

## The History of Flight SA295

On 27 November 1987 Flight SA295 was scheduled to depart from Taipei's Chiang Kai Shek Airport at 13:00 for Plaisance Airport, Mauritius, on a scheduled international flight. Adverse weather and the late arrival of a connecting flight delayed departure and the aircraft took off an hour and 23 minutes late. On board were 149 000 kg of fuel, 43 225 kg of baggage and cargo, 140 passengers and a crew of five flight crew members and 14 cabin crew members. The calculated flight time was 10 hours 14 minutes. Take-off was normal in all respects and for the first few hours of the flight routine communications were made with Hong Kong radar and flight information centres at Hong Kong, Bangkok, Kuala Lumpur, Colombo, Cocos Islands and Mauritius.

At 15:55:18 a routine report was made to Springbok Johannesburg Radio Station (codename ZUR), the international radio communications centre adjacent to SAA's base at Jan Smuts Airport. The flight crew confirmed to ZUR their take-off from Taipei at 14:23, that the *Helderberg* was flying at flight level 310 and that arrival time at Mauritius was estimated at 00:35. ZUR's radio operator informed Flight SA295 that the selective calling system (SELCAL), by which the radio station could call an individual aircraft, was unserviceable and requested a flight crew call at 18:00.

### THE MISSING ZUR TAPE

ZUR came under heavy fire during the public hearing of the Board of Inquiry into the *Helderberg* accident. It was questioned on its failure to contact the *Helderberg* when the flight crew had not made the ZUR-requested call at 18:00, on the loss of the ZUR-tape which would have recorded communication between ZUR and the *Helderberg* and also on log entries.

Evidence was given by Etienne du Toit, Communications Officer at ZUR, who explained that ZUR's purpose was '... to assist our aircraft, including any other international aircraft on the domestic and international routes, with taking down position reports and also to assist if there are any technical snags that we could possibly pass onto engineering, and anything to assist these people.' The SELCAL system, testified Du Toit, had been out of operation for two



weeks at the time of the *Helderberg* accident. A log book as well as 24-hour tape recordings of all ZUR communications are kept. Two tapes are operated, with the one overlapping the other by half an hour. The specific tape recording relating to the due call of the *Helderberg* had 'gone lost'.

Advocate B.R. Southwood, SC (on behalf of the Board of Inquiry) confronted Du Toit with '... a suggestion that there was a communication between the aircraft *Helderberg* and Springbok Johannesburg — it would have been just before midnight on the 27th/28th November, and that the tape on which that communication was recorded has disappeared.' The ensuing cross examination proceeded:

*Du Toit*: I have no knowledge of that, sir.

*Southwood*: We know that the log contains no reference ... to such a conversation. If somebody had removed the tape with a view to concealing some conversation that had taken place, it would imply that you had also had to re-do this particular log book. You would have to rewrite it to make sure that it had a large number of entries in it, excluding the reference to this conversation.

*Du Toit*: One would have to be an awfully good forger, sir.

In his testimony *Du Toit* stated that he had instructed the next shift coming on duty to expect a call from the *Helderberg* at 18:00 on 27 November. *Gavin Dick*, who took over the shift, testified that sometime after 20:15 he had approached the Duty Officer to inform him that no communication had yet been received from the *Helderberg*.

Advocate *Southwood* pursued his relentless cross-examination:

*Southwood*: Forgive me if I'm wrong. You sitting there with the knowledge that contact should be made at 18:00 and aware of the standing order [of contact to be made every one and a half to two hours], should have had no need whatsoever to discuss it with anybody [Duty Officer]. If the communication didn't occur at 18:00 then your duty was clear; you should have made contact either by manual means or by asking other airlines to use their SELCAL facilities. Is that correct?

*Dick*: Correct.

*Southwood*: That is what you should have done.

*Chairman*: What is your answer?



Dick: Well I did not do that, sir. As I said I approached the Duty Officer.

Southwood: That is what you should have done immediately.

Dick: Yes, but I did not do that.

Southwood: And some one-and-a-half to two hours later we have a repeat of this scenario, that no communication is made . . .

In cross examination Advocate C.E. Puckrin, SC, appearing on behalf of SAA, made a clearer definition of the arguments which Advocate Southwood had been attempting to lead. Puckrin said that Southwood was arguing that the *Helderberg* had in fact called ZUR to enquire as to the nature of the cargo in the hold. ZUR, said Puckrin, did not hold flight cargo lists but radio operator Dick did confirm that the Duty Officer could have had access to those ' . . . a matter of metres. . . ' away.

The same log book of that particular night carried entries with intervals of far more than two hours from other SAA flights. Johannes le Roux, Duty Officer at ZUR who came on duty at 17:00 on 28 November, then testified that he removed both tapes (Number 1, which recorded SA295's departure from Taipei, and Number 2) for safe storage (tapes are kept for 30 days before re-use). These tapes, said Le Roux, were handed over to Connie Booysen, SAA's Assistant Manager: Flight Operations and in charge of Communications on his request. The tapes were eventually impounded by DCA. Two weeks afterwards Booysen told Le Roux that tape Number 2 (on which the communication between the *Helderberg* and ZUR would have been recorded) was the wrong tape and had been placed in the wrong numbered container and was therefore long since used for re-recording. This happened despite a complex information recording card system attached to each tape and container.

The protracted cross examination came to an end when Advocate Southwood urged the Chairman and members of the Board ' . . . that this line of examination come to an end . . . ' and stated that any possible link to the cause of the accident was 'tenuous to say the least . . . '. Justice Cecil Margo gave his prompt permission.



At about 22:23 Captain Uys called Mauritius Air Traffic Control and advised that the position of his aircraft would be  $070^{\circ}$  East and Flight Level 350 within six minutes. He gave a further indication of the flight's progress by informing Air Traffic Control that the *Helderberg* would reach position  $065^{\circ}$  East at 23:12. He confirmed that position progress at 23:13:27, a minute and 27 seconds beyond the estimated time. As it can be accepted that the aircraft was on track, the position given as  $065^{\circ}$  East would have been at latitude  $15^{\circ}40'12''$  South and position  $060^{\circ}$  East at latitude  $18^{\circ}57'54''$  South.



*Flight path of the Helderberg, the route which SAA aircraft fly from Taipei, Republic of China, to Jan Smuts Airport. The Helderberg had completed the largest stretch of the journey when it plunged into the Indian Ocean north-east of Mauritius*

(Adapted from the Citizen)





*The Stena Workhorse, a large motor vessel designed to support offshore oilfield work, was the mothership which supported the ROV operation during the search and recovery phase. Its large open aft workdeck was ideal for the temporary stowage of debris brought to the deck by four cranes  
(DCA)*





*The ROV being deployed from the Stena Workhorse. Deployment was often delayed owing to breakdowns or bad weather. Once operational, the ROV could notch up spectacular stints underwater, such as a record single descent of 51 hours and 40 minutes*

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Routine radio transmissions between the *Helderberg* and Mauritius ended at 23:14. The next radio communication with Plaisance was at 23:48:51 when Captain Uys called Mauritius Air Traffic Control, where air traffic controller Yacoob Khodabacus was on duty. The official transcription of the Plaisance Air Traffic Control tape as presented by the Department of Transport to the Board of Inquiry (with MRU denoting Mauritius and 295 denoting the *Helderberg* cockpit) reads as follows:

TIME	SPEAKER	RECORDED INFORMATION
23:48:51	295	Eh, Mauritius, Springbok Two Nine Five.
23:49:00	MRU	Springbok Two Nine Five, eh, good morning, eh, go ahead.
23:49:07	295	Eh, good morning, we have, eh, a smoke, ehp, eh, problem and we're doing emergency descent to level one five, eh, one four zero.
23:49:18	MRU	Confirm you wish to descend to flight level one four zero.
23:49:00	295	Ya, we have already commenced, eh, due to a smoke problem in the aeroplane.
23:49:25	MRU	Eh, Roger, you are clear to descend immediately to flight level one four zero.
23:49:30	295	Roger, we will appreciate if you can alert, eh, fire, ehp, ehp, eh, eh . . .
23:49:40	MRU	Do you wish to, eh, do you request a full emergency?
23:49:48	295	Okay Joe, kan jy . . . vir ons . . .
23:49:51	MRU	Springbok Two Nine Five, Plaisance.
23:49:54	295	Sorry, go ahead.
23:49:56	MRU	Do you, eh, request a full emergency please a full emergency?
23:50:00	295	Affirmative, that's Charlie Charlie.
23:50:02	MRU	Roger, I declare a full emergency, Roger.
23:50:04	295	Thank you.

23:50:40 MRU  
 23:50:44 295  
 23:50:46 MRU  
  
 23:50:51 295  
 23:50:55 MRU  
  
 23:51:00 295  
 23:51:02 MRU  
 23:51:08 295  
  
 23:51:12 MRU  
  
 23:51:15 295  
 23:51:18 MRU  
 23:52:19 MRU  
  
 23:52:30 MRU  
 23:52:32 295  
 23:52:33 MRU  
  
 23:52:36 295  
 23:52:40 MRU  
 23:52:50 295  
 23:52:52 MRU  
 00:01:34 295  
 00:01:36 295  
 00:01:45 295  
 00:01:57 295  
 00:02:10 295  
 00:02:14 295  
 00:02:25 295  
 00:02:38 295  
  
 00:02:41 MRU  
  
 00:02:43 295  
 00:02:45 MRU

Springbok Two Nine Five, Plaisance.  
 Eh, go ahead.  
 Request your actual position please  
 and your DME distance.  
 Eh, we haven't got the DME yet.  
 Eh, Roger and your actual position  
 please.  
 Eh, say again?  
 Your actual position?  
 Now we've lost a lot of electrics, we  
 haven't got anything on the aircraft  
 now.  
 Eh, Roger, I declare a full emergency  
 immediately.  
 Affirmative.  
 Roger.  
 Eh, Springbok Two Nine Five, do you  
 have an Echo Tango Alfa Plaisance  
 please?  
 Springbok Two Nine Five, Plaisance.  
 Ya, Plaisance.  
 Do you have an Echo Tango Alfa Plaisance  
 please?  
 Ya, eh, zero zero, eh eh eh three zero.  
 Roger, zero zero three zero, thank you.  
 Hey Joe, shut down the oxygen left.  
 Sorry say again please.  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Carrier wave only.)  
 Eh Plaisance, Springbok Two Nine  
 Five, do (did) you copy?  
 Eh negative, Two Nine Five, say  
 again please, say again.  
 We're now sixty five miles.  
 Confirm sixty five miles.



00:02:47	295	Ya, affirmative Charlie Charlie.
00:02:50	MRU	Eh, Roger, Springbok eh Two Nine Five, eh re you're recleared flight level five zero. Recleared flight level five zero.
00:02:58	295	Roger, five zero.
00:03:00	MRU	And, Springbok Two Nine Five copy actual weather Plaisance copy actual weather Plaisance. The wind one one zero degrees zero five knots. The visibility above one zero kilometres. And we have a precipitation in sight to the north. Clouds, five octas one six zero zero, one octa five thousand feet. Temperature is twenty two, two two. And the QNH one zero one eight hectopascals, one zero one eight over.
00:03:28	295	Roger, one zero one eight.
00:03:31	MRU	Affirmative, eh and both runways available if you wish.
00:03:43	MRU	And Two Nine Five, I request pilot's intention.
00:03:46	295	Eh we'd like to track in eh, on eh one three.
00:03:51	MRU	Confirm runway one four.
00:03:54	295	Charlie Charlie.
00:03:56	MRU	Affirmative and you're cleared, eh direct to Foxtrot Foxtrot. You report approaching five zero.
00:04:02	295	Kay.
00:08:00	MRU	Two Nine Five, Plaisance.
00:08:11	MRU	Springbok Two Nine Five, Plaisance.
00:08:35	MRU	Springbok Two Nine Five, Plaisance.

Additional history of the flight was retrieved from the miraculously recovered Cockpit Voice Recorder (CVR). Only the last 1 minute and 14 seconds of the 30 minute recording cycle of the CVR which records cockpit conversation was reasonably clear. Sufficient data was recovered during the analysis of the CVR tape to determine that the



cockpit conversation prior to the sounding of the smoke warning bell had been on general topics only. 'Joe', referred to in the transcription, was the senior flight engineer Guiseppe Michele Bellagarda. The following transcript is once again the official version as presented by DCA to the Board of Inquiry:

TIME IN MINUTES AND SECONDS FROM START OF TAPE	ORIGIN	CONVERSATION/REMARKS
28:31	Fire alarm bell	(Stopped almost immediately.)
28:35	Intercom chime	
28:36	Joe	What's going on now?
28:37	?	Huh?
28:40	Joe	Cargo?
28:42	Joe	It came on afterwards.
28:45		(Strong click sound.)
	?	And where is that?
28:46	?	(Click sound.)
28:48	Joe	Just to the right.
28:49	?	Say again (?).
28:52	Joe	Main deck cargo.
28:57	Joe	Then the other one came on as well. I've got two.
29:01	Joe	Shall I (get/push) the (bottle/button) over there?
29:02	?	Ja.
29:05	Captain	Lees vir ons die checklist daar hoor. (Double click sound.)
29:08	?	Die buik (?) se lig is af (?).
29:09	?	Huh. (Two click sounds.)
29:11	?	Checklist main deck cargo light.
29:12	Captain	Ja. (Sounds of movement can be heard with clicks and clunks.)



29:33	Captain	(CURSE) dis die feit dat altwee aangekom het — dit steur mens.
29:36	Intercom chime	(While captain is speaking.)
29:38	?	Aag shit.
29:40	!!!	(800 Hz Test Tone signal commences.)
29:41	Captain	Wat de donner gaan nou aan? (Said in a surprised tone of voice.)
29:44		(Sudden loud sound.)
29:46		(Large and rapid changes in amplitude of test tone starts.)
29:51		(End of test signal, very irregular near end.)
29:52		(End of recording.)

According to the 30-minute cycle cockpit voice recording which had no time coding, much of the first 28-minute period was unintelligible. Twenty-eight minutes and 30 seconds after commencement of the recording cycle, the smoke warning bell sounded. Somebody, probably the pilot, inquired where it was from and received the reply that it came from the main deck cargo. The pilot then asked for the check list to be read. Some 30 seconds later somebody on the flight deck uttered an oath. This word was followed by the CVR 800 Hz Test Tone and ended in a warble at 29 minutes 52 seconds after commencement of the recording. It is assumed that the recorded cockpit conversation had commenced very shortly after communication with Plaisance at 23:14:00 and ended shortly after the communication with Mauritius Air Traffic Control at 23:48:51.

#### THE 'ALTERNATIVE' TAPE TRANSCRIPTS

As had been the case with other international air disasters, the content and correctness of transcripts of the *Helderberg's* CVR tape as well as the Mauritius Air Traffic Control tape were disputed. Official and non-official versions were debated before the Board of Inquiry. Read together — though perhaps not at all times valid — the transcripts fill in crucial gaps in the history of the disaster flight.



DCA contracted (Brigadier) Dr Leendert Jansen, formerly with the Forensic Science Laboratory and now a private consultant, to transcribe both the CVR and Air Traffic Control tapes. He made use of a self-designed 'machine' (his own modest description!) to transcribe the CVR recording. It uses a computer-type memory to retain the information and is coupled to a tape recorder in such a way that the moment the Stop button is pressed, the machine goes into repeat mode of the past 4 seconds of tape to facilitate transcription.

After extensive computer analysis synthesis methods and computer filtering methods Jansen finally completed the transcript and described the CVR transcription as '... as good as one could possibly get it ...'. Jansen in fact prepared two transcripts of the CVR tape, one in which he indicated both accurate and dubious commentary and a second in which he underlined words and phrases the correctness of which he had no doubts about at all. For the transcript of the Plaisance Air Traffic Control tape he made use of a computer to rebuild human voice into synthetic voice.

Jansen, in cross-examination before the Board of Inquiry, mentioned that he was convinced of detecting at least five different voices apart from that of the captain and the senior flight engineer on the CVR tape. One of these referred to 'Elaine' but the others were not identifiable.

One of Jansen's interesting comments on the ATC tape was that '... there was air flowing in or out of the cockpit with quite a loud noise ... if he [the captain] had an oxygen mask on these noise sounds would not be as loud [on the tape] ...'.

During the public hearing of the Board of Inquiry all of the CVR tape and not only the last 1 minute and 14 seconds were debated. Mr Justice Cecil Margo, in response to a plea by the South African Airways Pilots' Association, ruled that the CVR transcript containing information of a purely personal nature and not relevant to the investigation, could not be made public.

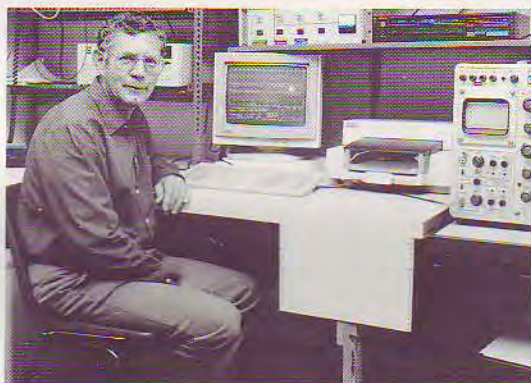
The full recording was therefore only played to the members of the Board and the transcript of the last 1 minute and 14 seconds was read out in public.

What DCA noted as 'unintelligible conversation' in the transcript of the Air Traffic Control tape was amplified upon by Jansen in his evidence before the Board of Inquiry. The recordings on the Air Traffic Control tape from 00:01:34 to 00:02:14 were generally accepted not to have been intended for Mauritius but to be unintentional transmissions on the VHF channel intended for cockpit communication.

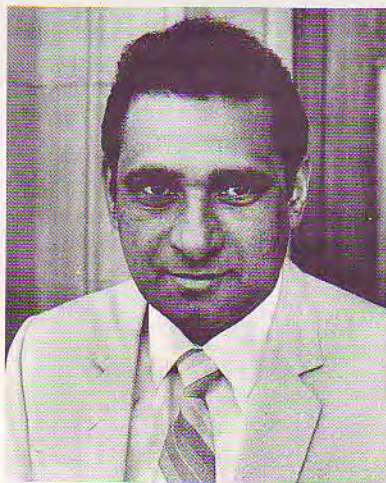


Jansen's interpretation of the 'unintelligible conversation' (which DCA could not concur with) included:

00:01:34	295	Plaisance Springbok Two Nine Five, we've opened the door to see if we can
		...
01:36:00	295	Look there.
00:02:10	295	Pressure twelve thousand.
00:02:14	295	... genoeg is ... anderste kan ons vlug verongeluk. [Translated by Jansen as '... is enough ... otherwise we could have an accident...']



Dr Leendert Jansen, a forensic expert, was contracted to transcribe the recordings of the cockpit voice recorder and conversation between the Helderberg flight crew and Air Traffic Control at Plaisance Airport. At times his interpretation of conversation conflicted with the opinions of other investigators



Yacoob Khodacabus was the air traffic controller on duty at Plaisance Airport when contact was lost with the Helderberg. He was the last person to speak to the crew. He misinterpreted Captain Uys's communication that the Helderberg was 65 miles from its next checkpoint as being 65 miles from Mauritius. The Helderberg was in fact at that stage a full 130 miles from the island

(The Star)



In the statement of Air Traffic Controller Yacoob Khodacabus presented to the Board, additional commentary not noted by Jansen was inserted, such as:

23:52:51	295	I tell you put down the oxygen there.
00:02:21	295	Joe . . . quickly . . . we are . . . ? thousand . . . ongeluk [accident] . . .

As regards the CVR tape, Advocate Southwood submitted Jansen's free translation of the first 28 minutes of the CVR tape to the Board only. Some of that commentary however did come to light in the public cross examination by Advocate Southwood of Jansen and may therefore be published. This included such CVR comments as:

11:22	. . . ons . . . anders . . . [ . . . we . . . otherwise . . . ]
14:02	Who is going to cook?
14:05	They are coming to fetch him at around midnight.
14:14	This is a good thing if you tell him that.

Further input as regards conversation recorded on the Air Traffic Control tape was made during the formal inquest by Roy Downes, DCA's Investigator: Operational:

00:01:34	295	We . . . position . . . We should be okay.
00:01:57	295	Joe, switch up quickly . . .

The *Helderberg* crashed into the Indian Ocean at a position determined to be about 19°10'S and 59°38'E — roughly at a point within a triangle formed by the islands of Mauritius, Rodriques and Cargados/St Brandon — just after midnight, at about 00:07.



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 Ya, eh, zero zero, eh eh eh three zero.  
 Roger, zero zero three zero, thank you.  
 Hey Joe, shut down the oxygen left.  
 Sorry say again please.  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Unintelligible transmission.)  
 (Carrier wave only.)  
 Eh Plaisance, Springbok Two Nine  
 Five, do (did) you copy?  
 Eh negative, Two Nine Five, say  
 again please, say again.  
 We're now sixty five miles.  
 Confirm sixty five miles.



00:02:47	295	Ya, affirmative Charlie Charlie.
00:02:50	MRU	Eh, Roger, Springbok eh Two Nine Five, eh re you're recleared flight level five zero. Recleared flight level five zero.
00:02:58	295	Roger, five zero.
00:03:00	MRU	And, Springbok Two Nine Five copy actual weather Plaisance copy actual weather Plaisance. The wind one one zero degrees zero five knots. The visibility above one zero kilometres. And we have a precipitation in sight to the north. Clouds, five octas one six zero zero, one octa five thousand feet. Temperature is twenty two, two two. And the QNH one zero one eight hectopascals, one zero one eight over.
00:03:28	295	Roger, one zero one eight.
00:03:31	MRU	Affirmative, eh and both runways available if you wish.
00:03:43	MRU	And Two Nine Five, I request pilot's intention.
00:03:46	295	Eh we'd like to track in eh, on eh one three.
00:03:51	MRU	Confirm runway one four.
00:03:54	295	Charlie Charlie.
00:03:56	MRU	Affirmative and you're cleared, eh direct to Foxtrot Foxtrot. You report approaching five zero.
00:04:02	295	Kay.
00:08:00	MRU	Two Nine Five, Plaisance.
00:08:11	MRU	Springbok Two Nine Five, Plaisance.
00:08:35	MRU	Springbok Two Nine Five, Plaisance.

Additional history of the flight was retrieved from the miraculously recovered Cockpit Voice Recorder (CVR). Only the last 1 minute and 14 seconds of the 30 minute recording cycle of the CVR which records cockpit conversation was reasonably clear. Sufficient data was recovered during the analysis of the CVR tape to determine that the



cockpit conversation prior to the sounding of the smoke warning bell had been on general topics only. 'Joe', referred to in the transcription, was the senior flight engineer Guiseppe Michele Bellagarda. The following transcript is once again the official version as presented by DCA to the Board of Inquiry:

TIME IN MINUTES AND SECONDS FROM START OF TAPE	ORIGIN	CONVERSATION/REMARKS
28:31	Fire alarm bell	(Stopped almost immediately.)
28:35	Intercom chime	
28:36	Joe	What's going on now?
28:37	?	Huh?
28:40	Joe	Cargo?
28:42	Joe	It came on afterwards.
28:45		(Strong click sound.)
	?	And where is that?
28:46	?	(Click sound.)
28:48	Joe	Just to the right.
28:49	?	Say again (?).
28:52	Joe	Main deck cargo.
28:57	Joe	Then the other one came on as well. I've got two.
29:01	Joe	Shall I (get/push) the (bottle/button) over there?
29:02	?	Ja.
29:05	Captain	Lees vir ons die checklist daar hoor. (Double click sound.)
29:08	?	Die buik (?) se lig is af (?).
29:09	?	Huh. (Two click sounds.)
29:11	?	Checklist main deck cargo light.
29:12	Captain	Ja. (Sounds of movement can be heard with clicks and clunks.)



29:33	Captain	(CURSE) dis die feit dat altwee aangekom het — dit steur mens.
29:36	Intercom chime	(While captain is speaking.)
29:38	?	Aag shit.
29:40	!!!	(800 Hz Test Tone signal commences.)
29:41	Captain	Wat de donner gaan nou aan? (Said in a surprised tone of voice.)
29:44		(Sudden loud sound.)
29:46		(Large and rapid changes in amplitude of test tone starts.)
29:51		(End of test signal, very irregular near end.)
29:52		(End of recording.)

According to the 30-minute cycle cockpit voice recording which had no time coding, much of the first 28-minute period was unintelligible. Twenty-eight minutes and 30 seconds after commencement of the recording cycle, the smoke warning bell sounded. Somebody, probably the pilot, inquired where it was from and received the reply that it came from the main deck cargo. The pilot then asked for the check list to be read. Some 30 seconds later somebody on the flight deck uttered an oath. This word was followed by the CVR 800 Hz Test Tone and ended in a warble at 29 minutes 52 seconds after commencement of the recording. It is assumed that the recorded cockpit conversation had commenced very shortly after communication with Plaisance at 23:14:00 and ended shortly after the communication with Mauritius Air Traffic Control at 23:48:51.

#### THE 'ALTERNATIVE' TAPE TRANSCRIPTS

As had been the case with other international air disasters, the content and correctness of transcripts of the *Helderberg's* CVR tape as well as the Mauritius Air Traffic Control tape were disputed. Official and non-official versions were debated before the Board of Inquiry. Read together — though perhaps not at all times valid — the transcripts fill in crucial gaps in the history of the disaster flight.



DCA contracted (Brigadier) Dr Leendert Jansen, formerly with the Forensic Science Laboratory and now a private consultant, to transcribe both the CVR and Air Traffic Control tapes. He made use of a self-designed 'machine' (his own modest description!) to transcribe the CVR recording. It uses a computer-type memory to retain the information and is coupled to a tape recorder in such a way that the moment the Stop button is pressed, the machine goes into repeat mode of the past 4 seconds of tape to facilitate transcription.

After extensive computer analysis synthesis methods and computer filtering methods Jansen finally completed the transcript and described the CVR transcription as '... as good as one could possibly get it ...'. Jansen in fact prepared two transcripts of the CVR tape, one in which he indicated both accurate and dubious commentary and a second in which he underlined words and phrases the correctness of which he had no doubts about at all. For the transcript of the Plaisance Air Traffic Control tape he made use of a computer to rebuild human voice into synthetic voice.

Jansen, in cross-examination before the Board of Inquiry, mentioned that he was convinced of detecting at least five different voices apart from that of the captain and the senior flight engineer on the CVR tape. One of these referred to 'Elaine' but the others were not identifiable.

One of Jansen's interesting comments on the ATC tape was that '... there was air flowing in or out of the cockpit with quite a loud noise ... if he [the captain] had an oxygen mask on these noise sounds would not be as loud [on the tape] ...'.

During the public hearing of the Board of Inquiry all of the CVR tape and not only the last 1 minute and 14 seconds were debated. Mr Justice Cecil Margo, in response to a plea by the South African Airways Pilots' Association, ruled that the CVR transcript containing information of a purely personal nature and not relevant to the investigation, could not be made public.

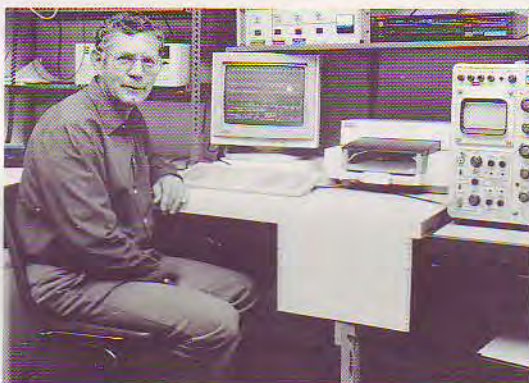
The full recording was therefore only played to the members of the Board and the transcript of the last 1 minute and 14 seconds was read out in public.

What DCA noted as 'unintelligible conversation' in the transcript of the Air Traffic Control tape was amplified upon by Jansen in his evidence before the Board of Inquiry. The recordings on the Air Traffic Control tape from 00:01:34 to 00:02:14 were generally accepted not to have been intended for Mauritius but to be unintentional transmissions on the VHF channel intended for cockpit communication.

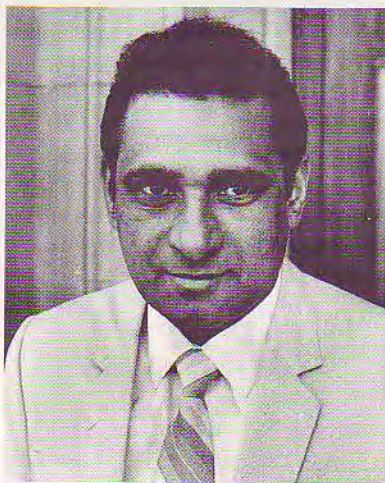


Jansen's interpretation of the 'unintelligible conversation' (which DCA could not concur with) included:

00:01:34	295	Plaisance Springbok Two Nine Five, we've opened the door to see if we can
		...
01:36:00	295	Look there.
00:02:10	295	Pressure twelve thousand.
00:02:14	295	... genoeg is ... anderste kan ons vlug verongeluk. [Translated by Jansen as '... is enough ... otherwise we could have an accident...']



Dr Leendert Jansen, a forensic expert, was contracted to transcribe the recordings of the cockpit voice recorder and conversation between the Helderberg flight crew and Air Traffic Control at Plaisance Airport. At times his interpretation of conversation conflicted with the opinions of other investigators



Yacoob Khodacabus was the air traffic controller on duty at Plaisance Airport when contact was lost with the Helderberg. He was the last person to speak to the crew. He misinterpreted Captain Uys's communication that the Helderberg was 65 miles from its next checkpoint as being 65 miles from Mauritius. The Helderberg was in fact at that stage a full 130 miles from the island

(The Star)



In the statement of Air Traffic Controller Yacoob Khodacabus presented to the Board, additional commentary not noted by Jansen was inserted, such as:

23:52:51	295	I tell you put down the oxygen there.
00:02:21	295	Joe . . . quickly . . . we are . . . ? thousand . . . ongeluk [accident] . . .

As regards the CVR tape, Advocate Southwood submitted Jansen's free translation of the first 28 minutes of the CVR tape to the Board only. Some of that commentary however did come to light in the public cross examination by Advocate Southwood of Jansen and may therefore be published. This included such CVR comments as:

11:22	. . . ons . . . anders . . . [ . . . we . . . otherwise . . . ]
14:02	Who is going to cook?
14:05	They are coming to fetch him at around midnight.
14:14	This is a good thing if you tell him that.

Further input as regards conversation recorded on the Air Traffic Control tape was made during the formal inquest by Roy Downes, DCA's Investigator: Operational:

00:01:34	295	We . . . position . . . We should be okay.
00:01:57	295	Joe, switch up quickly . . .

The *Helderberg* crashed into the Indian Ocean at a position determined to be about 19°10'S and 59°38'E — roughly at a point within a triangle formed by the islands of Mauritius, Rodriques and Cargados/St Brandon — just after midnight, at about 00:07.