twenty sixty five when able to eh which engine you had off/

58 22:39:10 Pilot AA2065: that was the LEFT engine

59 22:39:11 ATCO2: twenty sixty [fife] six miles *** at about eight thousand five hundred clear to RNAV runway two nine approach

60 22:39:18 Pilot AA2065: alright so we're above ehh eighty five hundred and clear the RNAV two nine aproach American twenty sixty [fife]

61 22:39:25 ATCO2: thirty five contact grand junction tower on one eight point one have a good day

62 22:39:30 Pilot AA2065: eighteen one American twenty sixty [fife]

(My transcript / audio LiveATC.net)

3. Transcript of flight EI106 - 23 Dec 2022:

Flight Aer Lingus 106 was a scheduled flight from John F. Kennedy Airport in New York to Dublin. The plane had technical problems and suffered an engine failure which is why the pilots were forced to return to JFK.

LEGEND

* Unintelligible word

() Insertion

[] Difference in pronunciation

/ Question with a risen tone

CAPSLOCK Emphasis on utterance

1 21:54:29 ATCO1: Shemrock one [o] two heavy *** four one remain three one left for the takeoff

2 21:54:35 Pilot EI106: ** for departure Shemrock one zero six heavy

3 21:54:38 ATCO1: and it's gonna eh be twenty eight [twelfe]

4 21:54:39 Pilot EI106: twenty eight twelve copy Shemrock eeeeh one six heavy

5 21:54:45 Pilot EI106: eeh departures Shemrock one zero six heavy engine trouble here and we're gonna *** (mumble)

6 21:54:51 ATCO1: one zero seven heavy radar contact fly heading one [niner] zero and maintain FIVE thousand

7 21:54:57 Pilot EI106: heading one [niner] zero * (mumble) for Shemrock one zero six

8 21:55:00 ATCO1: Shemrock one zero seven heavy eh **

9 21:55:04 Pilot EI106: ** at the moment at eh we're on a level five * takeoff heading one [niner] zero

10 21:55:12 ATCO1: Shemrock one zero six heavy eh whatever you need just eh let me know

11 21:55:15 Pilot EI106: we'll get ehh we'll get back to [ya] just eh give us a few seconds ** whats the problem (unintelligible - thick accent)

12 21:55:21 ATCO1: sorry say that again

13 21:55:22 Pilot EI106: we'll get back to [ya] in a couple of minutes ** exactly what the problem was on departure

14 21:55:26 ATCO1: okay very good thank you

15 21:55:30 ATCO1: Shemrock one zero six heavy * power * vehicle on the ground reported a fire out of your right engine

16 21:55:37 Pilot EI106: okay eh understood um so papa papa papa Shemrock eh one zero six heavy we're gonna have to return to Kennedy

17 21:55:51 ATCO1: Shemrock one zero six heavy roger you're cleared to Kennedy via radar vector fly heading maintain five thousand when you're able eh fuel in POUNDS and SOULS on board

18 21:56:07 Pilot EI106: [tree] hundred thirteen passengers on board and eh the eh * is [tree] hundred twelve

19 21:56:15 ATCO1: fuel remaining please

20 21:56:17 Pilot EI106: eh fuel remaining is eh forty four pounds Shemrock one zero six heavy

21 21:56:22 ATCO1: Shemrock one zero six heavy roger just advise when your ready to come back and see approach eh expect ILS runway three one left approach THIRTY one left

22 21:56:30 Pilot EI106: eh copy that eh THIRTY one left Shemrock one zero six heavy

23 21:56:34 ATCO1: Shemrock one zero six heavy just wanna verify you're declaring emergency at this time

24 21:56:38 Pilot EI106: * eh it is the time call at the moment eh for eh return to eh three one left charlie

25 21:56:46 ATCO1: okay roger just advise when you're ready to come back

26 21:56:48 Pilot EI106: eh well crew was just set up for the approach now so I'll call [ya] in tree minutes

27 21:56:55 ATCO1: Shemrock one zero six heavy fly heading one three zero descending on a uh very extended eh down one there oxygen * if you want to descend at all you can maintain five

28 21:57:05 Pilot EI106: eh Shemrock one zero six heavy descending to [tree] point eighty kilos

29 21:57:09 ATCO1: Shemrock one zero six heavy roger maintain [tree] thousand extend the altimeter two [niner] SIX zero

30 21:57:15 Pilot EI106: down [tree] thousand eh two [niner] six zero to Shemrock one zero six heavy

31 21:57:20 ATCO1: Shemrock one zero six heavy turn left heading zero [niner] zero

32 21:57:24 ATCO1: Shemrock one zero six heavy fly heading zero [niner] zero

33 21:57:27 Pilot EI106: heading zero [niner] zero and we're ready to be back two [niner] zero for an approach on Shemrock one zero six heavy

34 21:57:33 ATCO1: Shemrock one zero six heavy roger turn left heading zero [FIFE] zero

35 21:57:36 Pilot EI106: left turn zero five zero Shemrock one zero six heavy

36 21:57:41 ATCO1: Shemrock one zero six [heavyyy] exit right when able and eeh advise your advise your status

37 21:57:47 Pilot EI106: * exit eeh exit right charlie *****
(unintelligible - hum)

38 21:57:55 ATCO1: alright Shemrock one zero six make the right turn here right turn onto PAPA as soon as you're on PAPA you can hold there and I'll have the vehicles eh eeeh approach to take a look, changeover to ground control that's on one two one * six [fife], there be- eh you'll be able to approach the vehicles on point one two one point six [fife]

39 21:58:12 Pilot EI106: * thank ya and ** and the vehicles on one two one six [fife] Shemrock one zero six heavy

(My transcript / audio LiveATC.net)

4. Transcript of flight UA1888 - 07 Feb 2023:

Flight United 1888 was a scheduled flight from Chicago O'Hare to Las Vegas, which diverted to Lincoln Municipal Airport after its departure due to a failuire of right engine.

LEGEND

* Unintelligible word

() Insertion

[] Difference in pronunciation

/ Question with a risen tone

CAPSLOCK Emphasis on utterance

01 16:58:24 Pilot U1888: calling for approach United eighteen eighty eight, mayday mayday mayday inbound for Lincoln, eeh planning on landing south and I think it's half point the weather, we have been *

02 16:58:35 ATCO1: United eighteen eighty eight, * approach to maintain four thousand, expect the hour of one eight

03 16:58:43 Pilot U1888: I descend to maintain four thousand, we're not of eeeeh one three thousand, we expect ILS one eight United eighteen eighty eight

04 16:58:50 ATCO1: United eighteen eighty eight no problem, * the hour of one eight

05 16:58:54 Pilot U1888: ** pass on the eight to Sierra, we're pretty busy

06 16:58:59 ATCO1: United eighteen eighty eight no problem eh you ready to copy/

07 16:59:01 Pilot U1888: we're good

08 16:59:03 ATCO1: United eighteen eighty eight information Sierra start out at Lincoln, wind two two zero at one three, visibility is one zero mile, sight distance clear, temperature eight two point minus two, MOH altimeter's two [niner] eight [niner]

09 16:59:21 Pilot U1888: United eighteen eighty eight eh appreciate sir thank you

10 16:59:24 ATCO1: United eighteen eighty eight no problem, fly heading zero one * fly heading one zero zero

11 16:59:31 Pilot U1888: heading one zero zero United eighteen eighty eight

12 16:59:39 ATCO1: United eighteen eighty eight turn right heading one two zero

13 16:59:44 Pilot U1888: turn right one two zero United eighteen eighty eight

14 16:59:51 ATCO1: United eighteen eighty eight one zero mile from flown turn RIGHT heading one [FIFE] zero maintain at above three thousand * the localizer cleared to ILS runway one eight approach

15 17:00:02 Pilot U1888: um right turn one five zero maintain at above three thousand * cleared to ILS one eight approach United eighteen eighty eight

16 17:00:15 Pilot U1888: United eighteen eighty eight heavy, is there */

17 17:00:19 Pilot U1888: United eighteen eighty eight eh we are on Lincoln eh Nebraska side

18 17:00:23 ATCO1: United eighteen eighty eight heavy you contact Lincoln TOWER one one eight point [fife]

19 17:00:27 Pilot U1888: one one eight point five ***

20 17:00:32 ATCO2: United eeh eighteen eighty eight remain the aircraft, come down ILS thank you one eight

21 17:00:38 ATCO2: United eighteen eighty eight Lincoln tower going on one eight, clear to land, wind two two zero at one four

22 17:00:44 Pilot U1888: Runway one eight clear to land United eighteen eighty eight

23 17:00:45 ATCO2: United eighteen eighty eight turn left back to the Kilo or *** you can contact ground point nine

24 17:00:54 Pilot United 1888: okey we'll turn left on to ground point nine United eighteen eighty eight

25 17:00:58 ATCO2: and do you need any further assistance Eh we got you parking at gate four so we'll have you parking there

26 17:01:03 Pilot United 1888: eh gate four and eh * United eighteen eighty eight thank you

27 17:01:07 ATCO2: all set

(My transcript / audio LiveATC.net)

5. Transcript of flight US1549 - 15 Jan 2009:

"Transcript of an Allied Signal/Honeywell model SSCVR cockpit voice recorder (CVR / Black Box), s/n 2878, installed on an Airbus Industrie A320-214, registration N106US." (tailstrike.com)

Flight US1549 is also known as the Miracle on the Hudson River. Captain Chesley "Sully" Sullenberger and First Officer Jeffrey Skies were forced to make an emergency landing on water due to bird strike

which resulted in failure of both engines. They managed to save the lives of all 150 passengers and 5 crew members.

LEGEND

ATIS Radio transmission from the Automated Terminal Information System

RDO Radio transmission from accident aircraft, US Airways 1549

CAM Cockpit area microphone voice or sound source

PA Voice or sound heard on the public address system channel

HOT Hot microphone voice or sound source

INTR Interphone communication to or from ground crew

For RDO, CAM, PA, HOT and INTR comments:

-1 Voice identified as the Captain

-2 Voice identified as the First Officer

-3 Voice identified as cabin crewmember

-4 Voice identified as groundcrew

-? Voice unidentified

FWC Automated callout or sound from the Flight Warning Computer

TCAS Automated callout or sound from the Traffic Collision Avoidance System

PWS Automated callout or sound from the Predictive Windshear System

GPWS Automated callout or sound from the Ground Proximity Warning System

EGPWS Automated callout or sound from the Enhanced Ground Proximity Warning system

RMP Radio transmission from ramp control at LaGuardia

GND Radio transmission from ground control at LaGuardia

CLC Radio transmission from clearance delivery at LaGuardia

TWR Radio transmission from the Air Traffic Control Tower at LaGuardia

DEP Radio transmission from LaGuardia departure control

4718 Radio transmission from another airplane (Eagle flight 4718)

CH[1234] CVR Channel identifier 1=Captain 2= First Officer 3= PA 4= Cockpit Area Microphone

* Unintelligible word

@ Non-Pertinent word

& Third party personal name (see note 5 below)
Expletive
-, - - - Break in continuity or interruption in comment
() Questionable insertion
[] Editorial insertion
... Pause

INTRA-AIRCRAFT CONTENT

AIR-GROUND COMMUNICATION CONTENT

15:00:32 [Start of Recording]

15:00:32 [Start of Transcript]

01 15:00:32 ATIS expressway visual runway three one approach in use. depart runway four, bravo four hold line in use. LaGuardia class bravo services available on frequency one two six point zero five. all pilots read back all hold short instructions and assigned altitudes. advise on initial contact you have information papa... LaGuardia airport information papa. one nine five one zulu. winds three four zero at one three, visibility one zero. ceiling three thousand five hundred broken.

temperature minus six dewpoint minus one four. altimeter three zero two three. remarks A O two

sea level pressure two three four. [ATIS repeats on ch2 until time 15:02:44.]

02 15:02:19 CAM-1 yes, thank you.

03 15:02:21 CAM-1 so we should have two open seats (cause) the jumpseaters are gonna sit in the back.

04 15:02:25 CAM-? thank you.

05 15:02:26 CAM-1 all right anytime.

06 15:02:27 CAM-? cool you bet.

07 15:02:30 CAM-? ok.

08 15:02:35 HOT-2 the seats uh-

09 15:02:37 HOT-1 there you go.

10 15:02:45 CAM-? do you mind if I keep my bag(s) up here?

11 15:02:47 CAM-1 no not at all.

12 15:02:48 CAM-? thank you so much.

13 15:02:51 PA-1 a quick hello from the cockpit crew, this is fifteen forty nine bound for Charlotte. its a nice day for flying, be at thirty eight thousand feet mostly smooth about an hour and forty five minutes takeoff to landing, welcome aboard.

14 15:03:12 CAM-2 quite a difference in the flight time pretty incredible, huh? fifty six minutes.

15 15:03:15 HOT-1 well we had a hundred and sixty knots of wind all the way up here. its a average headwind on this lists minus one ten.

16 15:03:34 HOT-1 all right.

17 15:03:34 PA-3 if everyone would please take their seats.

18 15:03:39 HOT-1 * *.

19 15:03:40 INTR-4 hello cockpit ground's ready.

20 15:03:42 INTR-1 we'll give them a call.

21 15:03:42 RDO-2 (ground) fifteen forty nine like to push at uh gate twenty one.

22 15:03:47 RMP Cactus (fifteen) forty nine....gate twenty one, spot twenty eight, ground * for your taxi.

23 15:03:55 RDO-2 ok uh. that's uh * what's wrong here. [may be multiple mic keys]

24 15:03:57 HOT-1 ok... clear to push?

25 15:04:00 HOT-2 yeah.

26 15:04:01 INTR-4 yes sir, you say you are clear to push?

27 15:04:02 INTR-1 clear to push, spot twenty eight, brakes released.

28 15:04:03 RDO-2 and that's uh spot twenty eight for Cactus uh nine- er fifteen forty nine, excuse me and over to ground twenty one seven.

29 15:04:05 INTR-4 twenty eight, brakes released.

30 15:04:09 RMP affirmative.

31 15:04:09 CAM-? seated and stowed.

32 15:04:11 HOT-1 thank you, all set.

33 15:04:13 CAM [sound similar to cockpit door closing]

34 15:04:20 HOT-1 ok. that # door again.

35 15:04:23 HOT-2 what's wrong?

36 15:04:24 HOT-1 this-

37 15:04:25 HOT-2 oh.

38 15:04:25 CAM-1 (you) have to slam it pretty hard.

39 15:04:29 CAM [sound similar to cockpit door closing]

40 15:04:52 HOT-1 got the newest Charlotte.

41 15:05:04 PA-3 ladies and gentlemen all electronic devices have to be turned off at this time, anything with an on off button must be in the off position.

42 15:05:07 HOT-1 yeah too bad they aren't still using three one... for takeoff.

43 15:05:10 HOT-2 yeah.

44. 15:05:11 HOT-1 I was hoping we could land on four and takeoff on three one, but it didn't quite work out that way.

45 15:05:22 HOT-2 well we can make an attempt to beat Northwest here anyways.

46 15:05:25 HOT-1 what's that?

47 15:05:26 HOT-2 so we can make an attempt to beat Northwest but he's already starting isn't he.

48 15:05:29 HOT-1 yeah. and we have to pull up before we can even start on this.

49 15:05:32 HOT-2 they start their number two engine first.

50 15:05:34 PA-3 good afternoon ladies and gentlemen welcome on board US Airways flight fifteen forty nine, with service to Charlotte. please take a moment to listen to this important safety information, in preparation for departure be certain that your seat back is straight up and your tray table is stowed. all carryon items must be secured completely underneath the seat in front of you, or stowed in an overhead compartment. please use caution when placing items in or removing them from the overhead bins. please ensure that all electronic devices are turned off, some devices such as cell phones, TVs, radios and any device transmitting a signal may not be used at anytime during flight. however you may be certain * * use other electronic devices when advised by your crew. please direct your attention to the flight attendants in the cabin, for everyone's safety regulations require your compliance with all lighted signs, placards, and crewmember instructions. whenever the seatbelt sign is illuminated please make sure that you seatbelt is fastened low and tight around your hips.

to fasten insert the metal fitting into the buckle and tighten by pulling loose end away from you. to release lift the metal flap. during the flight the Captain may turn off the fasten seatbelt sign, however for safety we recommend that you keep your seatbelt fastened at all times. please review the safety instruction card in the seatback pocket in front of you, it explains the safety features of this aircraft as well as the location and operation of the exit and flotation devices. your seat cushion serves as a flotation device, to remove your cushion, (pla)- take it with you to the nearest usable exit, when exiting the-[sound similar to power interruption 15:07:01] place both arms through the straps and hug it to your chest. flight attendants are pointing out there are a total of eight exits on this aircraft, two door exits in front of the aircraft, four window exits over the wings, and two door exits in the rear of the aircraft. once again, two door exits at the front of the aircraft, four window exits over the wings, and two door exits in the rear of the aircraft. each door is equipped with an evacuation slide if directed to exit... the aircraft jump onto the slide and move away from the aircraft. take a moment to locate the exit nearest you keeping in mind that the closest usable exit may be located behind you. if there is a loss of electrical power low level lighting will guide you to the exits indicated by illuminated exit signs. if needed oxygen masks will be released from the overhead, to start the flow of oxygen, reach up and pull the mask toward you, fully extending the plastic tubing. place the mask over your nose and mouth, place the elastic band over your head. to tighten pull the tab on each side of the mask. the plastic bag does not inflate when oxygen is flowing. secure your mask before assisting others. as a reminder smoking is prohibited in all areas of the aircraft including the lavatories. federal regulations prohibit tampering

with disabling or destroying a lavatory smoke detector. on behalf of your entire crew, its our pleasure to have you on board.... thank you for flying US Airways.

51 15:05:34 **HOT-1** that's interesting.

52 15:05:41 **HOT-2** did you always start number one or is that a uh America West thing?

53 15:05:44 **HOT-1** no that's no its been that way ever since I've been on it, for six and a half years anyway.

54 15:06:09 **INTR-1** confirm we're clear to start?

55 15:06:10 **INTR-4** uh, one second.

56 15:06:13 **HOT-1** he told me to wait.

57 15:06:15 **HOT-2** he did?

58 15:06:16 **HOT-1** yeah, this guy was giving the signal but I asked and he said no wait just a second.

59 15:06:17 **HOT-2** yeah.... OK.

60 15:06:25 **INTR-4** kay. clear to start.

61 15:06:26 **INTR-1** clear to start.

62 15:06:26 **HOT-1** start engines.

63 15:06:44 **HOT-2** wonder how the Northwest and Delta pilots are gettin on.

64 15:06:47 **HOT-1** I wonder about that too, I have no idea.

65 15:07:01 **CAM** [sound similar to power interruption]

66 15:07:01 **CAM** [sound similar to increase in engine noise/frequency]

67 15:07:04 **HOT-1** yeah hopefully better than we and West do.

68 15:07:11 **HOT-2** be hard to do worse.

69 15:07:13 **HOT-1** yeah... well I hadn't heard much about it lately but I can't imagine it'd be any better.

70 15:07:20 **HOT-2** I think that's just cause we're separate..... and there's nothing going on right now.

71 15:07:25 **HOT-1** right.

72 15:07:28 **INTR-4** kay set the parking brake.

73 15:07:32 **INTR-1** parking brake set. disconnect.

74 15:07:34 **INTR-4** brake set, disconnect.

75 15:08:15 **HOT-1** okay wands up, wave off.

76 15:08:16 **HOT-2** wands up.

77 15:08:17 **HOT-1** flaps two, taxi.

78 15:08:36 RDO-2 ground Cactus uh fifteen forty nine spot twenty eight, taxi please.

79 15:08:40 GND Cactus fifteen forty nine LaGuardia ground runway four uh, turn left alpha, short of golf, and uh did you call clearance?

80 15:08:48 RDO-2 (I'm) sorry forgot.

81 15:08:48 HOT-1 *.

82 15:08:52 HOT-1 uh thirty five two. so its alpha short of golf is that right?

83 15:08:56 HOT-2 yup.

84 15:08:57 HOT-1 yeah I'll start taxiing while you do that.

85 15:08:58 HOT-2 ok.

86 15:09:35 RDO-2 Cactus fifteen forty nine is uh over BIGGY seven one three four, and three sixty and up to five thousand.

87 15:09:44 HOT-1 you put it here.

88 15:09:46 HOT-2 what was that?... am I on the wrong one?

89 15:09:53 HOT-1 you switched me off of ground.

90 15:09:55 HOT-2 oh, sorry.

91 15:09:57 HOT-? * you wanna be there [heard on CH2]

92 15:10:04 HOT-1 you were talking on number two but you switched number one.

93 15:10:07 HOT-2 ok.

94 15:10:11 RDO-2 I'm sorry I messed up my radio here Cactus fifteen forty nine, seven one three four and we're three sixty up to five thousand.

95 15:10:40 RDO-2 Cactus-

96 15:10:41 RDO-2 Cactus fifteen forty nine is uh squawking seven one three four and were uh runway four three sixty and five thousand.

97 15:10:48 CLC (kay it's) fifteen forty nine LaGuardia clearance read *back correct, ground point seven verify information papa.

98 15:10:53 RDO-2 we have papa.

99 15:10:54 RDO-2 we have papa thank you Cactus uh * fifteen forty nine.

100 15:10:58 CLC ground point seven.

101 15:11:05 HOT-2 ok.

102 15:11:06 HOT-1 ok no change.

103 15:11:08 HOT-2 I don't think my uh MIC switch works all the time here.

104 15:11:12 HOT-1 your trigger, your trigger?

105 15:11:12 CAM-2 * * transmit.

106 15:11:14 CAM-2 what's that?

107 15:11:15 HOT-1 your trigger on the stick? ... I'll write that up too.

108 15:11:18 CAM-2 so you don't hear me transmit... you might wanna jump in.

109 15:11:21 HOT-1 ok.... got it.

110 15:11:25 RDO-1 and OPS, fifteen forty nine.

111 15:11:28 HOT-1 I'm calling on number two.

112 15:11:31 OPS yeah, (sixteen) forty nine go ahead.

113 15:11:33 RDO-1 yeah fifteen forty nine if you want uh weight and balance uh corrected to total of passenger one forty eight and ACM [additional crew members] two.

114 15:11:42 OPS ok one forty eight.

115 15:11:51 RDO-1 yeah for fifteen forty nine passenger count is one four eight, plus ACM two.

116 15:12:00 RDO-1 so one forty eight, plus two ACM's.

117 15:12:02 OPS ok. copy that.

118 15:12:08 HOT-1 all right... I'm still holding short of golf, and they're correcting the passenger count to one forty eight.

119 15:12:25 GND Cactus fifteen forty nine taxi foxtrot, bravo hold short echo, just gotta hold you there for about three minutes uh for your uh in trail into Charlotte.

120 15:12:31 RDO-2 foxtrot, bravo, short of echo, Cactus fifteen forty nine.

121 15:12:35 HOT-1 ok, foxtrot, bravo, hold short of echo... and once we stop then, I'll do the flight control check.

122 15:12:57 HOT-1 did it uh, did it not uplink?

123 15:13:01 HOT-2 (well) I figured it was the old one.

124 15:13:04 HOT-1 what's that?

125 15:13:06 HOT-2 umm.... ok.

126 15:13:18 HOT-2 so do you want me to use this one?

127 15:13:19 HOT-1 oh... oh I see what you're saying, yeah I uh you can wait if you want I just thought we'd have something in there.

128 15:13:37 **HOT-1** yeah we can wait, that's fine.

129 15:13:38 **HOT-2** go with this one? ok.

130 15:13:40 **HOT-1** cause we're going to be holding here for a minute anyway.... all right foxtrot, bravo, hold short of echo.

131 15:14:15 **HOT-1** where is the uh, the portion of the release the- of the weight and balance part of it that was below what you tore off to put on here... or was there part of it.

132 15:14:24 **HOT-2** there was, I think I threw it away it just had names on it... its right here.

133 15:14:26 **HOT-1** ok thank you. I need this number, yeah I wanted this part... I'm gonna just call this guy directly cause I don't think this OPS guy knows what the # he's doin.

134 15:15:04 **HOT-1** I'm just gonna call our load control agent directly, it's his number right here.

135 15:15:12 **FWC** [sound of single chime]

136 15:15:15 **HOT-1** yeah I'm the Captain on fifteen forty nine aircraft one zero six if you'll if you will please correct the passenger count we have a total of one four eight, plus two plus two ACM. [sounds as if this communication is by cellular telephone]

137 15:15:19 **GND** Cactus fifteen forty nine follow the Northwest you can monitor tower.

138 15:15:23 **RDO-2** Cactus fifteen forty nine follow Northwest monitor tower, thank you.

139 15:15:32 **HOT-1** that's it... thank you. runway four, thank you, bye. [sounds as if communication is by cellular telephone]

140 15:15:38 **HOT-1** what did I miss?

141 15:15:40 **HOT-2** follow Northwest.

142 15:15:41 **HOT-1** all right here we go.

143 15:15:49 **HOT-1** * I talked to CLP [Central Load Plan] he's gonna send it.

144 15:15:54 **HOT-1** all right, flight control check.

145 15:15:57 **CAM-2** full up.....full down.

146 15:16:01 **HOT-2** neutral.

147 15:16:03 **HOT-2** full left.

148 15:16:06 **HOT-2** full right.

149 15:16:07 **HOT-2** neutral.

150 15:16:09 **HOT-2** full left.

151 15:16:11 HOT-2 full right.
152 15:16:13 HOT-2 neutral.
153 15:17:26 HOT-1 I'll go ahead and sit them down.
154 15:17:30 PA-1 flight attendants please be seated for takeoff.
155 15:17:33 HOT-2 kay.
156 15:18:03 HOT-1 okay, taxi check.
157 15:18:07 HOT-2 * *.
158 15:18:19 HOT-2 departure briefing, FMS. [Flight Management System]
159 15:18:21 HOT-1 reviewed runway four.
160 15:18:22 HOT-2 flaps verify. two planned, two indicated.
161 15:18:24 HOT-1 two planned, two indicated.
162 15:18:46 HOT-2 um. takeoff data verify... one forty, one forty five, one forty nine, TOGA. [Takeoff/Go Around]
163 15:18:53 HOT-1 one forty, one forty five, one forty nine, TOGA.
164 15:18:56 HOT-2 the uh weight verify, one fifty two point two.
165 15:19:00 HOT-1 one fifty two point two.
166 15:19:02 HOT-2 flight controls verify checked.
167 15:19:03 HOT-1 check.
168 15:19:04 HOT-2 stab and trim verify, thirty one point one percent... and zero.
169 15:19:08 HOT-1 thirty one point one percent, zero.
170 15:19:11 HOT-2 the uh... engine anti-ice.
171 15:19:13 HOT-1 is off.
172 15:19:16 CAM-2 ECAM [Electronic Centralized Aircraft Monitoring] verify takeoff, no blue, status checked.
173 15:19:19 HOT-1 takeoff, no blue, status checked.
174 15:19:22 PA-2 ladies and gentlemen at this time we're number one for takeoff, flight attendants please be seated.
175 15:19:25 HOT-1 * *.
176 15:19:27 HOT-2 takeoff min fuel quantity verify. nineteen thousand pounds required we got twenty one point eight on board.
177 15:19:32 HOT-1 nineteen thousand pounds required, twenty one eight on board.
178 15:19:35 HOT-2 flight attendants notified, engine mode is normal, the taxi checklist is complete sir.
179 15:19:40 HOT-1 below the line... oh you finished it all * * -

180 15:19:42 CAM-2 yeah.

181 15:19:42 HOT-1 -yeah kay thank you. we're good. holding short.

182 15:20:03 HOT-1 still possible.

183 15:20:06 CAM-2 oh yeah.

184 15:20:37 TWR Cactus fifteen forty nine, LaGuardia runway four position and hold. traffic to land three one.

185 15:20:40 RDO-2 position and hold runway four, Cactus uh fifteen forty nine.

186 15:20:42 HOT-1 on the hold.

187 15:20:44 CAM [sound similar to increase then decrease in engine noise/frequency]

188 15:21:27 HOT-1 your brakes, your aircraft.

189 15:21:30 HOT-2 my aircraft.

190 15:21:48 HOT-1 he's gotta *.

191 15:24:54 TWR Cactus fifteen forty nine runway four clear for takeoff.

192 15:24:56.7 RDO-1 Cactus fifteen forty nine clear for takeoff.

193 15:25:06 CAM [sound similar to increase in engine noise/speed]

194 15:25:09 CAM-2 TOGA.

195 15:25:10 HOT-1 TOGA set.

196 15:25:20 HOT-1 eighty.

197 15:25:21 HOT-2 checked.

198 15:25:33 HOT-1 V one, rotate.

199 15:25:38 HOT-1 positive rate.

200 15:25:39 HOT-2 gear up please.

201 15:25:39 HOT-1 gear up.

202 15:25:45 TWR Cactus fifteen forty nine contact New York departure, good day.

203 15:25:48 RDO-1 good day.

204 15:25:49 HOT-2 heading select please.

205 15:25:51.2 RDO-1 Cactus fifteen forty nine, seven hundred, climbing five thousand.

206 15:26:00 DEP Cactus fifteen forty nine New York departure radar contact, climb and maintain one five thousand.

207 15:26:02 CAM [sound similar to decrease in engine noise/speed]

208 15:26:03.9 RDO-1 maintain one five thousand Cactus fifteen forty nine.

209 15:26:07 **HOT-1** fifteen.
210 15:26:08 **HOT-2** fifteen. climb.
211 15:26:10 **HOT-1** climb set.
212 15:26:16 **HOT-2** and flaps one please.
213 15:26:17 **HOT-1** flaps one.
214 15:26:37 **HOT-1** uh what a view of the Hudson today.
215 15:26:42 **HOT-2** yeah.
216 15:26:52 **HOT-2** flaps up please, after takeoff checklist.
217 15:26:54 **HOT-1** flaps up.
218 15:27:07 **HOT-1** after takeoff checklist complete.
219 15:27:10.4 **HOT-1** birds.
220 15:27:11 **HOT-2** whoa.
221 15:27:11.4 **CAM** [sound of thump/thud(s) followed by shuddering sound]
222 15:27:12 **HOT-2** oh #.
223 15:27:13 **HOT-1** oh yeah.
224 15:27:13 **CAM** [sound similar to decrease in engine noise/frequency begins]
225 15:27:14 **HOT-2** uh oh.
226 15:27:15 **HOT-1** we got one rol- both of 'em rolling back.
227 15:27:18 **CAM** [rumbling sound begins and continues until approximately 15:28:08]
228 15:27:18.5 **HOT-1** ignition, start.
229 15:27:21.3 **HOT-1** I'm starting the APU.
230 15:27:22.4 **FWC** [sound of single chime]
231 15:27:23.2 **HOT-1** my aircraft.
232 15:27:24 **HOT-2** your aircraft.
233 15:27:24.4 **FWC** [sound of single chime]
234 15:27:25 **CAM** [sound similar to electrical noise from engine igniters begins]
235 15:27:26.5 **FWC** priority left. [auto callout from the FWC. this occurs when the sidestick priority button is activated on the Captain's sidestick]
236 15:27:26.5 **FWC** [sound of single chime]
237 15:27:28 **CAM** [sound similar to electrical noise from engine igniters ends]
238 15:27:28 **HOT-1** get the QRH... [Quick Reference Handbook] loss

of thrust on both engines.

239 15:27:30 FWC [sound of single chime begins and repeats at approximately 5.7 second intervals until 15:27:59]

240 15:27:32.9 RDO-1 mayday mayday mayday. uh this is uh Cactus fifteen thirty nine hit birds, we've lost thrust (in/on) both engines we're turning back towards LaGuardia.

241 15:27:42 DEP ok uh, you need to return to LaGuardia? turn left heading of uh two two zero.

242 15:27:43 CAM [sound similar to electrical noise from engine igniters begins]

243 15:27:44 FWC [sound of single chime, between the single chimes at 5.7 second intervals]

244 15:27:46 RDO-1 two two zero.

245 15:27:50 HOT-2 if fuel remaining, engine mode selector, ignition.* ignition.

246 15:27:54 HOT-1 ignition.

247 15:27:55 HOT-2 thrust levers confirm idle.

248 15:27:58 HOT-1 idle.

249 15:28:02 HOT-2 airspeed optimum relight. three hundred knots. we don't have that.

250 15:28:03 FWC [sound of single chime]

251 15:28:05 HOT-1 we don't.

252 15:28:05 DEP Cactus fifteen twenty nine, if we can get it for you do you want to try to land runway one three?

253 15:28:05 CAM-2 if three nineteen-

254 15:28:10.6 RDO-1 we're unable. we may end up in the Hudson.

255 15:28:14 HOT-2 emergency electrical power... emergency generator not online.

256 15:28:18 CAM [sound similar to electrical noise from engine igniters ends]

257 15:28:19 HOT-1 (it's/is) online.

258 15:28:21 HOT-2 ATC notify. squawk seventy seven hundred.

259 15:28:25 HOT-1 yeah. the left one's coming back up a little bit.

260 15:28:30 HOT-2 distress message, transmit. we did.

261 15:28:31 DEP arrright Cactus fifteen forty nine its gonna be left traffic for runway three one.

262 15:28:35 RDO-1 unable.

263 15:28:36 TCAS traffic traffic.

264 15:28:36 DEP okay, what do you need to land?

265 15:28:37 HOT-2 (he wants us) to come in and land on one three...for whatever.

266 15:28:45 PWS go around. windshear ahead.

267 15:28:45 HOT-2 FAC [Flight Augmentation Computer] one off, then on.

268 15:28:46 DEP Cactus fifteen (twenty) nine runway four's available if you wanna make left traffic to runway four.

269 15:28:49.9 RDO-1 I'm not sure we can make any runway. uh what's over to our right anything in New Jersey maybe Teterboro?

270 15:28:55 DEP ok yeah, off your right side is Teterboro airport.

271 15:28:59 TCAS monitor vertical speed.

272 15:29:00 HOT-2 no relight after thirty seconds, engine master one and two confirm-

273 15:29:02 DEP you wanna try and go to Teterboro?

274 15:29:03 RDO-1 yes.

275 15:29:05 TCAS clear of conflict.

276 15:29:07 HOT-2 -off.

277 15:29:07 HOT-1 off.

278 15:29:10 HOT-2 wait thirty seconds.

279 15:29:11 PA-1 this is the Captain brace for impact.

280 15:29:14.9 GPWS one thousand.

281 15:29:16 HOT-2 engine master two, back on.

282 15:29:18 HOT-1 back on.

283 15:29:19 HOT-2 on.

284 15:29:21 DEP Cactus fifteen twenty nine turn right two eight zero, you can land runway one at Teterboro.

285 15:29:21 CAM-2 is that all the power you got? * (wanna) number one? or we got power on number one.

286 15:29:25 RDO-1 we can't do it.

287 15:29:26 HOT-1 go ahead, try number one.

288 15:29:27 DEP kay which runway would you like at Teterboro?

289 15:29:27 FWC [sound of continuous repetitive chime for 9.6 seconds]

290 15:29:28 RDO-1 we're gonna be in the Hudson.

291 15:29:33 DEP I'm sorry say again Cactus?

292 15:29:36 HOT-2 I put it back on.

293 15:29:37 FWC [sound of continuous repetitive chime for 37.4 seconds]

294 15:29:37 HOT-1 ok put it back on... put it back on.

295 15:29:37 GPWS too low. terrain.

296 15:29:41 GPWS too low. terrain.

297 15:29:43 GPWS too low. terrain.

298 15:29:44 HOT-2 no relight.

299 15:29:45.4 HOT-1 ok lets go put the flaps out, put the flaps out.

300 15:29:45 EGPWS caution. terrain.

301 15:29:48 EGPWS caution terrain.

302 15:29:48 HOT-2 flaps out?

303 15:29:49 EGPWS terrain terrain. pull up. pull up.

304 15:29:51 DEP Cactus uh....

305 15:29:53 DEP Cactus fifteen forty nine radar contact is lost you also got Newark airport off your two o'clock in about seven miles.

306 15:29:55 EGPWS pull up. pull up. pull up. pull up. pull up. pull up.

307 15:30:01 HOT-2 got flaps out.

308 15:30:03 HOT-2 two hundred fifty feet in the air.

309 15:30:04 GPWS too low. terrain.

310 15:30:06 GPWS too low. gear.

311 15:30:06 CAM-2 hundred and seventy knots.

312 15:30:09 CAM-2 got no power on either one? try the other one.

313 15:30:09 4718 two one zero uh forty seven eighteen. I think he said he's goin in the Hudson.

314 15:30:11 HOT-1 try the other one.

315 15:30:13 EGPWS caution terrain.

316 15:30:14 DEP Cactus fifteen twenty nine uh, you still on?

317 15:30:15 FWC [sound of continuous repetitive chime begins and continues to end of recording]

318 15:30:15 EGPWS caution terrain.

319 15:30:16 HOT-2 hundred and fifty knots.

320 15:30:17 HOT-2 got flaps two, you want more?

321 15:30:19 HOT-1 no lets stay at two.
322 15:30:21 HOT-1 got any ideas?
323 15:30:22 DEP Cactus fifteen twenty nine if you can uh....you
got uh runway uh two nine available at Newark it'll be two o'clock
and seven miles.
324 15:30:23 EGPWS caution terrain.
325 15:30:23 CAM-2 actually not.
326 15:30:24 EGPWS terrain terrain. pull up. pull up. ["pull up"
repeats until the end of the recording]
327 15:30:38 HOT-1 we're gonna brace.
328 15:30:38 HOT-2 * * switch?
329 15:30:40 HOT-1 yes.
330 15:30:41.1 GPWS (fifty or thirty)
331 15:30:42 FWC retard.
15:30:43.7 [End of Recording]
15:30:43.7 [End of Transcript]

(Tailstrike.com)

6. Transcript of flight BA2276 - 08 Sep 2015:

"Transcript of an Allied Signal 6022 solid-state cockpit voice recorder, serial number 9698, installed on an British Airways Boeing 777-200 (G-VIIO), which incurred an uncontained engine failure at McCarran International Airport in Las Vegas, Nevada." (Tuccio, Tailstrike.com)

Legend:

CAM = cockpit area microphone voice or sound source
HOT = flight crew audio panel voice or sound source
RDO = radio transmissions from G-VIIO
GND = radio transmission from the LAS airport ground controller
TWR = radio transmission from the LAS airport tower controller
EICAS = engine indicating and crew alerting system
PA = passenger address system
MISC-AC = an aircraft other than G-VIIO
MOBILE8 = airport recue and firefighting unit

-1 = voice identified as the captain
-2 = voice identified as the first officer
-3 = voice identified as the relief pilot (BA refers to this position as the "heavy pilot")
-4 = voice identified as a flight attendant
-? = voice unidentified
* = unintelligible word
= expletive
() = questionable insertion
[] = editorial insertion

Note 1: Times are expressed in Pacific daylight time (PDT).

Note 2: Radio transmissions from other aircraft were generally paraphrased in this transcript.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

INTRA-AIRCRAFT CONTENT

AIR-GROUND COMMUNICATION CONTENT

- 1 16:07:12 GND Speedbird twenty two seventy six heavy * monitor tower one one niner point niner. See ya.
- 2 16:07:16 RDO-2 * one (niner) point niner. * Speedbird twenty two seventy six heavy.
- 3 16:07:25 CAM [sound of hi-lo chime]
- 4 16:07:27 HOT-1 (hooray).
- 5 16:07:28 HOT-2 splendid.
- 6 16:07:28 HOT-1 *.
- 7 16:07:28 HOT-1 briefing updated so ah.
- 8 16:07:31 CAM-1 before take-off's next.
- 9 16:07:34 CAM-2 loadsheet.
- 10 16:07:35 CAM-1 acknowledged.
- 11 16:07:36 CAM-2 critical data changes.
- 12 16:07:37 CAM-1 no.
- 13 16:07:39 CAM-2 take-off brief.
- 14 16:07:40 HOT-1 updated.

15 16:07:41 HOT-2 trim.
16 16:07:42 HOT-1 ah we've got zero and four is set.
17 16:07:46 HOT-2 cabin report.
18 16:07:48 HOT-1 received.
19 16:07:50 HOT-2 before take-off checklist complete.
20 16:07:52 HOT-1 **.
21 16:07:53 HOT-? **.
22 16:07:55 HOT-1 I think the tires must be melting. **.
23 16:08:00 HOT-1 **.
24 16:08:01 HOT-1 **.
25 16:08:01 HOT-2 (just) the opposite. Coming in yeah.
26 16:08:03 HOT-1 yeah.
27 16:08:04 HOT-2 ***.
28 16:08:09 HOT-? Build up some speed now. So.
29 16:08:37 TWR [other aircraft is cleared for takeoff, full length
7L]
30 16:08:42 MISC-AC [other aircraft acknowledges the full length
takeoff clearance on 7L]
31 16:09:18 HOT-? *.
32 16:09:20 HOT-? He got away.
33 16:09:21 HOT-? [laughter] just a bit.
34 16:09:23 HOT-? ***.
35 16:09:32 HOT-2 full tanks and no d-rate.
36 16:09:34 HOT-1 yep.
37 16:10:44 HOT-2 what'd ya say this thing does?
38 16:10:46 HOT-1 oh that there. Uhm.
39 16:10:47 HOT-2 it looks like it belongs on the moon.
40 16:10:49 HOT-1 it's a bit old.
41 16:10:53 HOT-2 weird.
42 16:10:56 CAM-3 de-icing (gate).
43 16:10:58 HOT-1 [laughter]
44 16:10:58 HOT-2 [laughter]
45 16:11:00 HOT-1 (alright). **. Here we are.
46 16:11:01 HOT-2 *.
47 16:11:02 HOT-2 yep.
48 16:11:05 TWR Speedbird twenty two seventy six heavy Las Vegas
Tower.

49 16:11:09 RDO-2 Speedbird twenty two seventy six heavy good afternoon. We're ready for departure alpha eight.

50 16:11:13 TWR Speedbird twenty two seventy six heavy wind three six zero at five. Runway seven left at alpha eight. Cleared for takeoff.

51 16:11:19 HOT-1 marvelous.

52 16:11:19 RDO-2 cleared for takeoff. Zero seven left. Speedbird twenty two seventy six heavy.

53 16:11:23 HOT-1 right. Below the unofficial line.

54 16:11:26 HOT-2 okay.

55 16:11:34 HOT-1 nothing that will spoil our progress coming in. so that's good.

56 16:11:39 (HOT-1) *.

57 16:11:40 CAM [sound of multiple clicks, similar to setting external lighting for takeoff]

58 16:11:46 CAM [sound of multiple clicks]

59 16:11:50 HOT [sound of three mid-level tones, similar to ready-for-takeoff cabin signal]

60 16:11:52 CAM [sound of multiple clicks]

61 16:11:54 CAM [sound of click]

62 16:11:59 CAM [sound of low-volume thunk, similar to nosewheel passing over an in-pavement light]

63 16:12:01 CAM [sound of click]

64 16:12:07 CAM [sound of multiple clicks]

65 16:12:11 CAM [sound of low-volume thunk, similar to nosewheel passing over an in-pavement light]

66 16:12:35 HOT-1 right. Here we go.

67 16:12:36 TWR [Skywest 4778 runway 7L at A8 line up and wait for wake turbulence]

68 16:12:39 CAM [sound of increased background noise, similar to power application and aircraft acceleration]

69 16:12:41 MISC-AC [Skywest 4778 acknowledged line up and wait]

70 16:12:45 CAM [sound of low-volume thunk, similar to nosewheel passing over an in-pavement light]

71 16:12:46 HOT-2 thrust set.

72 16:12:47 MISC-AC [Spiritwing 356 inbound for 7R]

73 16:12:47 HOT-1 yep.

74 16:12:50 TWR [Spirit 356 following a 717 cleared to land 7R]
75 16:12:51 CAM [sound of bang, later identified as the engine event]
76 16:12:51 CAM [sound of reduced whining noise, similar to engine spooling down]
77 16:12:52 EICAS engine fail.
78 16:12:53 CAM-1 stop.
79 16:12:54 EICAS [sound of 4, approximately 1000Hz tones, similar to EICAS alert]
80 16:12:56 CAM [sound of click-clunk, similar to thrust reverser lever command]
81 16:12:56 MISC-AC [Spirit 356 cleared to land]
82 16:12:57 CAM [sound of bell for 1.8 seconds, similar to fire warning bell]
83 16:12:57 HOT-1 tell (them) we're stopping. Engine fire checklist please.
84 16:12:58 TWR [Skywest 4770 hold position]
85 16:13:00 CAM [sound of click]
86 16:12:01 EICAS [sound of 4, approximately 1000Hz tones, similar to EICAS alert]
87 16:13:02 HOT-1 I can't believe--.
88 16:13:03 EICAS [sound of 4, approximately 1000Hz tones, similar to EICAS alert]
89 16:13:04 RDO-2 Speedbird twenty two seventy six heavy stopping.
90 16:13:05 CAM-1 park brake set. That's forward.
91 16:13:06 TWR [sound of tone, similar to radio interference] - maintain seven thousand.
92 16:13:07 HOT-1 alright. Engine fire checklist left please.
93 16:13:08 MISC-AC okay. Understand. Ah Delta twenty two thirty five going around. Say the altitude and heading.
94 16:13:09 HOT-2 okay. Engine fire checklist.
95 16:13:11 HOT-3 do you want me to passenger crew?
96 16:13:13 TWR [Climb and maintain 7000 Delta 2335. Fly runway heading.]
97 16:13:13 CAM-1 okay. Tell them to stay there where they are.
98 16:13:14 HOT [sound of tone, similar to U.S. dialtone, followed by two keypad tones (over 3.3 seconds)]

99 16:13:17 MISC-AC [Runway heading up to 7000 Delta 2235]

100 16:13:18 (PA-3) passengers and crew please remain in your seats and await further instructions.

101 16:13:18 CAM [sound of click]

102 16:13:19 RDO-1 Speedbird ah Mayday Mayday. Speedbird twenty two seventy six. Request fire services.

103 16:13:20 CAM [sound of click]

104 16:13:25 TWR Speedbird twenty two seventy six heavy fire services are on the way.

105 16:13:25 CAM [sound of click]

106 16:13:28 RDO-1 thank you.

107 16:13:28 HOT-3 looks like smoke there guys.

108 16:13:29 HOT-1 yeah.

109 16:13:30 HOT-2 okay.

110 16:13:30 HOT-1 I think we got to get off.

111 16:13:31 HOT-1 you agree?

112 16:13:32 HOT-2 I've set the-yeah-I've set the left.

113 16:13:34 HOT-1 is it still going?

115 114 16:13:34 HOT-2 it's still going.

116 16:13:37 CAM [sound of multiple clicks]

117 16:13:38 HOT-1 # me.

118 16:13:39 HOT-1 tell 'em. Tell 'em to get off the.

119 16:13:42 HOT-3 let's get 'em off.

120 16:13:42 HOT-2 okay. Fire's now. Fire's now gone out. Fire's gone out.

121 16:13:42 HOT-1 keep away from the left hand side.

122 16:13:42 HOT [sound of tone, similar to U.S. dialtone, followed by one keypad tone (over 3.2 seconds)]

123 16:13:45 HOT-1 alright

124 16:13:45 HOT-2 fire has gone out.

125 16:13:46 HOT-? Okay.

126 16:13:46 HOT-1 stay there. Stay there.

127 16:13:46 HOT-3 I'll go and have a look. Shall I (open the) window?

128 16:13:48 HOT-1 yeah. Please do.

129 16:13:49 HOT-3 doesn't look good to me.

130 16:13:49 **HOT** [sound of hi-lo chime, similar to cabin interphone-calling the flight deck]

131 16:13:50 **TWR** [Delta 2235 contact departure]

132 16:13:52 **HOT-1** #me. I don't believe this.

133 16:13:54 **MISC-AC** [Delta 2235 acknowledges the frequency change]

134 16:13:54 **CAM** [sound of chime, similar to cabin crew interphone-calling another cabin crew]

135 16:13:55 **HOT-1** alright. What we've got to do. We've done the checklist.

136 16:13:57 **HOT-2** yeah.

137 16:13:57 **HOT-1** okay.

138 16:13:58 **CAM** [unintelligible background voices from the cabin]

139 16:13:58 **HOT-1** what about the... [sound of click]...gear.

140 16:14:02 **CAM** [sound of high pitch whine, similar to cockpit chair movement electrically]

141 16:14:02 **PA-4** ladies and gentleman please remain seated. Please remain seated.

142 16:14:07 **HOT-1** I think there's too much fire. I think we've got to get out.

143 16:14:08 **HOT-2** well. It says it's gone out. Can we see anything?

144 16:14:11 **HOT-1** look. There's all fire and smoke [stammer]. Look-look to your right.

145 16:14:13 **HOT-2** okay. Wh--

146 16:14:15 **HOT-1** no. we've got to evacuate.

147 16:14:16 **CAM** [sound of rustling]

148 16:14:18 **RDO-2** ah tower. Speedbird twenty two seventy six heavy.

149 16:14:21 **TWR** Speedbird twenty two seventy six heavy go ahead.

150 16:14:21 **CAM-3** yeah. (still) on fire need to evacuate. Right hand side.

151 16:14:23 **(PA)-1** ladies and gentleman. This is an emergency. This is the captain. Evacuate. Evacuate.

152 16:14:32 **CAM-(3)** right now.

153 16:14:27 **RDO-2** Speedbird twenty two seventy six heavy we are evacuating on the runway. We have a fire. I repeat we are evacuating.

154 16:14:28 CAM [sound of rapid, high pitched tone, similar to evacuation alarm (for about 33 seconds)]

155 16:14:29 CAM [sound of whooshing sound, similar to emergency evacuation slide inflation]

156 16:14:30 HOT [sound of tone, similar to U.S. dialtone, followed by two keypad tones (over 2.4 seconds)]

157 16:14:33 CAM-1 there's a fire on the left hand side. Use the right hand side to evacuate.

158 16:14:34 TWR Speedbird twenty two seventy six heavy roger.

159 16:14:35 HOT [sound of repetitive tone, similar to U.S. busy telephone busy signal (for about 5 seconds)]

160 16:14:35 CAM [background sounds from cabin of evacuation underway, including flight attendants yelling orders continues until end of recording]

161 16:14:36 (RDO)-2 thank you.

162 16:14:39 MOBILE8 Tower Mobile eight. I'm entering seven left.

163 16:14:41 TWR Tower Mobile eight proceed onto runway seven left.

164 16:14:41 (PA)-1 evacuate on the right hand side. The right hand side please.

165 16:14:46 MISC-AC [Spirit still cleared to land?]

166 16:14:47 CAM-2 which side is the fire on?

167 16:14:48 CAM-3 left side.

168 16:14:50 HOT-2 you said the fire's on the left. Hazard on the right or the left.

169 16:14:54 HOT-(2or3) yeah. We think it's the right. ** seen that.

170 16:14:56 HOT-1 yeah.

171 16:14:58 HOT-3 crew is doing a good job.

172 16:14:59 HOT-3 alright. We okay. We done everything?

173 16:15:01 HOT-1 we can't do much else.

174 16:15:01 TWR [Spirit 356 go around. Runway heading. Seven thousand.]

175 16:15:02 HOT-3 both engines shut down?

176 16:15:03 CAM [sound of bell, similar to fire warning for about 2 seconds]

177 16:15:04 CAM-2 no. the right engine's still shut down.

178 16:15:04 CAM-3 shut the other engine down guys.

179 16:15:07 **HOT-1** fire. (forward cargo).
180 16:15:07 **MISC-AC** [Spirit 356 acknowledges go around instructions.]
181 16:15:08 **CAM-2** we haven't done the engine checklist.
182 16:15:10 **CAM-3** we need to do the evacuation checklist.
183 16:15:11 **CAM** [sound of loud snap]
184 16:15:12 **HOT-1** let's do the evacuation checklist. I think we've got to go.
185 16:15:15 **HOT-3** just do the evacuation checklist.
186 16:15:16 **HOT-3** parking brake on.
187 16:15:16 **CAM-2** evacuate.
188 16:15:16 **CAM** [sound of bell, similar to fire warning bell (for about 2 seconds)]
189 16:15:20 **HOT-2** (set) outflow valve switch.
190 16:15:21 **CAM** [sound of bell, similar to fire warning bell (for about 2 seconds)]
191 16:15:25 **HOT-1** **.
192 16:15:27 **HOT-2** fire switch. A-P-U pull fire switch.
193 16:15:28 **HOT-1** how are we doing?
194 16:15:30 **HOT-3** have you done that?
195 16:15:31 **HOT-1** yeah. No. do it.
196 16:15:34 **CAM** [sound of loud click, similar to APU fire switch]
197 16:15:34 **CAM** [sound of electric motor, similar to cockpit seat movement]
198 16:15:35 **CAM-3** crew are brilliant.
199 16:15:35 **CAM** [sound of click]

(Tuccio, Tailstrike.com)

7. Transcript of flight AA383 - 28 Oct 2016:

"The following is a transcript of the L-3/Fairchild FA2100-1020 cockpit voice recorder, serial number 158589, installed on American Airlines flight 383, a Boeing 767-323, N345AN, which experienced an uncontained engine failure and subsequent fire during the take-off ground roll at Chicago O'Hare International Airport, Chicago, Illinois, on October 28, 2016." (Tailstrike.com)

Legend:

CAM = Cockpit area microphone voice or sound source

HOT = Flight crew audio panel voice or sound source

TWR = Radio transmission from O'Hare Tower controller

-1 = Voice identified as the captain

-2 = Voice identified as the first officer

-? = Voice unidentified

= Expletive

[] = Editorial insertion

Note 1: Times are expressed in Central Daylight Time.

Note 2: Generally, only radio transmissions to and from the incident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

INTRA-COCKPIT COMMUNICATION CONTENT

AIR-GROUND COMMUNICATION CONTENT

01 14:30:29 TWR American three eighty three heavy runway two eight right at november five line up and wait. Winds two zero zero a tone four.

02 14:30:33 RDO-2 line up and wait American three eighty three heavy.

03 14:30:35 HOT-1 okay checklist.

04 14:30:36 HOT-2 map display?

05 14:30:37 HOT-1 and checked at two eight right.

06 14:30:40 HOT-2 takeoff PA?

07 14:30:41 HOT-1 complete.

08 14:30:42 HOT-2 packs?

09 14:30:44 HOT-1 are auto.

10 14:30:45 HOT-2 lights?

11 14:30:46 HOT-1 set.

12 14:30:46 HOT-2 checklist complete.

13 14:30:57 TWR American three eighty three heavy turn left heading two two zero runway two eight right at november five cleared for takeoff.

14 14:31:00 CAM [sound of five clicks, similar to light switches]

15 14:31:02 RDO-2 left turn to two two zero cleared for takeoff American three eighty three heavy.

16 14:31:06 HOT-1 cleared for takeoff two twenty heading.

17 14:31:17 HOT-1 and engage.

18 14:31:19 CAM [sound similar to engine rpm increase]

19 14:31:19 HOT-2 clock's running.

20 14:31:24 HOT-2 thrust set.

21 14:31:32 HOT-2 eighty knots.

22 14:31:32 HOT-1 checked.

23 14:31:43 CAM [sound of bang]

24 14:31:44 HOT-1 whoa.

25 14:31:44 CAM [sound of click, similar to throttles contacting idle stops]

26 14:31:45 CAM [sound similar to engine rpm decrease]

27 14:31:50 RDO-2 American three eighty three heavy stopping on the runway.

28 14:31:52 TWR roger roger. Fire.

29 14:31:54 CAM [sound of two clicks]

30 14:31:56 RDO-2 do you see any smoke or fire?

31 14:31:57 HOT [sound similar to master caution]

32 14:31:58 TWR yeah fire off the right wing.

33 14:31:59 RDO-2 okay send out the trucks.

34 14:31:59 CAM [sound similar to engine fire warning]

35 14:32:02 TWR sending em.

36 14:32:04 HOT-1 okay let's run the uh checklist.

37 14:32:04 HOT-2 alright.

38 14:32:06 HOT-2 checklist.

39 14:32:06 HOT-1 we can shut it-

40 14:32:08 HOT-2 just shut it down and get- pull the handle?

41 14:32:09 CAM [sound similar to engine fire warning]

42 14:32:10 HOT-1 pull it yeah.

43 14:32:11 CAM [sound of click, similar to fire handle being pulled]

44 14:32:11 CAM [sound similar to engine fire warning]

45 14:32:12 CAM [sound of three clicks]

46 14:32:15 HOT-2 checklist for engine fire.

47 14:32:17 TWR American three eighty three can you give us any information right now?

48 14:31:17 HOT-1 #.

49 14:32:21 CAM [sound similar to engine fire warning]

50 14:32:23 RDO-2 uh stand by.

51 14:32:25 CAM [sound similar to master caution]

52 14:32:26 HOT-2 just the-

53 14:32:28 CAM-2 engine fire severe damage.

54 14:32:30 CAM [sound similar to engine fire warning]

55 14:32:31 HOT-2 *.

56 14:32:32 HOT-2 okay.

57 14:32:32 HOT-1 you didn't- you didn't fire the bottle.

58 14:32:34 HOT-1 did ya?

59 14:32:34 HOT-2 I did. I pushed it twice.

60 14:32:35 CAM [sound of click]

61 14:32:35 HOT-1 which one?

62 14:32:36 HOT-2 oh I didn't twist it. There we go.

63 14:32:36 CAM [sound of click]

64 14:32:37 HOT-1 oh.

65 14:32:38 HOT-2 okay.

66 14:32:39 CAM [sound of two whooshing sounds]

67 14:32:40 CAM [sound similar to engine fire warning]

68 14:32:40 HOT-2 alright.

69 14:32:40 CAM-1 oh look at the smoke - check out the smoke.

70 14:32:41 HOT-1 [sound of rustling noise, similar to headset being moved]

71 14:32:42 HOT-2 okay.

72 14:32:44 HOT-2 uhh.

73 14:32:45 CAM-1 do the evacuation checklist.

74 14:32:46 HOT-2 okay evacuation checklist.

75 14:32:49 CAM-1 #.

76 14:32:49 CAM [sound similar to engine fire warning]

77 14:32:53 HOT-1 okay I'm going both ways. Go.

78 14:32:54 HOT-2 okay.

79 14:32:55 HOT-1 go.

80 14:32:55 HOT-2 parking brake set?

81 14:32:56 HOT-1 set.

82 14:32:57 **HOT-2** cabin altitude mode selector manual?
83 24:32:59 **CAM** [sound similar to engine fire warning]
84 14:33:00 **HOT-1** okay.
85 14:33:01 **HOT-2** uh cabin altitude control hold in climb.
86 14:33:05 **HOT-1** okay. What about the-
87 14:33:06 **HOT-2** fuel control switches both cutoff.
88 14:33:06 **CAM** [sound similar to master caution]
89 14:33:08 **CAM** [sound similar to engine fire warning]
90 14:33:09 **HOT-2** PA evac this is the captain-
91 14:33:11 **CAM** [sound of thunk]

(Tailstrike.com)

8. Transcript of flight Southwest WN1380 - 17 Apr 2018:

"Transcript of a Honeywell 6022 solid-state cockpit voice recorder, serial number 2772, installed on a Southwest Airlines Boeing 737-700 (N772SW), which declared an emergency after experiencing an uncontained engine failure and landed at Philadelphia International Airport (KPHL) in Philadelphia, Pennsylvania." (Gregor, Tailstrike.com)

The plain suffered engine failure and a part of the engine blew up in flight. Fragments of it broke a window and due to that a passenger died from having suffered fatal injuries.

Legend:

APR = Radio transmission from the Philadelphia approach controller
CAM = Cockpit area microphone voice or sound source
CTR = Radio transmission from New York center controller
EMS = Emergency medical service voice or sound source
FC = Fire commissioner voice or sound source
GND = Radio transmission from the Philadelphia ground controller
HOT = Flight crew audio panel voice or sound source
INT = Intercom voice or sound source
RDO = Radio transmissions from N772SW

TWR = Radio transmission from the Philadelphia airport tower controller

-1 = Voice identified as the captain

-2 = Voice identified as the first officer

ARFF-1,2,3 = Voice identified as air rescue and firefighting personnel

FA-1,2,3 = Voice identified as a flight attendant

GND-1,2,3 = Voice identified as ground personnel

OPS-1,2,3 = Voice identified as operation personnel

-? = Voice unidentified

* = Unintelligible word

= Expletive

@ = Non-pertinent word

() = Questionable insertion

[] = Editorial insertion

Note 1: Times are expressed in eastern daylight time (EDT).

Note 2: Generally, only radio transmissions to and from the accident aircraft were transcribed.

Note 3: Words shown with excess vowels, letters, or drawn out syllables are a phonetic representation of the words as spoken.

Note 4: A non-pertinent word, where noted, refers to a word not directly related to the operation, control or condition of the aircraft.

INTRA-AIRCRAFT COMMUNICATION CONTENT

AIR-GROUND COMMUNICATION CONTENT

01 10:53:21 HOT-1 you've got it all.

02 10:53:23 HOT-1 the radios, everything. 'cause I'm gonna get some peanuts

03 10:53:29 CTR (Southwest thirteen eighty) amend altitude maintain flight level two two zero.

04 10:53:34 RDO-2 stop now at two two zero Southwest thirteen.

05 10:53:44 HOT-2 hey hello.

06 10:53:44 FA-1 hey, we're ready.

07 10:53:45 HOT-2 okay

08 10:53:46 FA-1 okay

09 10:53:47 HOT-2 they're ready.

10 10:53:52 FA-1 [sounds consistent with passenger briefing].

11 10:53:57 HOT-2 stopping at twenty two now.

12 10:53:58 HOT-1 okay.

13 10:54:07 HOT-1 @ is one fast talking girl. I listen to her P-A.

14 10:56:54 CTR * * * -outhwest thirteen eighty climb and maintain * * *.

15 10:56:58 RDO-1 Southwest thirteen eighty up to flight level two eight zero.

16 10:57:02 HOT-2 twenty eight.

17 10:57:04 HOT-1 okie dokie.

18 10:57:36 CTR Southwest thirteen eighty climb and maintain flight level three eight zero.

19 10:57:43 RDO-1 Southwest thirteen eighty up to flight level three eight zero.

20 10:57:44 CAM [sound of chime]

21 10:57:51 HOT-1 sorry.

22 11:00:51 CTR Southwest thirteen eighty contact New York center one three three point four seven.

23 11:00:57 RDO-1 * thirteen eighty * *.

24 11:01:33 RDO-1 center Southwest thirteen eighty flight level three zero zero for three eight zero.

25 11:01:39 CTR Southwest thirteen eighty New York hello.

26 11:03:33 CAM [sound of increased background noise].

27 11:03:39 CAM [sound of cabin altitude warning horn].

28 11:02:42 HOT-1 *.

29 11:03:46 HOT-1 * * *.

30 11:04:08 HOT-1 * * *.

31 11:04:21 CTR Southwest thirteen eighty cleared direct VINSE V-I-N-S-E.

32 11:04:25 HOT-? * *.

33 11:04:28 CTR ah you know what you * * there ya go cleared direct VINSE V-I-N-S-E.

34 11:04:38 CTR Southwest thirteen eighty New York?

35 11:04:41 HOT-1 * * * *.

36 11:04:49 HOT [sounds consistent with breathing through oxygen masks].

37 11:04:50 CTR Southwest thirteen eighty if you're trying to get me all I hear is static.

38 11:04:54 RDO-1 Southwest thirteen eighty has an engine fire descending.

39 11:04:59 CTR Southwest thirteen eighty ah you you're descending right now?

40 11:05:02 RDO-1 yes sir we're single engine descending have a fire in number, one.

41 11:05:07 CTR alright Southwest thirteen eighty ah wh- okay where would you like to go to which airport?

42 11:05:12 RDO-1 give us a vector for your closest.

43 11:05:15 * * *.

44 11:05:16 CTR uhmm okay.

45 11:05:17 RDO-1 Philadelphia.

46 11:05:18 CTR * just fly heading two five zero.

47 11:05:21 RDO-1 okay heading two five zero we're looking at ah Philly * * *.

48 11:05:28 CTR Southwest thirteen eighty roger and ah standby.

49 11:05:32 HOT-1 okay have you got the aircraft?

50 11:05:38 HOT-1 okay have you got the aircraft?

51 11:05:40 HOT-1 completely?

52 11:05:44 HOT-1 and I'm going to go through Q-R-H * * * from the back.

53 11:05:52 CTR Southwest thirteen eighty cleared direct to the Philadelphia airport via direct.

54 11:05:52 PA-1 ladies and gentleman this is your captain we're * * going into ah to Philadelphia * * ah remain seated thank you.

55 11:05:57 RDO-2 * * Philadelphia direct * * *.

56 11:06:02 CAM bank angle [electronic voice].

57 11:06:09 HOT-1 alright you've got it ah turning he said turn two five zero?

58 11:06:16 HOT-1 alright you're * rudder's just a little off I got it.

59 11:06:28 CTR Southwest thirteen eighty * * * -

60 11:06:31 RDO-1 say again for Southwest thirteen eighty.

61 11:06:33 CAM bank angle, bank angle [electronic voice].

62 11:06:36 HOT-1 okay, let me do that.

63 11:06:41 HOT-1 okay, I'm gonna give you some, trim.

64 11:06:46 HOT-1 I'm giving you trim into your good rudder.

65 11:06:50 HOT-1 kay?

66 11:06:51 CTR Southwest thirteen eighty New York?

67 11:06:53 RDO-1 Southwest thirteen eighty go ahead.

68 11:06:55 CTR * Southwest thirteen eighty ah understand so there's a fire you're single engine cause of fire?

69 11:07:02 RDO-1 actually we're no fire now but we are single engine.

70 11:07:08 CTR okay you are single engine now okay cleared direct to Philly and ah I guess * * can you maintain one one eleven thousand?

71 11:07:15 RDO-1 yes sir.

72 11:07:16 CTR okay * thirteen eighty descend and maintain one one eleven thousand.

73 11:07:19 RDO-1 okay down to one one eleven thousand.

74 11:07:28 HOT-1 okay are you getting ah *.

75 11:07:34 HOT-1 ah alright I got your phone I'm gonna clear this area.

76 11:07:37 CTR Southwest thirteen eighty just so I can understand you said that you are still single engine and ah what else?

77 11:07:45 RDO-1 okay Southwest thirteen eighty- eighty we're single engine, that's it.

78 11:07:51 CTR okay single engine. Maintain one one eleven thousand do you need anything standing by on the ground?

79 11:07:55 RDO-1 yes could ah you tell em roll the trucks it's on the ah engine number one captain's side.

80 11:08:01 CTR okay thank you Southwest thirteen eighty contact New York center one tree five point four five.

81 11:08:06 RDO-1 three five four five good day.

82 11:08:08 HOT-2 * * altimeter setting.

83 11:08:11 HOT-1 I'll get it.

84 11:08:12 RDO-1 center Southwest thirteen eighty declaring an emergency going through seventeen thousand need your local altimeter.

85 11:08:18 RDO-1 * altimeter?

86 11:08:19 CTR ah South- thirteen eighty ah New York the ah Baltimore altimeter is ah two niner eight zero and you're descending to one one thousand?

87 11:08:27 RDO-1 goin down to one one thousand two nine eight zero?

88 11:08:31 CTR Southwest thirteen eighty, thank you.

89 11:08:34 RDO-1 ah then Southwest thirteen eighty we're one hundred and forty nine souls on board.

90 11:08:38 CTR I'm sorry how many souls on board?

91 11:08:40 RDO-1 one four niner.

92 11:08:43 CTR forty nine?

93 11:08:44 RDO-1 one hundred forty nine.

94 11:08:46 CTR okay thank you ma'am and how many uh how many hours of fuel you have?

95 11:08:52 HOT-1 three - four.

96 11:08:54 HOT-2 ah.

97 11:08:58 HOT-2 * * two nine eight zero.

98 11:09:04 HOT-1 alright your rudder is not trimmed out.

99 11:09:07 HOT-2 * * * there's not ah there's not much trim required.

100 11:09:10 CTR thirteen eighty descend and maintain eight thousand.

101 11:09:13 RDO-1 Southwest thirteen eighty down to eight thousand.

102 11:09:15 HOT-1 alright, I tell you what, I'm going to go ahead-

103 11:09:17 CTR Southwest thirteen eighty * * of assistance at the at the airport correct?

104 11:09:21 RDO-1 yes sir we would like aha h fire truck on the captain's side please.

105 11:09:26 CTR fire truck on the captain's side thank you ma'am.

106 11:09:30 HOT-1 wow. Okay tell you what I'm gonna take it and you take over * * *.

107 11:09:46 HOT-1 alright.

108 11:09:47 HOT-1 * * for engine ah severe damage.

109 11:09:52 HOT-2 autothrottle if engaged disengage.

110 11:09:57 HOT-1 * I'm sorry. Say again.

111 11:09:59 HOT-2 autothrottle if engaged disengage.

112 11:10:01 HOT-1 disengaged.

113 11:10:02 HOT-2 thrust lever affected engine confirmed closed.

114 11:10:05 HOT-1 * it's confirmed I've got number two.

115 11:10:08 CTR * * thirteen eighty is the engine on fire?

116 11:10:11 RDO-2 negative.

117 11:10:14 CTR Southwest thirteen eighty contact Philly approach one two four point three five.

118 11:10:18 RDO-2 two four three five Southwest thirteen eighty.

119 11:10:25 HOT-2 engine start lever affected engine confirm?

120 11:10:28 HOT-1 confirm. Confirmed.

121 11:10:30 HOT-2 cutoff?

122 11:10:31 HOT-1 cutoff.

123 11:10:33 HOT-2 engine fire switch confirm pull?

124 11:10:37 HOT-1 okay.

125 11:10:39 HOT-2 confirmed?

126 11:10:39 HOT-1 confirmed.

127 11:10:45 HOT-2 engine fire switch on or overheat light illuminated rotate if nor illuminated.

128 11:10:53 HOT-1 alright then don't rotate it.

129 11:10:56 CAM [sound of fire bell].

130 11:10:57 CAM-2 system tests good.

131 11:10:59 CAM-1 alright.

132 11:11:00 HOT-2 ah go to Q-R-H engine severe damage.

134 133 11:11:02 APR thirteen eighty Philly.

135 11:11:04 RDO-1 go ahead.

136 11:11:05 APR Southwest thirteen eighty * * * descend and descend and maintain six thousand.

137 11:11:10 RDO-1 Southwest thirteen eighty down to six thousand.

138 11:11:13 APR when you get a chance I need ah fuel remaining and souls on board.

139 11:11:16 RDO-1 okay one hundred and forty nine souls on board. Five hours of fuel.

140 11:11:22 APR thank you very much.

141 11:11:24 RDO-1 roger.

142 11:11:27 HOT-1 alright.

143 11:11:31 HOT-1 we're down to six.

144 11:11:37 APR Southwest thirteen eighty fly heading zero niner zero please.

145 11:11:40 RDO-2 heading zero niner zero Southwest thirteen eighty.

146 11:11:45 HOT-2 hey we're gonna need a few minutes right? To run a couple checklists? Is that right?

147 11:11:49 HOT-1 nope just keep goin'.

148 11:11:50 HOT-2 okay.

149 11:11:53 APR Southwest thirteen eighty can I get the fuel in pounds and the exact nature of the emergency please?

150 11:11:59 RDO-1 engine ah engine sever damage. Engine failure. And exact pounds of fuel * fifteen seventeen twenty one * thousand.

151 11:12:13 HOT-? Hello?

152 11:12:14 APR thank you.

153 11:12:16 HOT-1 hello?

154 11:12:23 HOT-1 think we had a rapid D as well.

155 11:12:25 CAM-2 I know.

156 11:12:27 HOT-2 so ah.

157 11:12:28 HOT-1 alright

158 11:12:28 HOT-2 I'm off of oxygen we're below ten thousand feet.

159 11:12:36 HOT-2 okay choose one high airframe vibration occurs and continues after shutdown.

160 11:12:47 CAM-1 you know what? You really should.

161 11:12:50 HOT-2 I can't hear you.

162 11:12:52 HOT-2 I'll take you off a mask.

163 11:12:54 CAM-1 yeah thank you.

164 11:12:55 HOT-2 * * *.

165 11:12:57 CAM-1 hah.

166 11:12:58 HOT-2 okay there's your heading select we're down to six thousand.

167 11:13:00 CAM-1 heading select okay. You might have to take the aircraft for just a minute I haven't got I have got it trimmed real well. But we've got a-.

168 11:13:04 HOT-2 okay.

169 11:13:05 HOT-2 I'll take it.

170 11:13:08 HOT-2 we're down to six so I'll * keep goin down.

171 11:13:12 CAM-1 * * * just hold it for just a second.

172 11:13:19 APR South * thirteen eighty fly heading zero niner zero descend and maintain four thousand.

173 11:13:22 CAM-1 and we've got. Severe damage. Alrigh'. I've got it back.

174 11:13:26 RDO-2 four thousand heading zero nine zero Southwest, thirteen eighty.

175 11:13:31 CAM-1 four thousand.

176 11:13:34 HOT-2 kay. Check your speed.

177 11:13:36 CAM-1 yeah I'm trying to slow down on purpose.

178 11:13:42 CAM-1 and ah let's plan on landing with.

179 11:13:44 APR and Southwest thirteen eighty you going to go right in or do you need extended final?

180 11:13:47 HOT-1 extended final.

181 11:13:48 RDO-1 extended final.

182 11:13:50 APR thank you.

183 11:13:51 HOT-2 yeah we got a couple a checklists to run.

184 11:13:53 HOT-1 yeah I think it-

185 11:13:54 HOT-2 I wanna talk to the girls as well. We don't know what happened back there.

186 11:13:56 HOT-1 ah. You talk to the girls. I've got everything here.

187 11:14:00 HOT-2 okay.

188 11:14:02 APR Southwest thirteen eighty contact approach now on one two eight point four.

189 11:14:07 RDO-1 Southwest thirteen eighty one two eight point four. We need a single channel no more channel switching.

190 11:14:14 APR thirteen eighty you're on approach frequency one two eight point four. You're where you should be. Maintain four thousand and ah do you need any further assistance from me? What type of final do you want? I heard short. Or a long.

191 11:14:24 RDO-1 yeah, we're gonna need a long final.

192 11:14:24 INT-2 you guys there? Hello?

193 11:14:26 APR I'm gonna let you drive until you tell me you wanna turn base okay, so ah.

194 11:14:30 HOT-1 tell.

195 11:14:31 APR at least a twenty five mile final, longer than that I'll have to do some coordination but that'll be fine we'll get that done for you.

196 11:14:36 HOT-2 I've got no reply from the back.

197 11:14:37 RDO-1 okay, twenty is good. And ah, we may need shorter here in a moment. Tell me the runway we're settin' up for.

198 11:14:45 APR set up for two-

199 11:14:47 RDO-1 say again.

200 11:14:49 HOT-1 no reply in the back?

201 11:14:50 APR Southwest thirteen eighty you'll be landing two seven left, two seven left today. And ah you just let me know when you need to turn base ah I ah right now I only have one person in front of you which is a Southwest * I'm sure he'll pull off if you need to go.

202 11:15:00 CAM [sound of chime].

203 11:15:01 HOT-1 okay, talk to the girls.

204 11:15:02 FA-2 we're goin' down.

205 11:15:04 INT-2 hello it's @.

206 11:15:04 FA-2 he we got * * a window open and somebody - is out the window.

207 11:15:09 INT-2 okay.

208 11:15:09 FA-2 we- we're almost landing.

209 11:15:10 INT-2 okay we wer' we're coming down is everyone else in their seats strapped in?

210 11:15:14 FA-2 yeah everyone still in their seats, we have people have been helpin' her get in I don't know what her condition is. But the window is completely out.

211 11:15:23 INT-2 okay we're gonna slow down.

212 11:15:24 HOT-2 slow down to two hundred ten knots right now.

213 11:15:26 FA-2 * * * (alrighty) are we almost there?

214 11:15:29 INT-2 yes we're gonna land as soon as we can.

215 11:15:29 RDO-1 * * * * we're gonna need to slow down a bit.

216 11:15:29 FA-2 okay, thank you.

217 11:15:33 FA-? [unintelligible background voices].

218 11:15:33 FA-2 oh no.

219 11:15:34 APR Southwest thirteen eighty, speed is your discretion. Maintain at any altitude above three thousand feet and you let me know when you want to turn base.

220 11:15:38 HOT [sound similar to chime].

221 11:15:42 RDO-1 alright down to three thousand.

222 11:15:45 FA-2 ladies and gentlemen please remain seated we're * * back ladies and gentleman we are almost landing.

223 11:15:47 HOT-2 okay we have somebody that's flown outside the *.

224 11:15:54 HOT-1 alright. Severe damage. Ah let's just ah. Let's just let's do severe damage checklist and let's get it turned in *.

225 11:16:02 HOT-2 okay isolation valve closed, pack affected side off, A-P-U bleed switch off choose, A-P-U available for start, start.

226 11:16:15 HOT-1 okay if we're going to do a flaps five landing (I believe).

227 11:16:18 HOT-2 flaps five.

228 11:16:19 HOT-1 because I don't know the controllability of this thing. Gimme flaps one.

229 11:16:26 HOT-2 flaps one.

230 11:16:31 RDO-1 Southwest thirteen eight'd like to turn, start turning, inbound.

231 11:16:39 HOT-2 so we'll do a visual?

232 11:16:39 FA-2 everybody breathe and relax. Everybody breathe we are almost landing.

233 11:16:44 FA-2 * * * * everybody breathe we are almost there.

234 11:16:47 APR Southwest thirteen eighty turn ah just start turning southbound there there's Southwest seven three seven on a four mile final be turning southbound start looking for the airport it's off to your right and slightly behind you there. And ah altitude is your discretion use caution for the ah downtown area maintain ah advise you maintain at or above two thousand two hundreds per ah the M-V-A.

235 11:16:50 FA-2 * *.

236 11:16:56 CAM [sound of altitude alert tone].

237 11:17:04 RDO-1 okay could you have the ah medical meet us there on the runway as well we've got ah injured passengers.

238 11:17:12 APR injured passengers okay and are you is your airplane physically on fire?

239 11:17:16 RDO-1 no it's not on fire but part of it's missing.

240 11:17:22 RDO-1 they said there's a hole and ahm someone went out.

241 11:17:27 APR ahm, I'm sorry you said there was a hole and somebody went out?

242 11:17:28 CAM-1 okay landing gear.

243 11:17:30 RDO-1 yes.

244 11:17:31 HOT-1 okay, landing gear.

245 11:17:32 APR Southwest thirteen eighty it doesn't matter ah we'll work it out there so the airport's just off to your right report it in sight please.

246 11:17:33 CAM [sound of chime].

247 11:17:35 CAM [sound of altitude alert tone].

248 11:17:37 RDO-1 in sight. Southwest thirteen eighty airport's in sight.

249 11:17:41 APR Southwest thirteen eighty you're cleared visual approach two seven right contact the tower on one one eight point five.

250 11:17:45 RDO-1 okay cleared the visual two seven right.

251 11:17:46 CAM [sound of increased background noise].

252 11:17:48 APR two seven left and tower's on eighteen five.

253 11:17:50 RDO-1 we're goin' on two seven left. And switchin' tower good day.

254 11:17:56 HOT-1 alright flaps to five.

255 11:17:59 HOT-2 five.

256 11:18:02 HOT-1 thank you. And give me. Give me a good speed for five.

257 11:18:02 HOT-2 [sound of numbers recited under the breath].

258 11:18:11 HOT-2 okay, you're set up for the I-L-S.

259 11:18:14 HOT-2 ah one. Flaps five are you sure? How about just fifteen? It's something we know.

260 11:18:25 HOT-1 okay. I'm gonna plan on. Yeah, yes.

261 11:18:30 HOT-2 fifteen? One forty three. One forty eight.

262 11:18:37 HOT-2 there's flaps.

263 11:18:38 HOT-1 alright, we're gettin' a little low. You have the right frequency for this?

264 11:18:45 RDO-2 Phila tower Southwest ah thirteen eighty landing on ah two seven right.

265 11:18:48 CAM glide slope, glide slope, glide slope [electronic voice].

266 11:18:48 HOT-1 heavenly father * * *. [spoken under the breath].

267 11:18:53 TWR Southwest thirteen eighty wanna land two seven right?

268 11:18:56 HOT-1 No.

269 11:18:57 RDO-2 ah two seven left I'm sorry two seven left.

270 11:18:59 TWR Southwest thirteen eighty runway two seven left cleared to land wind two eight zero a tone nine gust two five.

271 11:19:06 RDO-2 two seven left cleared to land ah Southwest thirteen eighty.

272 11:18:11 HOT-2 hold on I'm getting you.

273 11:19:18 HOT-2 okay. So we're a little low. We're at flaps five right now. Ah your speed for flaps fifteen would be -.

274 11:19:25 HOT-1 it's taking us a little time to get back on it.

275 11:19:28 CAM glide slope [electronic voice].

276 11:19:31 HOT-1 would you put visual on my HUD for me V-M-C?

277 11:19:33 CAM glide slope [electronic voice].

278 11:19:39 CAM glide slope [electronic voice].

279 11:19:49 HOT-2 okay five hundred feet. Landing gear down. Flaps five. Speed brakes * armed.

280 11:19:53 HOT-1 uh oh, that's gone ah there we go.

281 11:19:55 CAM glide slope [electronic voice].

282 11:19:56 HOT-1 before landing checklist.

293 11:19:57 HOT-2 speedbrake?

284 11:19:58 HOT-1 armed. With a green light.

285 11:20:00 HOT-2 landing gear?

286 11:20:01 HOT-1 you do it if I don't see it.

287 11:20:02 CAM glide slope, glide slope, glide slope, glide slope [electronic voice]. Too low terrain [electronic voice].

288 11:20:02 HOT-1 down green light.

289 11:20:04 HOT-2 flaps are fif-.

290 11:20:05 **HOT-1** I can't hear you.

291 11:20:07 **HOT-2** flaps?

292 11:20:08 **HOT-1** position five green light.

293 11:20:10 **HOT-2** alright.

294 11:20:10 **CAM** glide slope, glide slope, glide slope, glide slope [electronic voice]. Too low terrain, too low terrain [electronic voice].

295 11:20:11 **HOT-2** your speed is good.

296 11:20:13 **CAM** [heads down, stay down; from the passenger cabin; spoken repeatedly].

297 11:20:20 **HOT-2** okay, looking good, speed's one eighty.

298 11:20:20 **CAM** glide slope [electronic voice]. Too low terrain, too low terrain [electronic voice].

299 11:20:22 **HOT-2** fifty feet.

300 11:20:24 **HOT-2** thirty feet.

301 11:20:27 **CAM** ten [electronic voice].

302 11:20:27 **HOT-2** ten.

303 11:20:27 **HOT-2** kay, extended.

304 11:20:32 **CAM** [sound consistent with nose gear touchdown].

305 11:20:34 **HOT-2** one deployed.

306 11:20:37 **HOT-2** six thousand feet remaining.

307 11:20:43 **HOT-1** thank you lord. Thank you thank you thank you lord.

308 11:20:47 **HOT-2** eighty knots.

309 11:20:51 **HOT-2** sixty knots.

310 11:20:56 **HOT-1** I'm gonna get off.

311 11:20:57 **HOT-2** okay d'you need me to tell them to - to not we're not gonna evacuate?

312 11:21:01 **HOT-1** yeah.

313 11:21:02 **HOT-2** stay in seats?

314 11:21:03 **FA-3** * * stay in your seats though. Stay in your seats until we know from the captain what -.

315 11:21:03 **FA-2** [unintelligible].

316 11:21:07 **INT-2** okay listen up, listen up, this is the flight deck, stay in you seats, stay in your seats we're pulling off the runway, emergency equipment will be pulling up stay in your seats.

317 11:21:17 TWR Southwest thirteen eighty right turn when you're able. If you wanna stop wherever you need to is fine.

318 11:21:23 RDO-1 thank you we're gonna stop right here by the ah fire truck thanks guys for the help.

(Gregor, Tailstrike.com)