



MEMBER OF FLIGHT ENGINEERS INTERNATIONAL ASSOCIATION
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REPORT OF THE SAAFEA HELDERBERG INVESTIGATION COMMITTEE

THIS REPORT IS NOT TO APPORTION BLAME TO ANY PERSON OR PARTY, BUT TO PRESENT TO THE HELDERBERG BOARD OF INQUIRY, THE NORMAL FLIGHT DECK PROCEDURE AND OPERATION FROM THE VIEWPOINT OF PRACTICAL EXPERIENCE OF THE FLIGHT ENGINEER OFFICER (FEO) IN SAA AND ON SAA ROUTES.

THE REPORT IS DIVIDED INTO TWO MAIN PARTS:

1. OUR INTERPRETATION OF THE COCKPIT VOICE RECORDER (CVR) AND THE MAURITIUS TOWER CONTROL TAPES.

2. RECOMMENDATIONS TO THE BOARD OF INQUIRY THAT MAY PREVENT THE POSSIBLE RE-OCCURRENCE OF A SIMILAR TRAGEDY.

AFTER STUDYING THE CVR TRANSCRIPT, INTERPRETATION BY DR L P C JANSEN ON THE 20TH JUNE 1989, AND LISTENING TO THE TAPES, WE ACCEPT THAT DR L C P JANSEN HAD A VERY DIFFICULT TASK AND ONLY DUE TO OUR PRACTICAL EXPERIENCE OF FLIGHT DECK OPERATION AND PERSONAL KNOWLEDGE OF THE CREW INVOLVED, WE OFFER A SLIGHTLY DIFFERENT INTERPRETATION OF SOME WORDS AND EVENTS.

ONE MAIN DIFFERENCE SEEMS TO BE THE TIME OF THE CVR, UTC, PREVIOUSLY GMT. ALL PREVIOUS EVIDENCE SUBMITTED TO THE BOARD SEEMS TO INDICATE THAT THE CVR 29 MINUTES 52 SECONDS, IS BETWEEN THE POSITION REPORT 065 DEGREES EAST AT 23:13:27 AND MAURITIUS APPROACH CONTROL AT TIME 23:48:50, A DIFFERENCE OF APPROXIMATELY 35 MINS 24 SEC.

WE FEEL THAT HAD THE START OF THE TAPE BEEN AT THE END OF THE HF TRANSMISSION, (65 EAST AND RUN FOR THE 28 MIN 31 SEC BEFORE THE FIRST BELL), THE CREW HAD ONLY 6 MIN 53 SEC TO CARRY OUT THE FULL MAIN DECK FIRE/SMOKE DRILL, INCLUDING THE USE OF A CABIN ATTENDANT OUTSIDE THE COCKPIT, PLUS APPROXIMATELY 50% OF THE SMOKE EVACUATION DRILL, BEFORE THE CHECKLIST CALLS FOR AN EMERGENCY DESCENT.

IT IS NOT A PRACTICAL POSSIBILITY TO ACCOMPLISH ALL THESE TASKS WITHIN THE 6 MINUTE 53 SECOND PERIOD.

PREVIOUS EVIDENCE ALSO SUGGESTED THAT IT HAD TO BE THIS PERIOD OF THE FLIGHT BECAUSE THE CREW DID NOT REPORT ANY ABNORMALITY TO ANY STATION ENROUTE BEFORE THE EMERGENCY DESCENT.

FIRSTLY WE HEAR THAT THE CREW DID NOT AT ANY TIME INFORM MAURITIUS THAT THEY HAD A MAIN DECK FIRE - ONLY THAT THE CREW REPORTED A SMOKE PROBLEM IN THE AIRCRAFT WHEN THEY DECLARED A FULL EMERGENCY.

FROM PRACTICAL EXPERIENCE OF ONBOARD FIRES, IT IS KNOWN THAT IF CREWS FEEL THEY HAVE THE SITUATION UNDER CONTROL, THEY DO NOT INFORM ANY ENROUTE STATION. DEPENDING ON THE CREWS' EVALUATION OF THE DEFECT OR IF CONDITIONS WARRANT IT, THE CREW MIGHT INFORM SAA'S MAINTENANCE CONTROL CENTRE (MCC) AT JSA OF THE DEFECT VIA FLIGHT OPERATIONS (ZUR) ON HF COMMUNICATION OR VHF DIRECT TO MCC IF WITHIN COMMUNICATION RANGE.

THE SCENARIO OF ACTUAL CABIN FIRES ON SAA AIRCRAFT, eg. GALLEY LIGHTS, OVENS, TOILETS, BATTERIES AND TRANSFORMER RECTIFIERS (T/R's) THAT WERE BROUGHT UNDER CONTROL, CREWS OPTED TO CONTINUE THE FLIGHT, INFORMING NO ONE, ARE ON RECORD FOR THE BOARDS' APPRAISAL.

A RECENT EXAMPLE ON 17 JANUARY 89, ABEAM WINDHOEK, SMOKE IN THE COCKPIT WAS CAUSED BY A FAULTY T/R. THE DEFECTIVE T/R WAS ISOLATED AND THE SMOKE CLEARED. THE AIRCRAFT PROCEEDED TO LISBON AND ONLY MCC AT JAN SMUTS AIRPORT WAS NOTIFIED.

BASED ON THE ABOVE KNOWLEDGE, WE THEREFORE DISAGREE WITH THE FACT THAT THE CVR HAD TAKEN PLACE BETWEEN 65E AND THE EMERGENCY DESCENT.

SCRUTINISING THE CVR WE NOTE THE FOLLOWING:

- (i) THAT BOTH FEO'S WERE IN THE COCKPIT WITH FEO A DANIELS IN THE FEO SEAT AT THE FLIGHT ENGINEERS STATION:
 1:58 CAPT "ALLAN, Maak dit 'n bietjie warmer hier voor, asseblief."
 2:01 ALLAN "Reg, Kaptein."

SEVEN MINUTES FORTY SIX SECONDS LATER:

9:41 ? "Joe gaan kyk"

(ii) THAT THE FULL PILOT COMPLEMENT WAS IN THE COCKPIT. Dr JANSEN STATES IN HIS EVIDENCE THAT AT LEAST FIVE PEOPLE WERE IN THE COCKPIT DURING PART OF THE 29 MINUTES 52 SECONDS.

(iii) THE GENERAL CONVERSATION REFERS TO A MEAL BEING SERVED (DINNER) TO THE FLIGHT DECK CREW. THE LOCAL TIME OF DEPARTURE OF SA295 ON THE 27th OF NOVEMBER 1987 FROM TAIPEI WAS 23:23 (14:23 UTC). THE CABIN CREW WOULD NORMALLY SERVE DINNER TO THE PASSENGERS APPROXIMATELY 30 MINUTES AFTER TAKE-OFF (MIDNIGHT), TAKING APPROXIMATELY 45 MINUTES. THEREAFTER THEY WOULD SERVE THE FLIGHT DECK CREW WITH A MEAL AND ALSO BECAUSE OF THE HIGH ATC WORK LOAD ON THE FLIGHT DECK PAST HONG KONG. THE CREW WAS SERVED DINNER AT APPROXIMATELY 01:00 LOCAL TIME BECAUSE OF THE LATE DEPARTURE FROM TAIPEI, OTHERWISE DINNER WOULD HAVE PROBABLY BEEN SERVED AT 23:00.

THE FOLLOWING STATEMENTS LEAD US TO BELIEVE THAT DINNER AND NOT BREAKFAST WAS SERVED:

01.04 ? "Nee ek moet liever nie die goed hê nie. Dan sukkel ek weer agterna."

THIS WAS USUALLY CAPT D UYS' REPLY WHEN OFFERED ANY SHELLFISH AS IT AGGRAVATED HIS SKIN ALLERGY WHICH CAUSED SEVERE ITCHING OF THE SKIN.

10.58 FEMALE "Julle moet toesig hou op vanaand se vlug"

11.36 ? " Hierdie ou word nou honger"

? " Ek wens ons kry nou dinner"

(iv) THERE SEEM TO BE SOME DISSENSION BY THE FLIGHT DECK CREW TO A DECISION BY "UYSIE" WITH REGARD TO A STEWARD OR STEWARDS ACTION OR LACK OF ACTION:

9:04 ? "What UYSIE (?) did was blooming terrible."

9:12 ? "Yes, what UYSIE should have done was to allow the stewards to open much earlier."

9:18 ? "I don't know, it gave us little chance....."

JOE IS SENT TO LOOK AT SOMETHING OUTSIDE THE COCKPIT:

9:41 ? " Joe gaan kyk"

THE WORD JIPPO REFERS TO GUISEPPE, AS THIS IS WHAT FIRST OFFICER J BIRCHALL CALLED JOE.

9:48 ? " We're just saying that that guy, Jippo (?) has had plenty of experience"

THE REST OF THE CVR TAPE, UNTIL THE FIRE, SOUNDS LIKE NORMAL COCKPIT CONVERSATION.

THE FIRE BELL.

THE BELL IS SILENCED ALMOST IMMEDIATELY.

28:31 FIRE ALARM BELL (CANCELLED ALMOST IMMEDIATELY)

CREW USUALLY FIRST LOOK TO SEE WHICH LIGHT IS ON (ie ENGINE FIRE, WHEEL WELL, CARGO) BEFORE CANCELLING THE BELL. IT IS NOT NECESSARY TO LOOK BEFORE CANCELLING THE BELL BUT IS NORMALLY THE PROCEDURE.

28.35 INTERCOM CHIME ANSWERED

28.36 JOE "What's going on now?"

JOE ACKNOWLEDGES THAT HE IS LISTENING.

28:37 ? " Huh?"

JOE CONFIRMS WITH THE SPEAKER OVER THE INTERPHONE THAT IT IS SOMETHING TO DO WITH CARGO.

28:40 ? "Cargo?"

JOE INFORMS THE SPEAKER THAT HE NOW HAS AN INDICATION IN THE COCKPIT. IT IS APPARENT THAT THE "SPEAKER" WAS A TECHNICAL PERSON SINCE JOE INFORMED HIM OF THE COCKPIT INDICATION:
 28:42 JOE "It came on now afterwards"

JOE ASKS WHERE THE FIRE IS:
 28:45 JOE "And where is that?"

JOE REPEATS WHAT HE HAS HEARD OVER THE INTERPHONE
 28:48 JOE "Just to the right?"

JOE THEN TELLS THE PERSON OVER THE INTERPHONE THAT BOTH PROTECTION LIGHTS ARE NOW ON:
 28:57 ? "Then the other one came on as well, I've got two"

JOE THEN ASKS IF HE SHOULD GET THE BOTTLE (FIRE OR OXYGEN BOTTLE) TO THE CARGO COMPARTMENT:
 29:01 ? "Shall I (get/push) the (bottle/button) over there"

JOE CONFIRMS THEY WANT THE BOTTLE:
 29:02 ? "Ja"

AT THE SAME TIME SOMEONE ELSE, POSSIBLY THE CAPTAIN, AGREES THAT A BOTTLE MUST GO OVER.
 29:02 ? "Ja"

THE CAPTAIN ONLY THEN CALLS FOR THE CHECKLIST:
 29:05 CAPT "Lees vir ons die checklist daar hoor"

WE "READ INTO" THE ABOVE THAT THEY SEEM TO BE EXPECTING THE FIRE:

1 BELL SILENCING.

2 JOE'S QUESTION ENDING WITH THE WORD "NOW". THE NORMAL WAY TO ANSWER THE INTERPHONE IS:

- (a) "Hello"
- (b) "Cockpit" (Flight deck)
- (c) "Feo"
- (d) "Yes"

3 THE CAPTAIN SEEMS TO BE FOLLOWING THE CONVERSATION WITHOUT ASKING ANY QUESTIONS FOR 34 SEC BEFORE HE CALLS FOR THE CHECKLIST. WE FEEL THAT THE INTERPHONE WAS ANSWERED IMMEDIATELY AS IN NORMAL FLIGHT CONDITIONS. IF THE INTERPHONE IS NOT ANSWERED IN A FEW SECONDS - 5 SEC MAX - THE CABIN CREW RING AGAIN OR COME TO THE COCKPIT.

THE DOUBLE CLICK COULD BE THE FIRE BOTTLE BEING UNCLICKED.
 20:05 (DOUBLE CLICK SOUND)

THE CIRCUIT BREAKER "FELL OUT AS WELL." THIS DOES NOT SOUND LIKE THE FLIGHT ENGINEER AS FLIGHT ENGINEERS SPEAK OF A CIRCUIT BREAKER TRIPPING, POPPING OUT OR COMING OUT BUT NOT " FELL OUT." THIS PERSON ALSO SEEMS TO KNOW WHICH CIRCUIT BREAKER - "THE BREAKER" AND HE EXPECTS THE OTHERS ON THE FLIGHT DECK TO KNOW WHICH CIRCUIT BREAKER HE IS TALKING ABOUT.
29:08 ? "The breaker (?) fell out as well"

29:11 to 29:12 THE DISCUSSION TO CHECK ALL CIRCUIT BREAKERS.

THE CAPTAIN SEEMS MORE WORRIED ABOUT THE TWO LIGHTS AS IF HE EXPECTS ONE BUT NOT TWO.
29:33 CAPT "Fok, dis die feit dat altwee aangekom het - dit steur mens"

29.36 INTERCOM CHIME.
THIS AGAIN COULD BE THE PERSON THAT ANSWERED THE INTERPHONE HEARING SOME UNEXPECTED NEWS.
29:38 ? "Aag shit"

WITH NORMAL COCKPIT HEADSETS ON, OR OVERHEAD SPEAKERS ON, THE 800 HERTZ TEST TONE CANNOT BE HEARD.
THE CAPTAIN NOW WANTS TO KNOW WHAT IS BEING SAID OVER THE INTERPHONE.
29:41 CAPT "Wat die donner gaan nou aan?"

AT THIS POINT NONE OF THE CREW ARE ON OXYGEN MASKS. THE CREW MIGHT NOT HAVE BEEN AWARE THAT THE CVR WAS NOW UNSERVICEABLE. THEY WOULD ONLY HAVE BEEN AWARE IF THEY HAD NOTICED THAT THE CVR CIRCUIT BREAKER (C/B) IN THE COCKPIT HAD TRIPPED, IF IT HAD TRIPPED.

THE CREW COULD HAVE BROUGHT THIS FIRE UNDER CONTROL, BEING A LOW INTENSITY FIRE (ACCORDING TO EVIDENCE AT THE INQUIRY) IN THE LEFT REAR CARGO PALLET, WHICH IS IN THE VICINITY OF THE CVR PANEL.

AT 23:49:07 UTC (SOME 7 HOURS LATER), THE AIRCRAFT IS ALREADY IN AN EMERGENCY DESCENT WITH JOE IN THE FEO SEAT. THE SPEAKER IS THE CAPTAIN WHO IS WEARING HIS OXYGEN MASK.

AT 23:52:50 THE CAPTAIN TELLS JOE TO SHUT DOWN THE OXYGEN REMAINING: " HEY JOE, SHUT DOWN THE OXYGEN LEFT". THIS COULD ONLY BE THE PASSENGER OXYGEN BOTTLE SINCE THE CREW OXYGEN BOTTLE IS NEVER CLOSED UNTIL AFTER LAANDING AND THE ENGINES ARE SHUT DOWN. THE CORRECT TERMINOLOGY WOULD HAVE BEEN TO "RESET THE OXYGEN", BUT THE CAPTAIN WAS NOW SPEAKING ENGLISH UNDER AN EXTREMELY HIGH STRESS AND WORK LOAD SITUATION. THE PASSENGER OXYGEN CAN ONLY BE ELECTRO/MECHANICALLY RESET IF THE CABIN IS BELOW 14 000 FEET CABIN ALTITUDE. (AUTOMATICALLY BAROMETRICALLY ACTIVATED AT 11000 FEET.) IF THE SMOKE WAS SEVERE IN THE COCKPIT OR THE CABIN AND THE CHECKLIST ADHERED TO, THE AIRCRAFT WOULD BE UNPRESSURISED.

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THEREFORE THE AIRCRAFT WAS AT LEAST AT, OR BELOW, 14 000 FEET AT THAT TIME - 23:52:50.

OF THE UNINTELLIGIBLE TRANSMISSION (PAGE 17 OF THE DCA FINAL REPORT REVISION 1), TWO STATEMENTS BLIND TO OXYGEN PRESSURE:

00:02:10 "Pressure 14000" WHICH IS JOE WEARING AN OXYGEN MASK.

00:02:14 "Is dit genoeg ? anders gaan hierdie vlug verongeluk" - CAPT D UYS, ALSO WEARING AN OXYGEN MASK. THIS IS THE FEO (JOE), REPORTING THE OXYGEN PRESS REMAINING AND THE CAPTAIN ASKING IF IT IS ENOUGH TO GET THEM TO LANDING.

00:02:25 CARRIER WAVE. DEFINATELY NOT CARRIER WAVE ONLY. THIS TRANSMISSION IS SOMEONE BREATHING THROUGH AN OXYGEN MASK WHILE HOLDING (KEYING) THE TRANSMIT BUTTON.

RECOMMENDATIONS:

1. THE CVR TAPES BE INCORPORATED WITH A TIME REFERENCE.
2. THE CABIN FIRE EMERGENCY CHECKLIST: LAND AT NEAREST SUITABLE AIRPORT, BE RELOCATED IN THE CHECKLIST BELOW BOX ITEMS. (SEE ATTACHED AMENDED EXAMPLE)
3. FAA/DCA/BOEING/CARRIERS TO REDEFINE NEAREST SUITABLE AIRPORT AND CARRIERS TO SUPPLY A LIST ONBOARD THE AIRCRAFT INDICATING NEAREST SUITABLE AIRPORT OF ALL ROUTES FOR CREW QUICK REFERENCE. (JEPPESEN CHARTS TO INCLUDE THE LET DOWN CHARTS OF THE NEAREST SUITABLE AIRPORTS).
4. INTERPHONE SYSTEM TO BE RECORDED ON CVR. (WIRED INTO CVR).
5. THE EXTRA OBSERVER STATION RADIO TRANSMISSIONS ALSO TO BE WIRED INTO THE CVR.
6. WHERE THE CHECKLIST CALLS FOR COMBINED COCKPIT/CABIN CREW EMERGENCY DRILLS, THIS TRAINING EXERCISE TO BE CONDUCTED AS A COMBINED EXERCISE FOR FLIGHT DECK CREW AND CABIN CREW.
7. THE COMMUNICATION BETWEEN THE COCKPIT AND CABIN CREW MEMBERS DURING SMOKE EVACUATION WITH THE SMOKE MASKS AND OR OXYGEN MASKS ON, WAS NOT POSSIBLE ON THE HELDERBERG AND IS NOT POSSIBLE ON ANY SAA PRESENT AIRCRAFT. WITH THE UTILIZATION OF THE PORTABLE FULL FACE SMOKE MASK, COMMUNICATION IS NOT POSSIBLE.
8. THAT THE FAA RECOMMENDATION OF SMOKE HOODS FOR ALL CREW MEMBERS BE IMPLEMENTED POSTE HASTE.

9. THE USE OF RECIRCULATING FANS ON THE B747 SMOKE EVACUATION CHECKLIST BE REASSESED.
 10. THAT CREWS BE TRAINED, OR AT LEAST BE MADE AWARE OF, THE HIGH G STRESS LOAD THAT CAN BE PLACED ON THE AIRCRAFT IF THERE IS A FAILURE OF THE ARTIFICIAL FEEL SYSTEM (ON PRIMARY CONTROLS), WITH A FULLY POWERED HYDRAULIC FLIGHT CONTROL SYSTEM.
 11. THAT IN ALL SMOKE/FIRE EMERGENCIES, THE WEARING OF OXYGEN MASKS AND GOGGLES ARE MADE MANDATORY - NOT "IF REQUIRED". (BY THE TIME THE CREW FIND THAT IT IS REQUIRED IT MIGHT BE TOO LATE.)
 12. THAT THE DOOR INTO THE CARGO COMPARTMENT FROM THE CABIN OR ELECTRONICS BAY HAVE A "DOOR OPEN" WARNING LIGHT IN THE COCKPIT.
 13. THAT A REMOTE CONTROLLED CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM BE INSTALLED AND POSITIONED IN THE CARGO BAY AREA WITH MOTOR DRIVES FROM THE COCKPIT OR CABIN, SO THAT THE CREW CAN OBSERVE ANY PROBLEMS FROM THE COCKPIT WITHOUT HAVING TO OPEN DOORS, ALLOWING FRESH OXYGEN IN.
 14. THAT DCA TAKE LOCAL CONDITIONS AND ROUTES FLOWN INTO ACCOUNT BEFORE ACCEPTING FAA CERTIFICATION.
 15. THAT THE AIRCRAFT MANUFACTURERS CONSIDER DESIGNING FUTURE AIRCRAFT WITH CARGO/BAGGAGE AREAS OUTSIDE THE PRESSURISED AREA.
- END OF REPORT.