Addendum 1

To Operations/Human Performance Group Factual Report

Attachment 4

DCA11IA040

Airbus Smoke/Fumes/Avionics Smoke Expanded Procedure

SMOKE/FUMES/AVNCS SMOKE

This paper procedure includes all the steps of the AVIONICS SMOKE ECAM procedure.

Apply this paper procedure when :

- *The flight (cabin) crew suspect that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment.*
- *The AVIONICS SMOKE ECAM caution is triggered, or, at the latest, after completing the immediate actions of the AVIONICS SMOKE ECAM procedure (before reaching the 5–minutes countdown procedure line)*
- *There is a smell of smoke/fumes in the cockpit :*
  - *If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid.*
  - *If the smell is similar to that of pine needles, suspect a non-toxic leak.*

If any other ECAM SMOKE alert triggers (CARGO, ...), the crew must first apply the ECAM procedure, then consider applying this paper procedure.

Note that these ECAM alerts may be caused by another source, that should usually first be detected by the flight crew/cabin crew/avionics smoke detectors.

The following explains the layout of this paper procedure :

- *The procedure lines above the text boxes indicate the actions that the flight crew must immediately perform, if smoke is detected (with or without ECAM activation and regardless of the smoke source). These immediate actions correspond to the most common steps to be taken in smoke cases. In all cases, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).*
- *The text boxes indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps :*
  - *Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or*
  - *The situation becomes critical and can no longer be controlled.*
- *The procedure lines below the text boxes indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke. The actions will depend on whether the smoke is coming from the avionics, and/or air conditioning, and/or cabin equipment.*

LAND ASAP

● IF PERCEPTIBLE SMOKE APPLY IMMEDIATELY :

If smoke is confirmed, the following procedure must be applied.

– BLOWER ..... OVRD

– EXTRACT ..... OVRD

Avionics ventilation air is extracted overboard.

– CAB FANS ..... OFF

To prevent smoke from entering the cockpit and cabin.

– GALLEY ..... OFF

– SIGNS ..... ON

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

– CKPT/CABIN COM . . . . . ESTABLISH

Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.

- **If required**
  – OXY MASK/GOGGLE ON/100%/EMERG

  Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise.
  Turn the emergency knob to remove condensation or smoke from the mask.
- **If smoke source immediately obvious, accessible, and extinguishable :**
  – FAULTY EQPT . . . . . ISOLATE
- **If smoke source not immediately isolated :**
  – DIVERSION . . . . . INITIATE
  – DESCENT (FL 100, or MEA, or minimum obstacle clearance altitude) . . . . . INITIATE

R

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- At ANY TIME of the remainder of the procedure, if smoke/fumes becomes the GREATEST THREAT:
  - SMOKE FUMES REMOVAL.....CONSIDER
  - ELEC EMER CONFIG..... CONSIDER
    Refer to the end of the procedure to set ELEC EMER CONFIG

- At ANY TIME of the procedure, if situation becomes critical and can no longer be controlled :
  - IMMEDIATE LANDING.....CONSIDER

Guidelines to determine smoke source :

– *If smoke initially comes out of the ventilation outlets, the crew may suspect AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must be applied.*
– *After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceived in the cockpit and/or cabin. In such a case, it will be recirculated throughout the aircraft, until it completely disappears from the air conditioning system.*
– *If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke.*
– *If the smoke is detected while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment.*
– *Avionics or forward galley smoke may be smelt, or may enter in the cockpit before ECAM warning activation.*

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

- **IF AIR COND SMOKE SUSPECTED :**
  - APU BLEED ..... OFF
  - BLOWER and EXTRACT ..... AUTO

    Note : *When both BLOWER and EXTRACT are in the OVRD position, a single pack may not be able to maintain the cabin pressure.*
  - CARGO AFT ISOL VALVE ..... OFF

    To prevent a cargo smoke warning from being triggered due to cabin smoke.
  - PACK 1 ..... OFF
  - **If smoke continues :**
    - PACK 1 ..... ON
    - PACK 2 ..... OFF
    - **If smoke still continues:**
      - PACK 2 ..... ON

        Restore normal configuration if PACK 2 is not suspected to cause smoke.
      - BLOWER and EXTRACT ..... OVRD
  - SMOKE/FUMES REMOVAL ..... CONSIDER
- **IF CAB EQUIPMENT SMOKE SUSPECTED :**
  - **If smoke continues :**
    - EMER EXIT LIGHT ..... ON
    - BUS TIE ..... OFF
    - GEN 2 ..... OFF

      AC BUS 2 shedding can be considered in order to isolate most of the cabin equipments. The ECAM lower display, and the F/O's PFD and ND will be lost.
    - SMOKE DISSIPATION ..... CHECK
    - FAULTY EQPT ..... SEARCH/ISOLATE

      Once the cabin has been secured, try to find the smoke source and isolate it. Cabin lights, reading lights, passenger systems, galleys have dedicated control C/B in the cabin or cockpit.
    - **If smoke still continues or if faulty equipment confirmed isolated :**
      - GEN 2 ..... ON

        All busbars recovered when GEN 2 restored. But, TR 2 remains inop.
      - BUS TIE ..... AUTO
    - **If faulty equipment not confirmed isolated, before L/G extension :**
      - GEN 2 ..... ON
      - BUS TIE ..... AUTO
    - SMOKE/FUMES REMOVAL ..... CONSIDER

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

● **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED :**

– ELEC EMER CONFIG . . . . . CONSIDER

As a last attempt, the flight crew can set the electrical emergency configuration to possibly isolate or minimize the smoke source.

● **IF SMOKE disappears within 5 minutes :**

– NORMAL VENTILATION . . . . . RESTORE

To set EMER ELEC CONFIG :

– EMER ELEC GEN 1 LIN . . . . . OFF

GEN 1 LINE contactor opens. GEN 1 remains running and supplies one fuel pump in each wing tank. AC BUS 1 is supplied by GEN 2 through the bus tie contactor.

– EMER ELEC PWR . . . . . MAN ON

RAT is extended and the emer gen is connected to the aircraft network. Check emergency generator parameters on the ECAM ELEC page (displayed automatically).

● **WHEN EMER GEN AVAIL :**

– APU GEN . . . . . OFF

– GEN 2 . . . . . OFF

ELEC **EMER CONFIG**

Two different procedures can be displayed on the ECAM, depending on whether the AVIONICS SMOKE ECAM caution is triggered or not before the flight crew sets the electrical emergency configuration.

● **If AVIONICS SMOKE is not triggered**

The ECAM displays the ELEC EMER CONFIG procedure described in FCOM 3.02.24. The flight crew must apply the ECAM without performing the GEN 1+2 reset.

● **BEFORE L/G EXTENSION :**

Restore all generators only few minutes before landing to minimize the possible reactivation of a smoke source.

– GEN 2 . . . . . ON

R – EMER ELEC GEN 1 LINE . . . . . ON

● **If AVIONICS SMOKE is triggered**

The ECAM displays a specific ELEC EMER CONFIG procedure. The flight crew must apply the following ECAM procedure.

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

MIN RAT SPEED . . . . . 140 KT

Note : The electrical configuration is the same as for loss of both generators (except that one fuel pump in each wing tank remains supplied).

– VHF 1/HF 1/ATC 1 . . . . . USE

Only VHF 1, HF 1 and ATC 1 are supplied in this configuration. Notify the ATC of the nature of the emergency, and state intentions. If there is no contact with the ATC, switch to code A7700, or transmit a distress message on one of the following frequencies : VHF 121.5 MHz, HF 2182 kHz, or 8364 kHz.

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

– APU MASTER switch (if APU not running) . . . . . OFF
With the APU master switch ON, the DC BAT BUS is supplied by the batteries.
– FAC 1 . . . . . OFF THEN ON
Rudder trim is recovered, despite the fact that no indication is available.
– LDG ELEV . . . . . MAN ADJUST
The LDG ELEV may be manually adjusted since, if the normal electrical supply is not restored before landing gear extension, the FMGC is no longer supplied.

● **BEFORE L/G EXTENSION**

R *Restore all generators only a few minutes before landing, to minimize possible*
R *smoke source reactivation.*
– GEN 2 . . . . . ON
– EMER ELEC GEN 1 LIN . . . . . ON

F/CTL ALTN LAW

(PROT LOST)
Flight control normal laws and associated protections are lost. Only the load factor limitation, and the high and low speed stability remain (ALTN law with reduced protection).
MAX SPEED . . . . . 320 KT
Note : The "EPR MODE FAULT N1 DEGRADED MODE" warning is triggered.

STATUS

ECAM lower display is not available. STATUS page is displayed on the upper ECAM display, as long as STATUS pushbutton is pressed.
MIN RAT SPEED . . . . . 140 KT
MAX SPEED . . . . . 320 KT
MAX BRK PR . . . . . 1000 PSI

SMOKE/FUMES/AVNCS SMOKE (CONT'D)

STATUS

– FOR LDG . . . . . USE FLAPS 3
– GPWS LDG FLAP 3 . . . . . ON
APPR SPD . . . . . VREF + 10 KT
LDG DIST PROC . . . . . APPLY
Refer to the QRH Part 2, or to the FCOM 3.02.80
ENG 1 + 2 APPR IDLE ONLY
ENG 1 + 2 N1 DEGRADED MODE
(IAE–powered aircraft ◁)
ALTN LAW : PROT LOST
WHEN L/G DN : DIRECT LAW
CTR TK (◁) FUEL UNUSABLE
INCREASED FUEL CONSUMP
SLATS/FLAPS SLOW
CAT 1 ONLY
APPR PROC

- **BEFORE L/G EXTENSION**
  – GEN 2 . . . . . ON
  – EMER ELEC GEN 1 LINE . . . . . ON
- **After recovery of normal electrical supply, the following STATUS will be displayed :**

  MIN RAT SPEED . . . . . 140 KT
  Will disappear at landing gear extension.
  MAX SPEED . . . . . 320 KT
  – FOR LDG . . . . . USE FLAPS 3
  – GPWS LDG FLAP 3 . . . . . ON
  Will be displayed when flaps in CONF3.
  APPR SPD . . . . . VREF + 10 KT
  LDG DIST PROC . . . . . APPLY
  Refer to the QRH Part 2, or to the FCOM 3.02.80
  ALTN LAW : PROT LOST
  Flight controls remain in alternate law, due to the loss of IR 2 and 3.
  WHEN L/G DN : DIRECT LAW
  At landing gear extension, control reverts to direct law in pitch, as well as in roll (refer to the DIRECT LAW procedure 3.02.27).

INOP SYS

See ELEC EMER CONFIG SYS REMAINING, 3.02.24 (except for fuel pumps)