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Transient Loss of Communication due to Jammed Push-To-Talk

A320 and A330/A340 Families

1. Introduction

At the end of 2011, the crew of a cruising A320 was unable to transmit on any radio, but reported that it was still possible to receive ATC communications. A few months before, on another A320, the crew reported after landing that it was not possible to contact the tower via either VHF system. Investigations attributed both events to Push-To-Talk (PTT) selectors jammed in the transmit position.

As illustrated by these examples, jammed PTT selectors generate events of transient loss of communication with ATC every year.

This kind of failure might be difficult to identify for the crew, and might lead to the feeling that all communications have been lost with ATC. In reality, a correct identification of the situation and the implementation of a few simple steps will, in most cases, allow the crew to recover full communications.

This article will outline the effects of a jammed PTT and will explain how to restore communications. It will also describe a new ECAM caution and procedure that will be introduced in the next Flight Warning Computer (FWC) standards.

2. Transmitting with VHF or HF

In order to transmit on VHF or HF radio, the flight crew uses one of the Audio Control Panels (ACP) (fig.1).

devices: side stick radio selector, hand mike PTT, or INT/RAD switch on the ACP (fig.2).



In the normal configuration, three ACP are available. They are located on the Captain side (ACP1), on the F/O side (ACP2), and on the overhead panel (ACP3). The ACP3 allows reconfiguration in case of failure of ACP1 or ACP2.

Initially, the pilot has to press one of the ACP transmission keys in order to select a VHF or HF transceiver. Then, in order to actually transmit on the selected radio, he uses one of the Push-To-Talk

3. Impacts of a Jammed Push-To-Talk

3.1 VHF

When a Push-To-Talk device is jammed in the transmit position, the VHF transceiver transmits continuously as soon as it is selected, and no reception is possible on the tuned frequency.

In order to limit such a continuous and unintentional transmission

that could disturb the ATC frequency, an internal protection is implemented inside each VHF, limiting the transmission time to 35s. After 30s of transmission, the crew is warned of this imminent automatic transmission cut-off through an interrupted tone that sounds for 5 seconds (5 audio “beeps”, one per second).

In normal operation, on hearing the 5 audio “beeps” the crew has to release and press again the PTT selector/button to continue the transmission. But if the Push-To-Talk device is jammed the transmission may not be resumed on the selected radio, which will be limited to reception only. In this case, an ECAM COM VHF (1 or 2 or 3) EMITTING caution is also triggered after 60s.

3.2 HF

There is no automatic transmission cut-off after 35s on the HF transceivers, but an ECAM COM HF (1 or 2) EMITTING caution is triggered as well if the HF transmission duration exceeds 60s.

4. VHF/HF Communication Recovery In Case of a Jammed Push-To-Talk

4.1 Typical scenario

Consider, for example, an attempt of VHF1 communication with a side-stick PTT jammed on the Capt side. As soon as the VHF1 transmission key is selected on the Audio Control Panel located on the Capt side (ACP1), a continuous VHF1 transmission is initiated.

The VHF1 transmission will be automatically interrupted after 35s (VHF internal protection). 25s later, the Flight Warning System (FWS) will trigger the ECAM COM VHF1 EMITTING caution.

Figure 2
Push-To-Talk devices

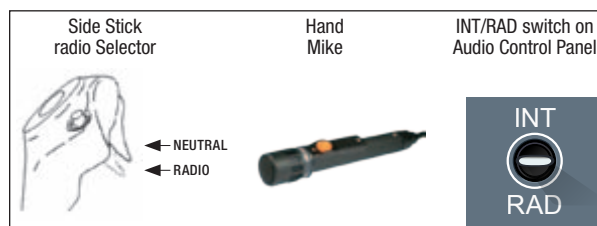


Figure 3
Audio Switching rotary switch



COM VHF 1(2)(3)/HF 1(2) EMITTING

1. If any Push To Talk (PTT) transmission selector (sidestick radio selector, hand mike selector, or PTT switch) is jammed in the transmit position, try to release it in order to remove the caution.
2. If unsuccessful, deselect the identified failed VHF/HF transmission keys on the associated Audio Control Panel (ACP) to remove the caution. This ACP should only be used in reception mode. The associated PTT transmission selectors must not be used.

Note : In this case, the ACP of the unaffected side may be used to recover the deselected VHF/HF channel.

3. If no transmission key on the ACP is found in the “transmit” position, pull the affected VHF/HF C/B associated to the ECAM message : COM\HF1 C/B HA 14 on 49 VU, COM NAV\VHF2 C/B L13 on 121 VU, COM\VHF1 C/B G09 on 49 VU, COM NAV\VHF2 C/B L04 on 121 VU, COM\VHF3 C/B L05 on 121 VU.

Figure 4
A320 Family FCOM information associated to the
COM VHF/HF EMITTING caution

COM VHF 1(2)(3)/HF 1(2) EMITTING

1. If any Push to Talk (PTT) transmission selector (sidestick radio selector, hand mike selector, or PTT switch) is jammed in the transmit position, try to release it in order to remove the caution.
2. If unsuccessful, deselect the identified failed VHF/HF transmission keys on the associated Audio Control Panel (ACP) to remove the caution. This ACP should only be used in reception mode. The associated PTT transmission selectors must not be used.

Note : In this case, the ACP of the unaffected side may be used to recover the deselected VHF/HF channel.

Figure 5
A330/A340 FCOM information associated to the
COM VHF/HF EMITTING caution

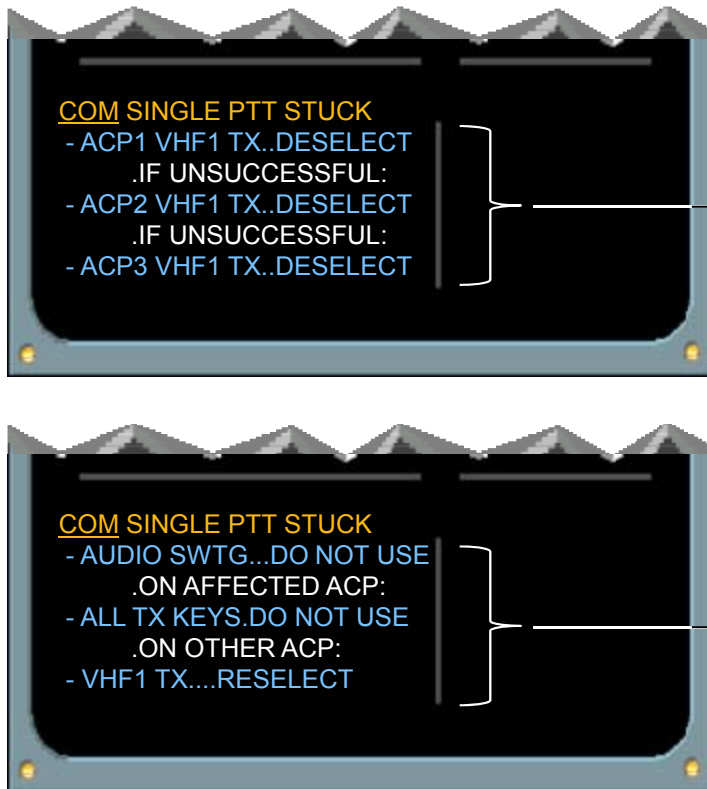
If the crew tries to select another VHF on the same ACP, for example VHF2, the same scenario will occur as the side-stick PTT is still jammed: the VHF2 will be automatically interrupted after 35s and the COM VHF2 EMITTING alert will trigger 25s later.

Selection of “CAPT ON 3” by means of the Audio Switching rotary switch (fig. 3), to use the ACP3 (overhead panel) on the Captain side, will not solve the problem as the jammed PTT will request a permanent transmission through the ACP3.

4.2 Recovery

The way to handle the situation in this case, is to first check the PTT transmission selector and try to release it. Then, if this does not work, isolate the jammed PTT and the associated Audio Control Panel by deselecting all the VHF transmission keys on the ACP1. It is then possible to use the ACP2 and the associated PTT devices, on the F/O side, to establish a new VHF transmission.

Such a procedure is available today in the FCOM, as expanded information associated to the COM VHF/HF EMITTING caution (fig.4 & 5).



Configuration: one PTT jammed, VHF1 transmission, and Audio Switching rotary switch on NORMAL position.

1st part of the procedure: identification of the affected side
These 5 procedure lines disappear as soon as the VHF1 transmission key has been deselected on the affected side (the side where the PTT is jammed).

For example, if the F/O side stick PTT is jammed, these lines will disappear as soon as the VHF1 transmission key has been deselected on the ACP2.

2nd part of the procedure: reconfiguration on the other side

Once the VHF1 has been deselected on all ACPs, the procedure requests the crew to not use the audio switching, nor any transmission keys on the affected ACP. Then, the procedure requests to reselect the VHF1 transmission key on the other ACP.

Figure 6
New ECAM COM SINGLE PTT STUCK caution with associated procedure

5. New ECAM Caution and Procedure in Case of a Jammed Push-To-Talk

5.1 VHF

To assist the crew to recover correct communication in case of a jammed PTT, a new amber COM SINGLE PTT STUCK caution has been developed. This alert will trigger when a PTT is detected continuously activated during 40s and will provide a new procedure to guide the crew through the two following steps :

- Identification of the side affected by the jammed Push-To-Talk.
- Reconfiguration on the non affected side.

An illustration of this procedure for a jammed PTT using a VHF1 radio is given in [fig. 6](#).

In association with the introduction of this new alert, the COM VHF 1 (2) (3) EMITTING alert will be

triggered simultaneously with the audio “beeps”, i.e. 30s after the start of the transmission, to reinforce the awareness that the transmission will be cut-off.

note

The introduction of the COM SINGLE PTT STUCK caution will lead to the downgrading of the COM VHF 1 (2) (3) EMITTING alert from a level 2 to a level 1 caution, which implies that there will be no associated Single Chime nor Master Caution light.

The differences between the present and future ECAM definitions for the VHF radios are summarized in [fig. 7](#).

5.2 HF

The COM SINGLE PTT STUCK caution described above will trigger as well for HF communication. The only difference will lie in the delay of activation: to take into account the longer average length of messages of HF transmissions, the caution will trigger only when a

PTT is detected continuously activated during 180s.

note

As for the VHF associated alert, the COM HF (1 or 2) EMITTING caution (level 2) will likewise be downgraded to a level 1 caution.

The differences between the present and future ECAM definitions for the HF transceivers are summarized in [fig. 8](#).

5.3 Calender

On the A320 Family, these improvements will be implemented on the Flight Warning Computer (FWC) H2-F7 standard (availability planned in December 2012).

On the A330/A340, these improvements will be implemented on the FWC T5 standard (planned in January 2013) for the A330 and A340-500/600, and from the L13 standard (planned in August 2013) for the A340-200/300.

Figure 7
Current and future
ECAM definition in
case of PTT stuck
(example for VHF1)

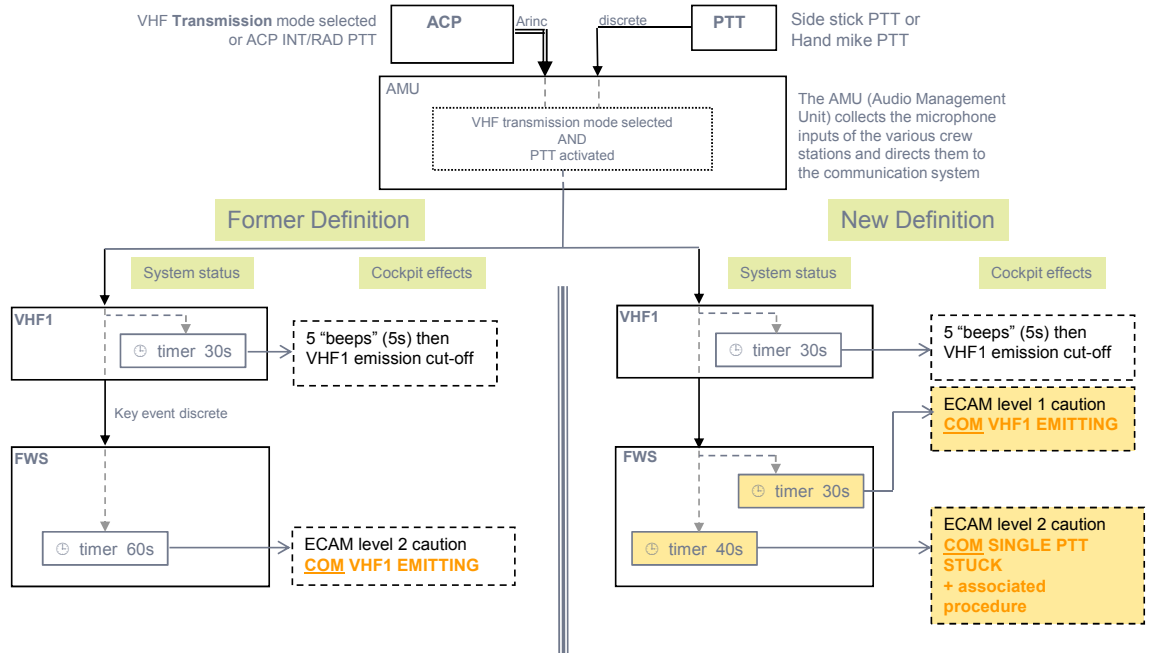
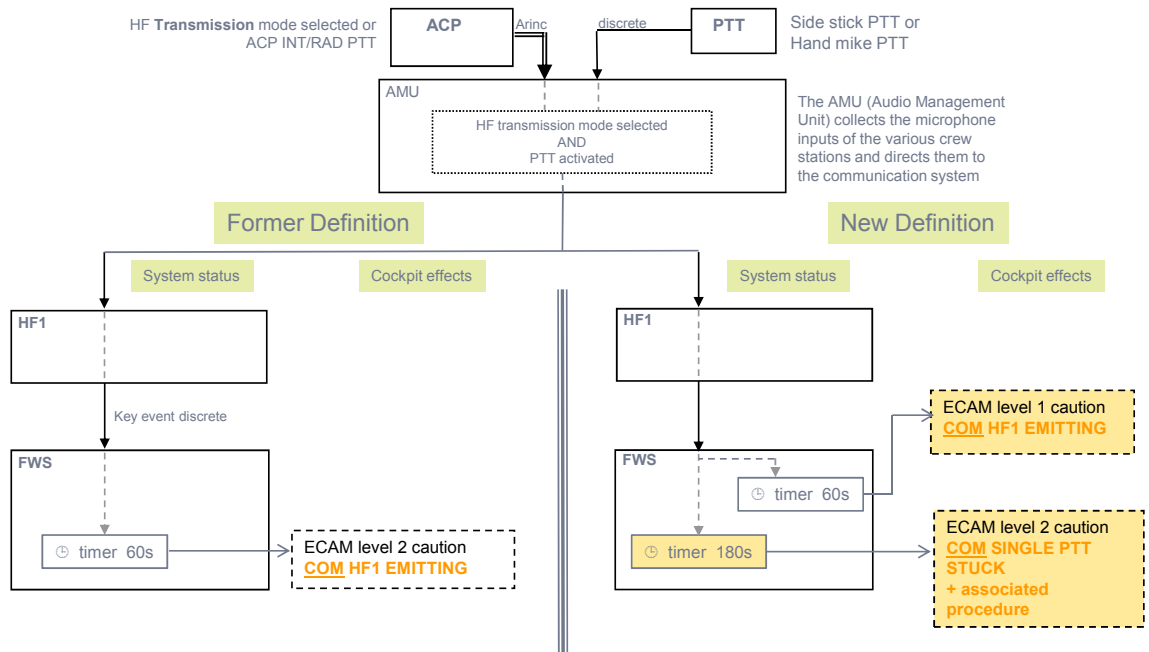


Figure 8
Current and future
ECAM definition in
case of PTT stuck
(example for HF1)



6. Conclusion

On the A320 and A330/A340 families, when a transient loss of VHF communication is experienced in association with the triggering of the alert COM VHF EMITTING, the root cause can almost always be attributed to a jammed PTT device.

In this case, it is necessary to isolate the jammed Push-To-Talk device by deselecting all the transmission keys of the Audio Control Panel on the affected side, then to use a Push-To-Talk device and Audio Control Panel on the other side to recover the transmission.

A new ECAM COM SINGLE PTT STUCK caution and associated procedure will be introduced in the next standards of FWC to assist the crew to recover both ways communications.

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A400M
*Formation of five
A400M nose to tail
at Toulouse-Blagnac
Airport*

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