For discussion on 23 April 2001

Legislative Council Panel on Economic Services

Review by the United Kingdom Civil Aviation Authority
On Hong Kong Air Traffic Control System

Introduction

This paper outlines the findings of the captioned Review and sets out the action plan on the recommendations of this Review. The Review concludes that our Air Traffic Control (ATC) operation in Hong Kong is safe and of a high standard.

2. We monitor the ATC system in Hong Kong closely and continue to identify room for enhancement of the system operation in the light of advances in ATC technology and system management, both for safety and to ensure that we could meet the growth in air traffic. After more than two years of operation at the Hong Kong International Airport (HKIA), the Director-General of Civil Aviation (DGCA) considered that a more comprehensive review should be conducted and hence commissioned the United Kingdom Civil Aviation Authority (UK CAA) in December 2000 to conduct a review of the ATC system in Hong Kong. The objectives of the review are to identify areas for improvement and to recommend specific follow-up actions as appropriate.

3. The UK CAA Review Team has concluded that the current ATC operation in Hong Kong is safe and of a high standard. However, to ensure that the same level of standards is maintained for the rapidly increasing traffic, the Review made a total of 34 specific recommendations to enhance the management and administration, controller standards, competence and training for ATC. It also made recommendation to streamline the incident investigation procedures. A copy of the Review Report is at Annex A.

4. After thorough consideration of the Review Report, the Civil Aviation Department (CAD) accepts all but two recommendations[1]. Indeed some recommendations cover the Department's on-going improvement initiatives, and have been taken aboard. These include regular review of procedures and improved communication between operational controllers. The other recommendations will be implemented over the next two years. The major recommendations of the Review Team and CAD's planned actions are outlined in the following sections.

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[1] One recommendation (no. 16) is that the Chief Electronics Engineer (CEE) who is responsible for ATC-related engineering equipment should be an integral part of the higher ATC management team. CAD considers that the present engineering support to ATC operations is adequate. The CEE or his representatives will continue to attend various ATC operational and management meetings to provide engineering-related advice. Therefore, the department does not consider creation of engineer posts in the ATMD necessary. The other recommendation (no. 32) is that the process for grading air traffic controllers by their competence should be stopped. CAD believes that the Review Team might have mistaken the existing performance appraisal system, which generally applies to civil servants and takes into account working attitude, team work, etc., in addition to operational competence, to be a "competence grading" system.

Safety Management System

5.　　　　The Review Team has concluded that CAD gives appropriate priority to safety and this has been demonstrated by the safe and orderly move of the ATC operation from Kai Tak to Chek Lap Kok.　However, although the present operations at the HKIA are safe, the existing arrangements for managing safety will not be able to cope with the anticipated traffic levels and increasing complexity of the air traffic system in the coming years.　It recommends that the management structure should be strengthened by the introduction of a formal Safety Management System (SMS) to ensure the highest standard of safety in ATC operations.　It also recommends the establishment of a Safety and Quality Section within the Air Traffic Management Division (ATMD) to implement and administer the SMS.

6.　　　　SMS's are a recent development in the aviation industry, particularly in areas such as aircraft maintenance and flight operations.　In the context of ATC operations, an SMS is essentially a systematic approach to manage safety.　It involves defining safety policies and principles, which in turn lead to detailed criteria and checklists for hazard prevention, performance monitoring and prudent risk management.　An SMS emphasizes safety principles in all aspects of ATC operations, including the selection, training and competence standardization of ATC personnel; the design, procurement and commissioning of ATC equipment; the development, evaluation and implementation of operating procedures; the monitoring of safety performance; and the conduct of proper incident reporting, investigation and analysis. It is now a standard practice of major advanced ATC service providers, such as the UK National Air Traffic Services and Airservices Australia.

7.　　　　While CAD already has safety checks in individual areas, to adopt an SMS would provide a more systematic approach to managing the ATC operations. We see definite merits in introducing an SMS.　CAD is now liaising with an overseas agency with proven field experience to assist it in implementing this safety management concept.　It also plans to establish a Safety and Quality Section in the ATMD to take forward the SMS.　The organization chart illustrating the establishment of the proposed Section in the ATMD is in Annex B.

Safety Regulator and Incident Investigation

8.　　　　To support the implementation of the SMS, the Review Team recommends the setting up of an independent safety regulator to monitor and audit the operations of ATMD.　The functions of this regulator are to conduct safety oversight of the ATC system, including overseeing the continual development of the SMS, closely monitoring incident investigations and follow-up actions, and conducting assessments of the risk involved in ATC incidents.

9.　　　　It is costly to set up a standing independent safety regulator and, in any

case, it may not be easy to find outside experts to perform the role of an ATC safety regulator. We are aware that the ATC service providing staff should not be the investigation members. Hence CAD's proposal is to maintain organisational separation between the ATC service providers and the regulators. Currently within CAD, there is a small Air Traffic Safety Unit in the separate Airport Standards Division (APSD) to oversee the safe operation of ATMD. However, due to the rapid expansion of ATC operations, this small unit is unable to cope with the heavy workload.

10.　　　　To take forward the recommendation of the Review Team, CAD proposes to establish a new and strengthened ATC Standards Section. This will be combined with the existing Flight Standards Section (now under the Flight Standards and Airworthiness Division and responsible for overseeing flight standards and personnel licensing) to form a new division called Air Traffic and Flight Standards Division (ATFSD). Upon its inception, the Air Traffic Safety Unit of APSD will be strengthened and transferred to this new division (Annex B).

11.　　　　The new ATFSD will take up the functions of a regulator of ATC operations, including controller licensing, ATC safety oversight, monitoring of standards and competence, stipulating training policies, etc. As an integral part of its regulatory functions, it will also monitor the investigation of minor ATC incidents by ATMD.

12.　　　　In the event of a major ATC incident, DGCA will appoint ATC experts and Inspectors of Accidents (mostly professional pilots and engineers who have received special training in aircraft accident investigation) within CAD to form an Incident Investigation Team. If deemed necessary, the team may invite suitable experts outside CAD (e.g. pilots of Government Flying Services or locally-based airlines) to participate in the investigation. The team will also conduct an independent assessment of the risk involved in each incident.

13.　　　　The Review Team has also expressed the view that the present investigation process has put excessive emphasis on apportioning blame to individuals. It recommends that the management should focus on re-training and the dissemination of the safety lessons learnt from the incident. Initial incident investigation should be introduced at watch level[2] to enable the controller involved in incidents of a less serious nature to be returned to operational duty with minimum delay, subject to any identified need for re-training. These recommendations are being implemented.

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[2] A watch is a team of controllers led by their respective stream supervisors, responsible for frontline ATC duties under a watch manager.

Watch-based Management

14.	The Review Team recommends that the ATC management structure be revised to provide more flexibility in resource management, encourage positive participation of operational staff in technical and operational matters, enhance team spirit, as well as improve communication between operational staff and management. This is achieved by transforming the existing centralized management approach to one of watch-based management through greater delegation of responsibilities to the Watch Managers and Stream Supervisors. This arrangement will provide more flexibility in resource management, encourage positive participation of operational staff in technical and operational matters, enhance team spirit, as well as improve communication between operational staff and management.

15.	ATC operations comprise three main streams, namely Aerodrome Control, Approach Control and Area Control[3]. To implement a watch-based management approach with emphasis on team work, CAD plans to strengthen the three operational streams by appointing Stream Supervisors to oversee the safe and efficient operations of each stream. Stream Supervisors are now already established in the Aerodrome Control and Area Control units. Additional Stream Supervisor posts are being established for Approach Control. Overall management of the operational areas will be the responsibility of the Watch Manager.

16.	The success of the watch-based approach relies heavily on communication and team work. To strengthen communication between management and operational staff, a Technical Committee comprising representatives from management, engineering staff and operational staff will be established and meet regularly to discuss technical and operational matters, such as changes to operational procedures and modifications to ATC equipment, etc. With increased participation of operational staff in the process of developing improvements/changes, they will be motivated to contribute positively to the enhancement of the ATC system.

Controller Competence and Standardization

17.	Under the existing arrangement, a controller's competence is assessed through an annual revalidation check. During the check, a controller's performance is scrutinized by a Senior Standards Officer of ATMD on the aspects of professional application of standard ATC procedures and his overall competence. The Review Team has commented that such a mechanism has the disadvantage of assessing on a snapshot basis during the revalidation session, which may not be the most accurate reflection of the controller's day-to-day performance.

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[3] Aerodrome Control is responsible for control of aircraft landing and take-off and maneuvering on the runway, taxiways and apron. Approach Control manages air traffic operating within 40 nautical miles (NM) of the HKIA. Area Control manages air traffic operating beyond 40 NM in the remaining airspace managed by Hong Kong.

18.　　　　To address this, CAD will introduce a watch-based competence assessment scheme.　Senior controllers will be appointed as rating examiners within each team.　Appropriate training will be provided to the selected examiners to prepare them to undertake the task.　The Senior Standards Officers of ATMD will be trained to run examiner courses and take on the role of ensuring that the competence assessment scheme is maintained.　When fully trained, the rating examiners will conduct operational assessment continuously to ensure the competence and performance standards of controllers.　Deviation from standards or established procedures by controllers will be brought to their attention and rectified promptly. Any major anomalies will be reported to the Safety and Quality Section through the Watch Managers for further review and standardization purposes.

19.　　　　The new ATC Standards Section of ATFSD mentioned in paragraph 10 above will oversee and ensure the effectiveness of the rating examiner programme. It will prescribe policy guidelines for the selection of examiners, such as technical qualifications, experience level and professional competence.

ATC Training

20.　　　　The Review Team has also made several suggestions to improve ATC training.　These include strengthening the training establishment, improving the structure of the training programmes, selecting high-calibre candidates as student controllers, streamlining documentation and updating training courses, and establishing a more effective feedback mechanism for students.

21.　　　　Following the review, ATMD has assigned dedicated staff to its Training Unit to review the course contents, and develop structured and objective-based course plans for all ATC training.　In order to ensure that appropriate in-house training expertise is available, more operational controllers will be provided with specialized training in instructional techniques to enhance their ability to convey knowledge to their trainees in an effective manner.

22.　　　　Extensive use of simulator facilities is being made to provide refresher training to controllers, covering radar control and aerodrome control operations. Such training includes drills on the handling of unusual or emergency situations and associated recovery actions.　The simulators will also be used to provide controllers with training under busy traffic scenarios so as to maintain their expertise in coping with increases in the level of traffic and new modes of operation in future.

23.　　　　CAD will continue to implement the various recommendations of the Review Team to improve ATC training.
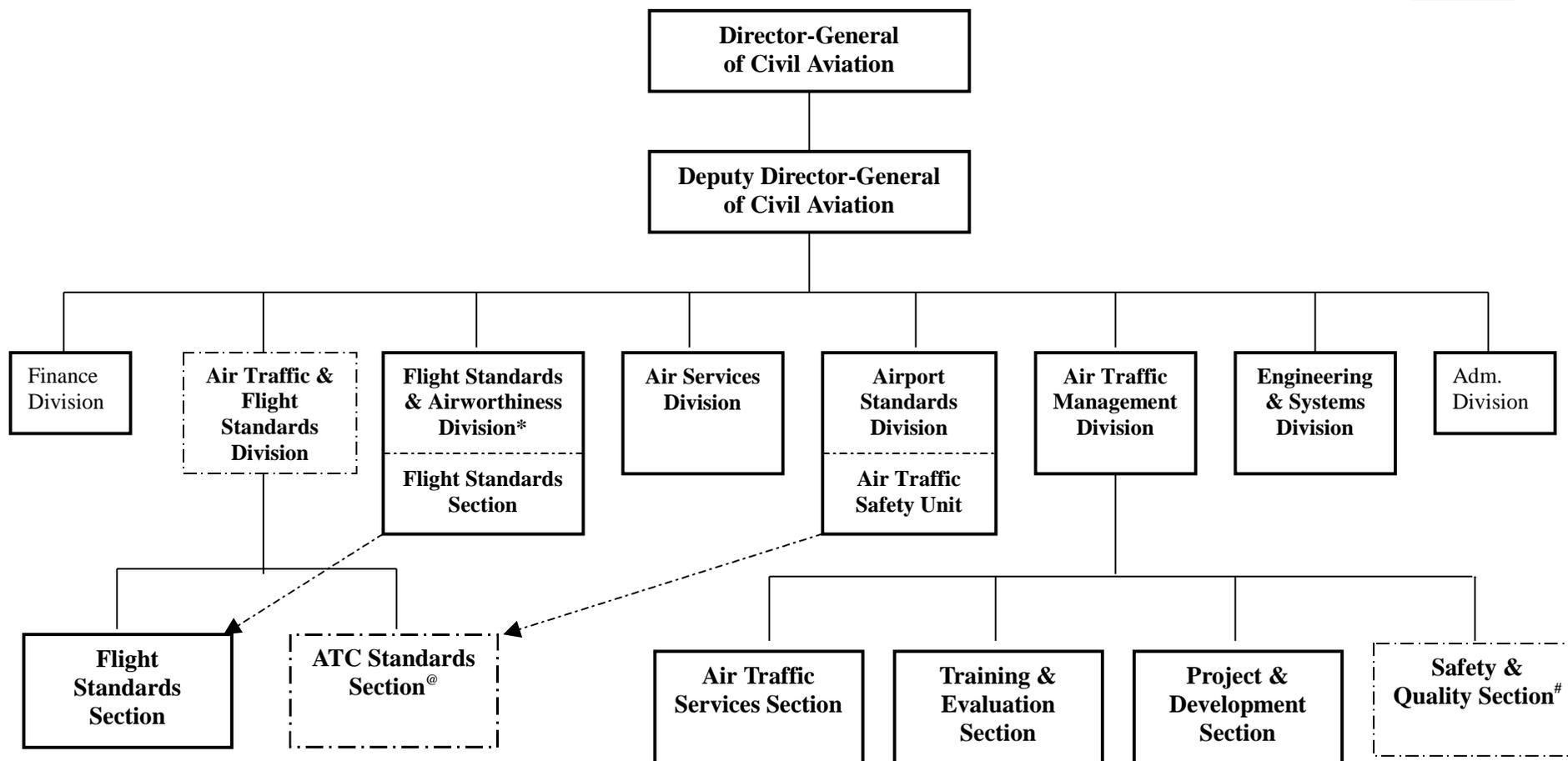
Work Plan and Resource Implications

24.　　　　CAD will implement the relevant recommendations in phases between

now and December 2002. CAD expects additional resources to be required and is examining the detailed resources implications. It will endeavour to meet new resources requirements by internal redeployment as far as possible and will brief the Economic Services Panel again before putting proposals, if any, to the Establishment Subcommittee of the Finance Committee.

Conclusion

25. The UK CAA Review Team has concluded that the Hong Kong ATC system is safe and of a high standard. They have made very useful recommendations to assist CAD in maintaining state-of-the-art ATC management. CAD is responding positively to these recommendations. A Safety and Quality section will be established in ATMD to ensure safety principles are followed in respect of controller training, procedure changes, operational competence and standardization. A new ATC safety oversight structure will be established outside ATMD to ensure the maintenance of safety standards. Other recommendations concerning watch-based management, controller competence and ATC training are being actively pursued. All these measures will enable Hong Kong to continue to provide high-standard ATC services and to cater for the rapid growth in air traffic.

Economic Services Bureau / Civil Aviation Department
April 2001

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Director-General of Civil Aviation

Deputy Director-General of Civil Aviation

Finance Division

Air Traffic & Flight Standards Division

Flight Standards & Airworthiness Division*

Flight Standards Section

Air Services Division

Airport Standards Division

Air Traffic Safety Unit

Air Traffic Management Division

Engineering & Systems Division

Adm. Division

Flight Standards Section

ATC Standards Section@

Air Traffic Services Section

Training & Evaluation Section

Project & Development Section

Safety & Quality Section#

▭ = New divisions or sections.

---▶ Transferal of section/unit

* The other section in the existing Flight Standards & Airworthiness Division, i.e. the Airworthiness Section, is proposed to become a separate Airworthiness Division of its own to cater for increase in workload arising from expansion in aircraft fleet, aircrew, maintenance agencies and overseas destinations of the local airlines.

\# Establishment of the Safety & Quality Section is subject to further study.

@ The Air Traffic Control (ATC) Standards Section will incorporate the Air Traffic Safety Unit transferred from the existing Airport Standards Division.