

Docket No. SA-532

Exhibit No. 2-J

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C.

Operations/Human Performance Group Chairmen
Airbus QRH – ENG DUAL FAILURE

(8 Pages)

Attachment 9

to Operations / Human Performance Group Factual Report

DCA09MA026

**AIRBUS QRH
ENG DUAL FAILURE**

ENG DUAL FAILURE – FUEL REMAINING

R *As long as none of the engines recover, the flight crew should apply this paper procedure and then, if time permits, clear ECAM alerts and check the ECAM STATUS page.*

LAND ASAP

- ENG MODE SEL IGN
- THRUST LEVERS IDLE
- OPTIMUM RELIGHT SPD 300 KT

In the case of a speed indication failure (volcanic ash), Pitch attitude for optimum relight speed is :

WEIGHT	Pitch (°)
At or below 50 000 kg/110 000 lb	– 4.5
60 000 kg/132 000 lb	– 3.5
70 000 kg/154 000 lb	– 2.5

At 300 knots, the aircraft can fly up to about 2 NM per 1000 feet (with no wind).

- LANDING STRATEGY DETERMINE
Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.
- EMER ELEC PWR MAN ON
- VHF1/HF1 (◀)/ATC1 USE
- ATC NOTIFY
- FAC 1 OFF THEN ON
Resetting FAC 1 also enables rudder trim recovery, even if no indication is available.

● **IF NO RELIGHT AFTER 30 SEC :**

- ENG MASTERS OFF 30 S/ON
Unassisted start attempts can be repeated until successful, or until APU bleed is available.
- CREW OXY MASKS (Above FL 100) ON

● **WHEN APU AVAIL FL < 200 :**

- WING ANTI ICE OFF
- APU BLEED ON
- ENG MASTERS (one at a time) OFF 30 S/ON



Code : 0218 = Mod : 56-5-B4 = (56-5-B6 + 36311) =
 (56-5-B4 + 28917) = (56-5-B6 + 28160 + 28917 + 36311)
 A320-214/-215/-216 w/o new RAT : optimum relight speed 300 KT

ENG DUAL FAILURE – FUEL REMAINING (CONT'D)

- When APU bleed is available or if engine restart is definitively considered impossible :

– OPTIMUM SPEED REFER TO TABLE BELOW

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)			
Weight (1000 lb)	At or below FL 200	FL 300	FL 400
170	239	249	259
160	230	240	250
150	221	231	241
140	212	222	232
130	203	213	223
120	194	204	214
110	185	195	205
100	176	186	196
90	167	177	187

At green dot speed, the aircraft can fly up to approximately 2.5 NM per 1000 feet (with no wind).

Average rate of descent is approximately 1600 feet/min.

- CABIN AND COCKPIT PREPARE
 - CABIN SIGNS ON
 - GALY & CAB OFF
 - USE RUDDER WITH CARE
- **WHEN BELOW FL 150**
 - RAM AIR ON

APPROACH PREPARATION

NOTE : Final descent slope, when configured (CONF 3 and L/G DOWN) will be approximately 800 feet/NM (with no wind).

- BARO SET
- CREW MASKS/OXY SUPPLY (below FL 100) OFF



IAE Eng. : V2522/V2524/V2527M – CFM Eng. : 56-5-A1/A3/A4/A5/B4/B5/B6/B7 L

Code : 0275

Galy & Cab p0

ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

■ **IF FORCED LANDING ANTICIPATED**

APPROACH

- FOR LDG USE FLAP 3
Only slats extend, and slowly.
- MIN APPR SPEED 150 KT
- VAPP DETERMINE
Vapp is the maximum between Vref + 25 knots / 150 knots :

Weight (1000 lb)	96	104	112	120	128	136	144	152	160	168	172
Vapp	150	150	150	150	152	156	160	164	168	171	173

● **At a suitable altitude (not below 3000 feet AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN) :**

- **When in CONF 3 and VAPP :**
 - GRAVITY GEAR EXTN handcrank PULL AND TURN
Disregard "USE MAN PITCH TRIM" on the PFD : The stabilizer is frozen due to insufficient hydraulic power.
- **When L/G downlocked**
 - L/G lever DOWN
 - APPROACH SPEED ADJUST
Adjust the speed to the determined Vapp. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 knots (max speed with slats extended).
 - GND SPLR ARM
 - MAX BRK PR 1000 PSI

AT 2000 FEET AGL

- CABIN NOTIFY FOR LANDING

AT 500 FEET AGL

- BRACE FOR IMPACT ORDER

AT TOUCHDOWN

- ENG MASTERS OFF
- APU MASTER SW OFF
- BRAKES ON ACCU ONLY

R



Code : 0046
A320-211/-212/-214/-215/-216

ENG DUAL FAILURE – FUEL REMAINING (Cont'd)

AFTER LANDING

● **When the aircraft has stopped :**

- PARKING BRK ON
 - ATC NOTIFY
 - FIRE pushbutton (ENG and APU) PUSH
 - AGENTS (ENG and APU) DISCH
- Engine Agent 2 is not available.*

■ **If Evacuation required :**

- EVACUATION INITIATE
 - ELT ◀ CHECK EMITTING
- If not, switch on the transmitter.*

■ **If Evacuation not required :**

- CABIN CREW and PASSENGERS (PA) NOTIFY



ENG DUAL FAILURE - FUEL REMAINING (Cont'd)

■ **IF DITCHING ANTICIPATED**

APPROACH

- FOR LDG USE FLAP 3
Only slats extend, and slowly.
- MIN APPR SPEED 150 KT
- VAPP DETERMINE
VAPP is the maximum between Vref + 25 knots / 150 knots :

Weight (1000 lb)	96	104	112	120	128	136	144	152	160	168	172
Vapp	150	150	150	150	152	156	160	164	168	171	173

● **At a suitable altitude (not below 3000 feet AGL), configure the aircraft for ditching (CONF 3 ; L/G UP)**

- L/G lever CHECK UP

AT 2000 FEET AGL

- CABIN NOTIFY FOR DITCHING
- DITCHING pushbutton ON
*In case of strong crosswind, ditch face to the wind.
In the absence of strong crosswind, prefer ditching parallel to the swell. Touchdown with approximately 11 degrees of pitch and minimum aircraft vertical speed.*

AT 500 FEET AGL

- BRACE FOR IMPACT ORDER

AT TOUCHDOWN

- ENG MASTERS OFF
- APU MASTER SW OFF

AFTER DITCHING

- ATC (VHF 1) NOTIFY
- FIRE pushbutton (ENG and APU) PUSH
- AGENT (ENG and APU) DISCH
Engine Agent 2 is not available.
- EVACUATION INITIATE
- ELT ◀ CHECK EMITTING
If not, switch on the transmitter

CFM Eng : 56-5-A1/A3/B4

Code : 0223
A320-211/-212/-214/-215/-216

ENG DUAL FAILURE – NO FUEL REMAINING

The flight crew should apply this paper procedure and then, if time permits, clear ECAM warnings and check the ECAM STATUS page.

- THRUST LEVERS IDLE
- FAC 1 OFF THEN ON
Resetting FAC 1 also enables rudder trim recovery, even if no indication is available.
- OPTIMUM SPEED 220 KT/GREEN DOT
Initially, fly 220 knots, because the PFD may not display the correct green dot speed. Then fly the green dot speed according to the following table :

GREEN DOT SPEED WITH ALL ENGINES INOPERATIVE (KNOTS)			
Weight (1000 lb)	At or below FL 200	FL 300	FL 400
150	221	231	241
140	212	222	232
130	203	213	223
120	194	204	214
110	185	195	205
100	176	186	196
90	167	177	187

At green dot speed, the aircraft can fly up to approximately 2.5 NM per 1000 feet (with no wind). Average rate of descent is approximately 1600 feet/min.

- LANDING STRATEGY DETERMINE
Determine whether a runway can be reached or the most appropriate place for a forced landing/ditching.
- EMER ELEC POWER (if EMER GEN not in line) MAN ON
- VHF1/HF1 (if installed)/ATC1 USE
- ATC NOTIFY
- CREW OXY MASKS (Above FL 100) ON
- CABIN AND COCKPIT PREPARE
- SIGNS ON
- GALY & CAB OFF
- USE RUDDER WITH CARE

● **WHEN BELOW FL 150**

- RAM AIR ON

APPROACH PREPARATION

NOTE : Final descent slope, when configured (CONF 3/L/G DOWN), will be approximately 800 feet/NM (with no wind).

- BARO SET
- CREW MASKS/OXY SUPPLY (below FL 100) OFF



ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

■ **IF FORCED LANDING ANTICIPATED**

APPROACH

- FOR LDG USE FLAP 3
Only slats extend, and slowly.
- MIN APPR SPEED 150 KT
- VAPP DETERMINE
Vapp is the maximum between Vref+25 knots / 150 knots.

Weight (1000 lb)	96	104	112	120	128	136	144	152	160	168	172
Vapp	150	150	150	150	152	156	160	164	168	171	173

● **At a suitable altitude (not below 3000 feet AGL), configure the aircraft for landing (CONF 3 ; L/G DOWN)**

● **When in CONF 3 and VAPP**

- GRAVITY GEAR EXTN handcrank PULL AND TURN
Flight controls revert to direct law at landing gear extension. Wait for CONF 3 and VAPP before extending the landing gear to enable the aircraft to be trimmed for approach. Disregard "USE MAN PITCH TRIM" on the PFD, because the stabilizer is frozen in the position where it was at, when the windmilling was insufficient to provide hydraulic power.

● **When L/G downlocked**

- L/G lever DOWN
- APPROACH SPEED ADJUST
Adjust the speed to the determined Vapp. Nevertheless, to reach the landing field/runway, the approach speed may be adjusted up to 200 knots (max speed with slats extended).
- GND SPLR ARM
- MAX BRK PR 1000 PSI

AT 2000 FEET AGL

- CABIN NOTIFY FOR LANDING

AT 500 FEET AGL

- BRACE FOR IMPACT ORDER

AT TOUCHDOWN

- ENG MASTERS OFF
- BRAKES ON ACCU ONLY

R



Code - 0046
A320-211/-212/-214/-215/-216

ENG DUAL FAILURE - NO FUEL REMAINING (Cont'd)

AFTER LANDING

- **When the aircraft has stopped :**
 - PARKING BRK ON
 - ATC NOTIFY
- **If Evacuation required :**
 - EVACUATION INITIATE
 - ELT ◀ CHECK EMITTING
If not, switch on the transmitter
- **If Evacuation not required :**
 - CABIN CREW and PASSENGERS (PA) NOTIFY

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■ **IF DITCHING ANTICIPATED**

APPROACH

- FOR LDG USE FLAP 3
Only slats extend, and slowly.
- MIN APPR SPEED 150 KT
- VAPP DETERMINE
Vapp is the maximum between Vref+25 knots / 150 knots :

Weight (1000 lb)	96	104	112	120	128	136	144	152	160	168	172
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- **At a suitable altitude (not below 3000 feet AGL), configure the aircraft for ditching (CONF 3 ; L/G UP)**
 - L/G lever CHECK UP

AT 2000 FEET AGL

- CABIN NOTIFY FOR DITCHING
- DITCHING pushbutton ON
*In case of strong crosswind, ditch face to the wind.
In the absence of strong crosswind, prefer ditching parallel to the swell. Touchdown with approximately 11 degrees of pitch and minimum aircraft vertical speed.*

AT 500 FEET AGL

- BRACE FOR IMPACT ORDER

AT TOUCHDOWN

- ENG MASTERS OFF

AFTER DITCHING

- ATC (VHF 1) NOTIFY
- EVACUATION INITIATE
- ELT ◀ CHECK EMITTING
If not, switch on the transmitter

Code : 0046
A320-211/-212/-214/-215/-216