第三章 CHAPTER 3

工程及系統
ENGINEERING AND SYSTEMS

本處於二零零零年檢討組織架構後，決定把技術及策劃部轄下的策劃組轉隸航班事務部；這項變動於二零零一年一月一日生效。技術及策劃部現已重新命名為工程及系統部，負責為香港設計、統籌及提供航空交通管制系統(空管系統)及導航設備。此外，本部還負責制定及推行各項資訊科技方案，以便落實公共服務電子化計劃。

年內，衛星通訊、導航及監察／航空交通管理系統計劃如期推行。本部正繼續詳細研究此系統的各項構件，以及測試部分較為成熟的構件。

I. 航空交通管制系統發展概況

航空交通管制系統

年內，組成整體空管系統的各項精密儀器繼續發揮穩定可靠的功能。現時，系統可應付每小時50架次的跑道升降量。整套空管系統投入運作至今已超過兩年，本處有必要提升其中數個主要電腦系統的功能，以提高運作效率及加強數據處理能力，俾能有效應付本港和珠江三角洲航空交通量的預期增長。立法會財務委員會已於二零零一年二月九日批准撥款5,070萬元，以便由二零零一／二零零二年度起，分階段提升各系統的功能。

南中國海空域將於二零零一年十一月一日重劃；屆時，該空域的航空交通服務和航路結構亦會重整。為配合這方面的轉變，多個空管電腦系統和操作控制台須進行改裝工程。有關工程已於二零零一年一月展開，並預定於同年十月完成。

致力提供安全而有效率的航空運輸系統

COMMITTED TO PROVIDE A SAFE AND EFFICIENT AIR TRANSPORT SYSTEM

Following an organisation review in 2000, the Department decided that the Planning Section in the Technical and Planning Division should be transferred to the Air Services Division. The change was effected on January 1, 2001. Following this transfer, the Technical and Planning Division has been re-named the Engineering and Systems Division, which is now responsible for the design, coordination and provision of air traffic control (ATC) systems and air navigation equipment for Hong Kong. The Division also formulates and implements the information technology (IT) plans for the introduction of Electronic Service Delivery.

During the year, the Satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems project progressed as scheduled. Detailed investigation work on the various elements of the CNS/ATM systems continued, and operational trials were performed on some of the more mature elements.

工程及系統部的其中一項職務是確保雷達設施獲得妥善保養。
One of the responsibilities of the Engineering and Systems Division is to ensure that the radar equipment is properly maintained.

I. AIR TRAFFIC CONTROL SYSTEMS DEVELOPMENT

Air Traffic Control System

The sophisticated equipment supporting the overall ATC System continues to perform in a stable and reliable manner. Presently the System has a capacity to cope with 50 runway movements per hour. With more than two years of working experience on the System, a number of major ATC computer systems will need to be enhanced to increase operational

中國民用航空總局的飛行校驗飛機。
Flight check aircraft of CAAC.

飛行校驗

自新香港國際機場啟用以來，各項設備一直發揮良好功能，而無線電導航儀器及着陸導航設備亦有穩定的性能表現，因此，自二零零零年十一月起，這些系統的例行飛行校驗周期，已由每三個月一次延長至每四個月一次。進行飛行校驗的飛機有些特殊的動作對航空交通造成不便，周期延長後，不便的情況便因此而得以減少。

本處現正安排轉由新的服務供應商，即中國民用航空總局，負責飛行校驗工作，預期有關安排於二零零一年七月完成。

備用航空交通管制大樓

為啟動備用航空交通管制中心、備用指揮塔和備用通訊中心等設施而進行的大型演習已於二零零零年四月及九月舉行。上述後備設施能在23分鐘內啟動和提供主要空管服務，並可維持大約三成的空管處理能力。

更換航路監察雷達

現時位於柏架山的航路監察雷達屬於遠程一次監察雷達，投入運作已超過22年，使用期快將屆滿。本處已要求撥款更換該雷達，獲立法會財務委員會於二零零一年二月九日批准撥款1億470萬元作更換雷達用途。

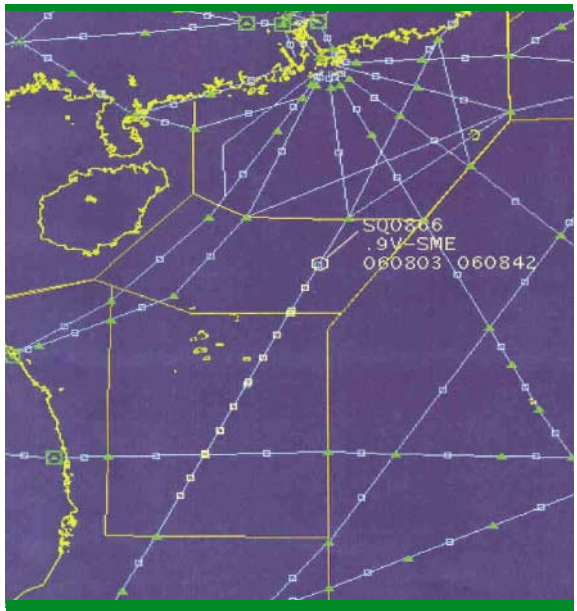
本處現正擬備上述設備的投標規格，並訂於二零零一年五月進行招標，預期新雷達可於二零零三年年底投入服務。

II. 衛星通訊、導航及監察／航空交通管理系統

為符合國際民航組織就衛星通訊、導航及監察/航空交通管理系統所訂的全球實施計劃，並考慮到系統的規模和複雜程度，本處將分以下三個階段落實有關計劃：

- 研究階段 － 系統研究和分析（一九九九至二零零四年）
- 測試階段 － 系統測試和評估（二零零零至二零零七年）
- 實施階段 － 系統實施和過渡（二零零三至二零一六年）

本處正繼續詳細研究衛星通訊、導航及監察／航空交通管理系統的各項構件，並已就以下系統進行測試：



自動從屬監察測試。
Automatic Dependent Surveillance trial.

efficiency and data processing capacities to handle effectively the projected increase in air traffic movements in Hong Kong and in the Pearl River Delta area. Funds amounting to $50.7 million were approved by the Legislative Council Finance Committee on February 9, 2001. The enhancements will be carried out in phases starting from 2001/2002.

To support the airspace reorganisation and the implementation of the revised air traffic services (ATS) route structure over the South China Sea on November 1, 2001, modification work on various ATC computer systems and operational consoles commenced in January with a target completion date of October 2001.

Flight Calibration

With good track records of equipment performance and stability of the radio navigation and landing aids since the opening of the new Hong Kong International Airport (HKIA), the periodicity of routine flight calibration on these systems has been extended from three to four monthly intervals since November 2000. This helps to minimise the disruption to air traffic due to the special manoeuvres of the flight check aircraft.

The transfer of flight calibration to the Civil Aviation Administration of China (CAAC), a new service provider, is on-going and is expected to be completed in July 2001.

Backup Air Traffic Control Complex (BATCX)

Full-scale activation drills on the Backup Air Traffic Control Centre, Backup Tower and Backup Communications Centre were conducted in April and September 2000. The backup facilities, which are able to support about 30 per cent of ATC handling capacity, can be activated and provide the essential services within 23 minutes.

備用航空交通管制中心。
Backup Air Traffic Control Centre.

Route Surveillance Radar Replacement

The existing Route Surveillance Radar (RSR) at Mount Parker, a long-range primary radar, has been in use for more than 22 years and is now approaching the end of its useful operational life. The Department has sought funds for its replacement and funding approval of $104.7 million was given by the Legislative Council Finance Committee on February 9, 2001.

Equipment tender specification is being prepared and invitation of tenders is scheduled for May 2001, with a ready-for-service date of end 2003.

自動從屬監察系統／管制員和飛行員聯繫用的數據鏈路通訊系統測試

本處於二零零零年九月就自動從屬監察系統／管制員和飛行員聯繫用的數據鏈路通訊系統進行了為期一個月的測試，讓香港南面三條航路的航機可透過數據鏈路傳送飛行位置報告，而該三條航路途經之處大部分都是在雷達探測範圍以外的。除空管作業數據外，測試項目還包括從航機下載有關外間溫度、風向和風速等氣象數據。

二零零零年十一月，本處改良和擴展了自動從屬監察系統／管制員和飛行員聯繫用的數據鏈路通訊系統之全面功能，數據訊息可透過飛機上的「一」型未來航空導航系統的儀器來接收。

數據化自動航站情報服務及數據化遠航氣象情報服務測試

有關透過數據化自動航站情報服務及數據化遠航氣象情報服務，把機場和氣象資料透過數據鏈路分別發送給航機的測試工作，已於一九九九年五月展開，進展令人滿意。新服務可補充話音廣播較低的效率和較易受干擾之不足。由於測試結果令人鼓舞，而國際航空運輸協會、航空公司和機師也給予正面評價，本處將於二零零一年四月十九日推出這兩項服務。為提高運作效率和飛行安全，本處於一九九九年展開衛星通訊、導航及監察／航空交通管理系統計劃，而上述數據化服務就是該計劃下首批投入運作的項目。

起飛前放行指示系統測試

本處與本地航空公司合作進行的起飛前放行指示系統測試於二零零零年九月展開。有關測試是在航機離場前，把離場路線、高度限制和最後巡航高度等有關的空管放行或飛行指示，透過數據鏈路傳送給飛行員，以助紓緩交通繁忙時段出現的無線電通訊擁擠情況。

航空通訊網絡測試

本處與泰國民航當局聯合進行的航空通訊網絡初步測試已於二零零零年十月展開。測試之目的為協助評估航空通訊網絡的地對地儀器與網關系統之間的連接性、互通操作及能力。

III. 電訊服務

電訊組專責提供固定航空通訊、流動航空通訊、航空氣象廣播和搜索及拯救行動通訊等服務。

電訊組在二零零零年四月二十五日及九月二十二日分別進行了兩次啟動備用通訊中心設施的演習，結果令人滿意。這些演習日後會每隔六個月進行一次。

年內，本部對航空流動通訊中心的運作模式進行了檢討，以配合二零零一年十一月一日南中國海空域重劃以及航空交通服務航線的結構重整。本部現正擬定和評估新的運作程序。

電報處理中心。
Message Preparation Centre.

II. SATELLITE-BASED COMMUNICATIONS, NAVIGATION AND SURVEILLANCE/AIR TRAFFIC MANAGEMENT (CNS/ATM) SYSTEMS

To comply with the Global Implementation Plan of the International Civil Aviation Organization for the satellite-based CNS/ATM systems and taking into consideration the scale and complexity of the systems, the Department will implement the project in three phases as follows:

- Study Phase – Systems Study and Analysis (1999 – 2004)
- Trial Phase – CNS/ATM Trial and Evaluation (2000 – 2007)
- Implementation Phase – CNS/ATM Implementation and Transition (2003 – 2016)

Detailed investigation work on the various elements of the CNS/ATM systems continues. Operational trials on the following systems have been performed.

ADS/CPDLC Trials

A one-month operational trial on the Automatic Dependent Surveillance (ADS)/Controller-Pilot Data Link Communication (CPDLC) was conducted in September 2000. The trial enabled aircraft to transmit their position reports via data link on three routes to the south of Hong Kong, which are mostly beyond radar coverage. Besides ATC operational data, the trial also included the downlink of meteorological data such as outside temperature, wind direction and speed from the aircraft.

In November 2000, the ADS/CPDLC system was upgraded and expanded to cover the full capability of receiving data messages from the Future Air Navigation System-1 (FANS 1) or FANS A equipment of the aircraft.

D-ATIS and D-VOLMET Trials

Operational trial on the dissemination of airfield and weather information to aircraft via Digital-Automatic Terminal Information Services (D-ATIS) and Digital-Meteorological Information for Aircraft in Flight (D-VOLMET) respectively via data link commenced in May 1999 and has been progressing satisfactorily. These systems supplement the voice broadcasts, which are less efficient and more susceptible to interference. With encouraging results and favourable feedback received from the International Air Transport Association, airlines and pilots, the Department will put the services into operational use on April 19, 2001. D-ATIS and D-VOLMET will be the first operational elements of the CNS/ATM systems project undertaken by the Department since 1999 to enhance operational efficiency and flight safety.

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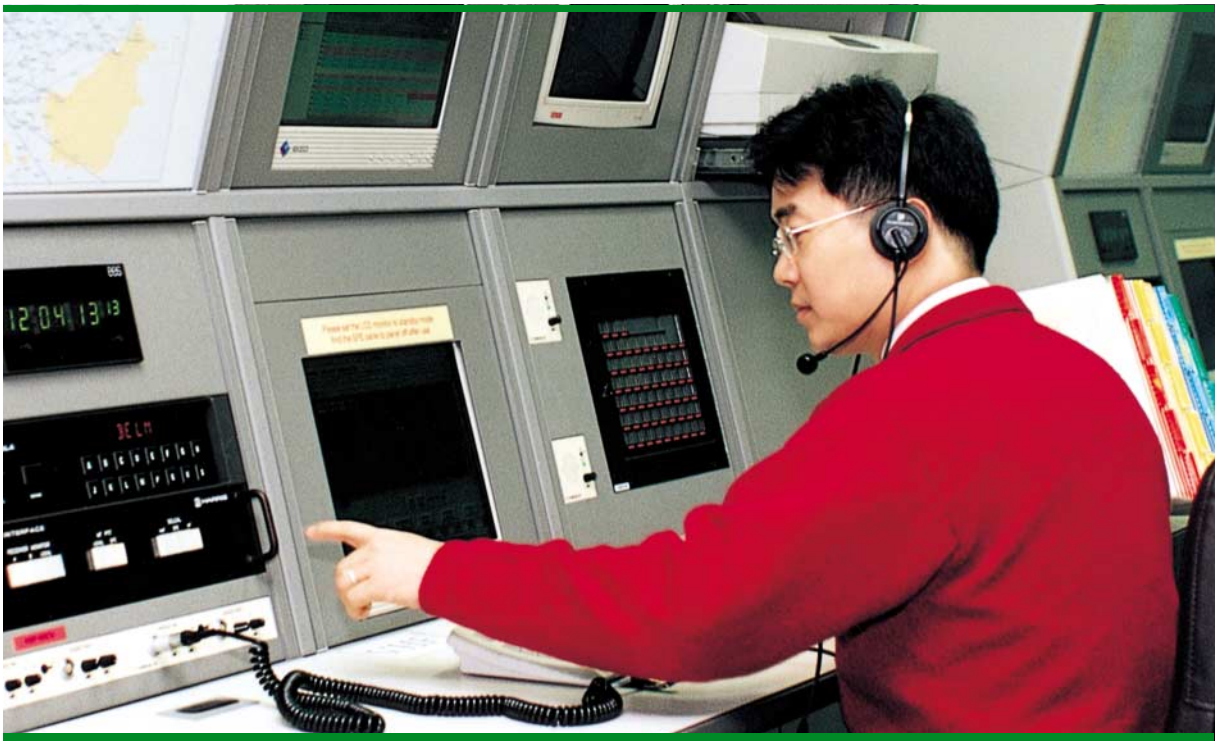

航空通訊員在航空流動通訊中心當值。
Aeronautical Communications Officer on duty at Aeronautical Mobile Centre.

固定航空通訊服務概況

	二零零零／二零零一年	一九九九／二零零零年	增減幅度（%）
處理電報總量	18 564 466	17 602 802	+5.4

二零零零年四月一日，香港與胡志明市之間的航空固定電訊網線路通訊提升至300波特單一線路運作。

二零零零年五月一日，本處與香港天文台之間的航空固定電訊網線路通訊提升至每秒4 800比特速度運作。

二零零一年一月十日，本處與海事處之間的航空固定電訊網線路通訊提升至75波特速度。

流動航空通訊服務概況

	二零零零／二零零一年	一九九九／二零零零年	增減幅度（%）
與航機聯絡次數	293 539	310 892	-5.6

由於新飛行程序自二零零零年五月起推行，把若干航機強制報告點改為非強制報告點，與航機聯絡的次數因而減少。

在二零零零年十二月五至八日舉行搜索及拯救演習期間，電訊組與搜救單位的通訊聯繫在長程演習中得以測試，結果令人滿意。

航空氣象廣播服務概況

在氣象廣播服務方面，電訊組年內為航機提供共211 205次氣象報告，較去年增加6.27%。

PDC Trials

Pre-Departure Clearance (PDC) trial with the local airlines commenced in September 2000. This system transits ATC clearances or flying instructions in respect of the departure routes, altitude restrictions and final cruising levels to pilots via data link prior to aircraft departure. This would help alleviate radio frequency congestion during busy traffic periods.

ATN Trials

Preliminary Aeronautical Telecommunication Network (ATN) trial with Thailand civil aviation authority commenced in October 2000. This helps to evaluate the connectivity, interoperability and capability of the ATN Ground/Ground Routers and ATN Gateway Systems.

III. TELECOMMUNICATIONS SERVICES

The Telecommunications Unit is responsible for the provision of aeronautical fixed, mobile and broadcasting services as well as communications for search and rescue.

Two drills were conducted on April 25 and September 22, 2000 respectively to activate the Backup Communications Centre and the results were satisfactory. The drills will be repeated on six-monthly intervals.

In connection with the airspace reorganisation and implementation of the revised ATS route structure over the South China Sea on November 1, 2001, a review was conducted on the revised mode of operations of the Aeronautical Mobile Centre, taking into account the anticipated changes. New operational procedures are being prepared and evaluated.

Aeronautical Fixed Service

	2000/2001	1999/2000	% change
Messages handled	18 564 466	17 602 802	+5.4

The Hong Kong – Ho Chi Minh Aeronautical Fixed Telecommunications Network (AFTN) circuit was upgraded to 300 bauds single channel operations on April 1, 2000.

The AFTN circuit with Hong Kong Observatory was upgraded to 4 800 bps on May 1, 2000.

The AFTN circuit with Marine Department was upgraded to 75 bauds on January 10, 2001.

Aeronautical Mobile Service

	2000/2001	1999/2000	% change
Aircraft contacts	293 539	310 892	-5.6

The decrease in the number of aircraft contacts was primarily due to the implementation of new procedures which change some compulsory aircraft reporting points to non-compulsory ones effective from May 2000.

During the annual Search and Rescue Exercise which took place from December 5 to 8, 2000, communication links with search and rescue units were tested during the long-range exercise and satisfactory results were attained.

Aeronautical Broadcast Service

During the year, the broadcast service provided a total of 211 205 weather messages to aircraft in flight. This figure was 6.27 per cent higher than the previous year.