

ELEVENTH AIR NAVIGATION CONFERENCE

Montreal, 22 September to 3 October 2003

Agenda Item 2: Safety and security in air traffic management (ATM)

2.5 Safety and security of the ATM infrastructure

:

IN-FLIGHT EMERGENCY RESPONSE PROCEDURES FOR AIR TRAFFIC CONTROLLERS

(Presented by the Secretariat)

SUMMARY

This paper presents the need to develop adequate procedures for in-flight emergency response for air traffic controllers in light of the continuing threat of unlawful interference to aircraft. In this respect, it is felt that consideration should be given to the development of in-flight emergency response procedures for air traffic controllers, taking into account procedures already devised for the management of these emergencies by flight crews, emerging technologies and human factors issues.

Action by the Conference is in paragraph 3.

1. INTRODUCTION

1.1 Recent events have emphasized how unlawful interference with aircraft in flight can be so extreme as to seriously and quickly compromise the safety of flight crews, passengers and persons on the ground, even at the cost of the perpetrators' own lives. The international civil aviation support services system was not designed to cope with this extreme form of unlawful interference. The prospect of future attempts to hijack international civil aircraft requires that air navigation service providers give consideration to the development of adequate procedures and guidance material so that air traffic controllers confronted with the operational and psychological demands of such contingencies, may be in a position to act appropriately.

1.2 One of the ways that ICAO is addressing the new threat to civil aviation is through a programme of activities to be carried out under the ICAO Aviation Security Plan of Action. In the air navigation field, the plan of action calls for the creation of defence mechanisms to safeguard civil aviation and for the development of the means necessary to ensure that the air navigation system is ready to cope with the consequences of an act of unlawful interference (AN-Conf/11-WP/23 refers).

1.3 Existing provisions for air traffic control (ATC) response to emergencies in flight are reviewed below. It can be seen that they are limited in their scope.

1.4 Article 37 of the Convention requires Contracting States “to collaborate in securing the highest practicable degree of uniformity in regulations, standards, procedures and organization in relation to”...aircraft in distress....” Article 25 of the Convention requires Contracting States “to provide such measures of assistance to aircraft in distress in its territory as it may find practicable....”

1.5 Annex 11 — *Air Traffic Services*, Chapter 2, 2.22.1 states that an aircraft known or believed to be in a state of emergency, including being subjected to unlawful interference, shall be given maximum consideration, assistance and priority over other aircraft as may be necessitated by the circumstances. The Recommendation at 2.22.1.1 reads “*In communications between ATS units and aircraft in the event of an emergency, Human Factors principles should be observed.*” A Note is added that “*Guidance material on Human Factors principles can be found in the Human Factors Training Manual (Doc 9683)*”. Paragraph 2.22.2 requires that “when an occurrence of unlawful interference with an aircraft takes place or is suspected, ATS units shall attend promptly to requests by the aircraft. Information pertinent to the safe conduct of the flight shall continue to be transmitted and necessary action shall be taken to expedite the conduct of all phases of the flight, especially the safe landing of the aircraft.”

1.6 Annex 11, Chapter 5, 5.1.1 c), stipulates that an “alerting service shall be provided to any aircraft known or believed to be the subject of unlawful interference”. Flight information centres or area control centres (ACCs) are required to forward information relevant to an aircraft’s state of emergency to the appropriate rescue coordination centre. More generally, air traffic services (ATS) units are required to notify rescue co-ordination centres (RCCs) immediately when an aircraft is considered to be in a state of emergency that requires the declaration of an uncertainty phase, alert phase or distress phase (5.2.1 refers). Information to be passed by ATS units to RCCs is given at 5.2.2. Other Standards require the progress of an aircraft in emergency to be plotted (5.4. refers), information to be passed to the aircraft operator, and other aircraft in the vicinity to be notified of the emergency (5.6.1 refers). Finally, an ATS unit is required to not make reference to a suspected circumstance of unlawful interference in air-ground communications unless reference has already been made by the subject aircraft or it is known that reference will not aggravate the situation (5.6.2 refers).

1.7 The *Procedures for Air Navigation Services — Air Traffic Management* (PANS-ATM, Doc 4444) at 15.1.1.1 states: “The various circumstances surrounding each emergency situation preclude the establishment of exact detailed procedures to be followed. The procedures outlined herein are intended as a general guide to air traffic services personnel. Air traffic control units shall maintain full and complete coordination, and personnel shall use their best judgement in handling emergency situations.” Further, at 15.1.1.2, it is stated: “When an emergency is declared by an aircraft, the ATS unit should take appropriate and relevant action as follows: “. . . b) decide upon the most appropriate type of assistance which can be rendered” and, at 15.1.3.9, “ATS units shall not provide any advice or suggestions concerning action to be taken by the flight crew in relation to an explosive device.”.

1.8 The above provisions make clear the demands on air traffic controllers, yet, it may be concluded that they lack specificity. Guidance material directly related to management of in-flight emergencies with respect to the unlawful interference of this new kind, is lacking. There may be a need for guidance in the form of general principles that have an application to optimal management of the extreme situations now threatening the civil aviation. To this end, distinctly different general principles may have to be developed for different phases of unlawful interference, such as “attempted hijack”, “suspected hijack” and “hijack”, which describe the situations where a flight crew is or is suspected to be still in control of the aircraft and one where the hijackers have taken control of the aircraft, respectively.

2. DISCUSSION

2.1 Given the far-reaching consequences of an incident involving unlawful interference and the need for rapid and effective coordination with many agencies with wide-ranging responsibilities, it is vital that air traffic controllers with jurisdiction over the affected airspace become aware of all aspects of the situation as soon as possible and then rapidly pass essential information to senior ATS personnel so that appropriate action may be taken. Lines of communication to all concerned parties must be established to allow the ready transfer of knowledge from the ATS unit to all affected external parties. As has recently been experienced, these types of situations may rapidly change from being one of a civil aeronautical emergency to one with serious significance to national defence and to lives on the ground. Of special importance, then, is the rapid transfer of information to the appropriate external agencies (e.g. defence, police, search and rescue (SAR)) and the enactment of procedures, including relegation of certain authorities, to suitable personnel.

2.2 Efficient coordination is essential, not only between flight crews, controllers and external emergency agencies, but between ATS units and RCCs that may have to assume operational responsibility once affected aircraft impact terrain or water. In this respect, more attention may need to be paid to respective ATS and SAR functions and responsibilities and the points of interface between ATS and SAR personnel. This aspect of situation management may assume added complexity because of the need for extensive external coordination and divided control.

2.3 As far as early controller awareness is concerned, consideration may need to be given, *inter alia*, to the manner in which controllers respond to circumstances of lost radio and/or last transponder contact. While many of these situations will arise because of equipment failure or operational error, there is the possibility that some may be attributable to unlawful interference. While either circumstance may give rise to common indications such as deviation from assigned routes and levels, it is vital that controllers be able to readily differentiate between incidents attributable to genuine operational or technical causes and incidents potentially attributable to unlawful interference. Any delay in determining the reason for loss of radio or transponder contact should be minimized, either by the application of procedures that isolate the cause or by the use of technology that would resolve doubt, or by both.

2.4 Among other things, the above may require an ability to survey a large region of airspace as opposed to the limited sectors for which one or two controllers are now normally responsible. This would facilitate an evaluation and understanding of any coordinated wide-scale unlawful activity, thereby

allowing, on an equally wide scale, a coordinated response. It may be possible to integrate such a monitoring capability into established air traffic management (ATM) systems, such as into flow control units. Initial alert triggers could be as simple as any unauthorized divergence from flight planned routes or from conformal flight patterns.

2.5 With respect to the potential need for a reassignment of third party responsibility for the operational control of a flight known or believed to be the subject of unlawful interference (e.g. defence or police authorities), some consideration may need to be given to a means of ensuring full and rapid access to all available information by all responsible parties and ready conveyance of situation updates to all personnel and agencies which have critical decision-making responsibilities. This may require changes to the traditional civil/military coordination role within ACCs and an increased reliance on civil/military liaison staff.

2.6 Supporting technology could also find a place both on aircraft and at ground stations. Several projects are underway on developing the means to better track unlawfully commandeered aircraft. In the course of a normal flight, significant time periods might elapse between actual and anticipated radiotelephony exchanges. One possibility for timely alert involves the development of a transponder that, once set in emergency mode, could not be reset. This may involve use of a “panic button”; once activated, selection of the transponder signal would be transferred automatically to the avionics, out of reach of personnel in the cabin and on the flight deck.

2.7 Another commercial project under development provides for tracking aircraft for which an alert code is transmitted to the designated ground-based receiving centre. Such alert would be triggered by first securing cockpits against unauthorized access. Secure access, in turn, is attained by identifying authorized personnel and then, by comprehensively monitoring controlled space on the aircraft, detecting and excluding other personnel from the designated secure area. This is achieved through text-dependent voice biometrics, by indexing stored parameters of known persons’ authorized voices. All personnel are required to log on prior to departure. From that time, all changes are locked out until the aircraft arrives at its destination. If any voice is detected in-flight other than those logged on, the transmission of the above-mentioned alert code is activated.

2.8 The above initiative would also give a display of the aircraft’s position, derived from global navigation satellite system (GNSS) and displayed in relationship to air routes, airspace boundaries, topographic detail and emergency response facilities. Readout can include vectors to proximate primary and secondary airports. Reciprocal bearing and distance of the aircraft in emergency can be provided in a geographic-correlated map display to SAR and ATS units. Among other features, there is a sophisticated, integrated data recording system that stores audio, video and data in separate channels and transmits it to ground-based facilities for analysis.

2.9 While developments such as these offer the prospect of early detection and ready assistance to both flight crews and air traffic controllers, it is also essential that controllers benefit from in-flight emergency response training through procedures specially designed to cope with present threats that will interface with the technology to be applied.

2.10 While it is critical that any delay in air traffic controller awareness is minimized, it is also important that no pre-emptive or misinformed action be taken by controllers. The present situation is such

that response measures to aircraft unlawfully commandeered need to be immediately effective. It is vital that responses and decisions taken also be carefully considered, deliberate and certain. Thus, procedures for controller reaction need to be properly defined to both safeguard aircraft not subject to unlawful interference on the one hand and, on the other, suitably responsive to any that are.

2.11 Equally important, in view of the potentially traumatic situations that may occur, is the need for psychologically based air traffic controller training designed to increase the controllers' own ability to cope and also enable controllers to assist flight crews confronted with these extraordinary emergencies. A psychologically sound response to in-flight emergencies is as much a need as is post-traumatic stress counselling, a procedure now universally accepted as a necessary tool in air traffic management. Lives may be dependent not only on the development of appropriate in-flight emergency procedures, but also on controller aptitude in applying procedures and in coordinating with flight crews and other parties in a detached, yet sensitive, way that encourages a cooperative, calculated and effective response to this most demanding of airborne emergencies.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to agree on the following recommendation:

Recommendation 2/ — In-flight emergency response procedures for air traffic controllers

That, in association with the ICAO Aviation Security Plan of Action, ICAO consider developing in-flight emergency response procedures for air traffic controllers related to distinctly different phases of unlawful interference that take into account:

- a) air traffic services/rescue co-ordination centre interface;
- b) coordination and communication requirements with aircraft operators, external emergency authorities and other concerned parties;
- c) aviation human factors considerations and research and development activities; and
- d) procedures already developed for the management of these emergencies by flight crews.

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