

致力於安全及有效率的航空系統
Committed to a Safe and Efficient Air Transport System

第三章 CHAPTER 3

工程及系統 Engineering and Systems



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工程及系統部的主要工作是設計、統籌和提供航空交通管制系統、雷達、導航儀器及通訊等設備，並為香港飛行情報區提供航空通訊服務。

年內，本部繼續致力把整個航空交通管制系統維持於最高服務水平，以確保航空交通管制設備的運作可靠穩定。衛星通訊、導航及監察／航空交通管理系統發展計劃如期進行，其中兩個系統構件已經投入運作，供航空公司和飛行員使用。至於提升六個主要航空交通管制系統功能和更換長程一次監察雷達的工作亦進展順利。此外，本部已推行所需的資訊科技系統計劃，並且為部門制定有關的數據保安政策，以配合政府事務電子化的目標。

The Engineering and Systems Division is responsible for the planning, coordination and provision of air traffic control (ATC) systems, radar, navigational aids and communications equipment for Hong Kong. The Division also provides aeronautical telecommunication services for the Hong Kong Flight Information Region.

During the year, the Division continued its efforts in maintaining the overall ATC System to the highest standard, thus enabling a stable and reliable equipment operation for ATC. The Satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems project also progressed as scheduled, with two system elements commissioned for operational use by airlines and pilots. Work on enhancements of six critical ATC systems and replacement of a long-range primary surveillance radar was in good progress. On the other hand, the Division has implemented the necessary information technology systems and established relevant data security policy for the Department in line with the e-government objective.

I. 航空交通管制系統的發展

航空交通管制系統

民航處已於二零零一年十月完成各個航空交通管制系統的更改和增加所需通訊設備，以配合重劃南中國海飛行空域和該區新航空交通服務航路的安排。整個地區於二零零一年十一月二日成功過渡到新的飛行空域，過程順利。

為了加強雷達數據處理及顯示系統、飛行數據處理系統、雷達模擬器系統、話音通訊處理系統、航空電報自動轉送系統，以及航空資料庫共六個主要空管系統的運作效率，民航處於二零零一年九月至十二月期間向中標的承建商批出有關合約，預期工程可於二零零三年三月底完成。

交換雷達數據

在與鄰近地區的航空交通管制單位進行技術合作方面，民航處於二零零一年七月與中國民用航空總局（中國民航

I. AIR TRAFFIC CONTROL SYSTEMS DEVELOPMENT

Air Traffic Control System

Modifications of various ATC systems and provisions of additional communications equipment were completed in October 2001 to facilitate the airspace reorganisation and the implementation of the revised air traffic services (ATS) route structure over the South China Sea. With these, there was a smooth and successful transition to the new airspace operations on November 2, 2001.

Contracts for enhancements of six critical ATC systems, viz. Radar Data Processing and Display System, Flight Data Processing System, Radar Simulator, Speech Processing Equipment, Automatic Message Switching System, and Aeronautical Information Database, were awarded respectively to successful contractors between September and December 2001, with an overall completion scheduled for March 2003.

Exchange of Radar Data

On technical cooperation with adjacent ATC authorities, agreement was made in July 2001 with the Civil Aviation Administration of China (CAAC) on exchange of radar data between Sanya on Hainan island and Hong Kong with a view to enhancing the air traffic surveillance capability of both sides. Following a series of technical coordination and tests, the radar data of Hong Kong Mount Parker Secondary Surveillance Radar (SSR) and the



民航處安排人員定期檢查雷達設施，確保飛行安全。
Radar checking is carried out on a regular basis to ensure flight safety.

總局) 就海南島三亞和香港之間相互交換雷達數據安排達成協議，以加強兩地的航空交通監察能力。經過一連串技術協調和測試後，分別位於香港柏架山和三亞的二次監察雷達已於二零零一年十月三十一日成功交換雷達數據，供兩地航空交通管制中心互相使用。

飛行校驗

本處於二零零一年七月順利把香港的無線電導航設備和着陸導航設備的飛行校驗工作，轉予中國民航總局。現時，除了精密跑道監察系統的校驗工作外，香港其餘導航設備的校驗服務均由中國民航總局負責提供。精密跑道監察系統的校驗工作現時仍然由美國聯邦航空管理局進行。

航空交通管制設備的維修事宜

現時的航空交通管制設備維修服務是根據一項中央合約而提供。由於該合約將於二零零六年九月三十日屆滿，因此本部已開始研究其他維修方案，以便定出提供維修服務的最佳方法。

Sanya SSR was successfully exchanged on October 31, 2001 for use at the two air traffic control centres.

Flight Calibration

The transfer of flight calibration on the Hong Kong radio navigation and landing aids to CAAC was successfully completed in July 2001. Currently, CAAC is providing flight calibration service to Hong Kong for all equipment systems except the Precision Runway Monitor System, on which the service from the US Federal Aviation Administration is still required.

ATC Equipment Maintenance

The ATC equipment maintenance services are currently provided under a central contract. As the contract is due to expire on September 30, 2006, the Division commenced investigation on other maintenance options with a view to formulating the best approach for the provision of maintenance services.



航空交通管制大樓內的設備都獲妥善保養。
Equipment housed in the Air Traffic Control Complex is well maintained.

更換航路監察雷達

在立法會財務委員會通過撥款後，本處已於二零零一年五月二十五日刊登憲報，招標更換設於柏架山的航路監察雷達。標書評選和審批工作正在進行，預期工程合約會於二零零二年五月批出，而雷達更換工程會於二零零三年下半年進行，以便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的衛星通訊、導航及監察／航空交通管理系統所訂的全球實施計劃，本處正繼續研究這些系統的最新發展並詳細測試系統的各個構件。有關系統的技術測試和試行運作均進展順利，部分技術成熟的系統構件已經投入運作，以便衛星通訊、導航及監察／航空交通管理系統的功能可以早日發揮，從而加強和提升香港航空交通管制服務的水平。

數據化自動航站情報服務及數據化遠航氣象情報服務

由於數據化自動航站情報服務及數據化遠航氣象情報服務試行運作結果理想，而航空界（包括國際航空運輸協會）也給予正面的評價，本處遂於二零零一年四月十九日推出新服務，經數據鏈路

Route Surveillance Radar Replacement

With funding approved by the Legislative Council Finance Committee, invitation of tenders for the replacement Route Surveillance Radar at Mount Parker was gazetted on May 25, 2001. Tenders evaluation and negotiation was underway and the contract is expected to be awarded in May 2002. The radar replacement will be carried out in the second half of 2003, with a targeted ready-for-service date in end 2003.

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 (ICAO) for the satellite-based CNS/ATM systems, studies on the latest CNS/ATM developments and detailed investigations on various elements of the CNS/ATM systems continue. Satisfactory progress was achieved on relevant technical and operational trials. Mature system elements were put into operational use to reap the benefits of early CNS/ATM applications, which can enhance and upgrade the ATC service of Hong Kong.

D-ATIS and D-VOLMET Services

With encouraging results and favourable feedback on the operational trials from the airlines community including the International Air Transport Association, the Department launched the Digital-Automatic Terminal Information Services (D-ATIS) and Digital-Meteorological Information for Aircraft in Flight (D-VOLMET)



處長和署理香港天文台台長林超英主持數據化自動航站情報服務及數據化遠航氣象情報服務的啟用儀式。

DGCA and Mr C Y Lam, acting Director of the Hong Kong Observatory officiated at the D-ATIS and D-VOLMET commencement ceremony.

提供有關資料給各航空公司和飛行員使用。這兩項數據化服務屬衛星通訊、導航及監察／航空交通管理系統計劃首批投入運作的系統，旨在改善飛行安全和提高運作效率。這兩項服務的需求年內均有穩定的增長，從運作初期的每月 3 900次增至二零零二年三月的每月約 6 100次，反映航空公司逐多使用有關嶄新服務。

飛前放行指示數據鏈路服務

由於飛前放行指示數據鏈路服務的運作測試結果令人滿意，本處在二零零一年十二月四月正式在香港國際機場推出這項服務。新服務提供另一途徑，支援航空交通指揮塔的管制員向飛行員發放飛前空管放行資料。有關離場路線、高度限制和最後巡航高度等空管放行或飛行指示，現已可經數據鏈路傳送到駕駛艙顯示及列印出來。推行飛前放行指示數據鏈路服務有助減輕飛行員和航空交通管制員的工作量、提高數據的完整性、紓緩無線電通訊的擠塞情況和提高運作效率。

via data link for use by airlines and pilots on April 19, 2001. They represented the first operational systems of the satellite-based CNS/ATM project undertaken by the Department to enhance flight safety and efficiency. The services were increasingly adopted by the airline users as reflected in the steady growth of the monthly service requests from 3 900 at the time of commissioning, to about 6 100 in March 2002.

PDC Service

Subsequent to the satisfactory operational trials on delivery of the Pre-Departure Clearance (PDC) via data link, the Department also put the service into operational use at the Hong Kong International Airport (HKIA) on December 4, 2001. This new service offers an alternative means to support the delivery of pre-departure ATC clearance information from ATC Tower controllers to pilots. The ATC clearances or flying instructions in respect of the departure routes, altitude restrictions and the final cruising levels can now be transmitted via data link for display and print-out in the cockpit. The introduction of this PDC data link service can help to reduce the workload of both pilots and air traffic controllers, improve data integrity, alleviate congestion in radio channel and enhance operational efficiency.

推行飛前放行指示數據鏈路服務有助減輕航空交通管制員的工作量。
The introduction of PDC data link service helps to reduce the workload of air traffic controller.



香港是亞太區內其中一個最先使用飛前放行指示數據鏈路服務以提高飛行效率的地區。截至二零零二年三月，香港國際機場每日平均有超過90架次離場航機使用該項服務，佔離場航班總數約35%。

航空通訊網絡及航空交通服務信息處理系統測試

國際民航組織規定亞太區須於二零零五年或之前建成全新的航空通訊網絡，並選定香港為區內其中一個中樞地點。為準備推行這項措施，本處在年內不斷與泰國民航局進行有關航空通訊網絡的初步測試。在二零零一年七月和八月，本處亦分別與日本和澳洲主管當局展開航空通訊網絡和航空交通服務信息處理系統的測試。這些測試皆已順利舉行，香港和其他參與測試的空管單位均獲益良多，所得的結果和經驗有助評估航空通訊網絡地對地儀器的連接性、互用性和功能，並可找出及解決航空通訊網絡網關系統的兼容問題，對航空通訊網絡日後在區內的推行和過渡，可發揮關鍵作用。

Hong Kong is among the first in the Asia Pacific region to use PDC data link service to enhance flight efficiency. In March 2002, a daily average of more than 90 departing flights were using the service, representing about 35 per cent of the total flights departing from Hong Kong.

ATN and AMHS Trials

The ICAO specifies an Aeronautical Telecommunication Network (ATN) to be implemented in the Asia Pacific region by 2005, and Hong Kong has been selected as one of the backbone sites in the region. To address this initiative, preliminary ATN trials with Thailand civil aviation authority continued throughout the year. Further trials on ATN and ATS Message Handling System (AMHS) also started with Japan and Australia in July and August 2001 respectively. Useful results and experience were gained by Hong Kong and the participating ATC authorities from these successful trials. They helped to evaluate the connectivity, interoperability and capability of the ATN Ground/Ground Routers as well as to identify and resolve the compatibility problems of ATN Gateway Systems, which are crucial to the success of future regional implementation and transition of the ATN.

甚高頻數據鏈路模式2測試

二零零一年十一月，本處在香港國際機場完成了甚高頻數據鏈路模式2通訊的初步技術測試，結果令人滿意。甚高頻數據鏈路模式2的數據傳送速度較高，可以每秒31 500比特的速度進行地空數據通訊，這個通訊模式將取替現行傳送速度僅為每秒2 400比特的飛機通訊定址及發送情報系統。這次測試不單選出適合設置地面站的地點，也評估了各項設備的技術表現，包括甚高頻數據鏈路模式2的數據完整性、信息傳送時間，以及與香港國際機場現行的航空及通訊設備的兼容能力等。

VDL Mode 2 Trial

In November 2001, the Department completed an initial technical trial on Very High Frequency Digital Link (VDL) Mode 2 Communications at HKIA with satisfactory results. The VDL Mode 2, which operates at a higher data transmission rate of 31 500 bits per second (bps) for air-ground data communications, aims to replace the existing Aircraft Communication Addressing and Reporting System (ACARS) that transmits at a much lower speed of 2 400 bps. The trial was successfully conducted in selecting the site suitable for ground station installation, and in evaluating the technical performance including VDL Mode 2 data integrity, message transit time and their compatibility with the existing navigation and communications equipment operating at HKIA.



民航處人員出席在港舉行的亞太經濟合作組織全球衛星導航系統實施地區會議。
CAD officials attended the Asia Pacific Economic Co-operation Global Navigation Satellite System Implementation Regional Meeting held in Hong Kong.

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。該組也負責就通訊運作事宜提供專業意見。

重劃南中國海飛行空域和在該區實施新的航空交通服務航路安排已於二零零一年十一月二日順利推行。為配合有關轉變，本部已檢討航空流動通訊中心的運作，進一步的架構檢討預期在二零零二年年中完成。

固定航空通訊服務概況

	二零零一／零二年度 2001 / 02	二零零零／零一年度 2000 / 01	增減幅度 (%) % change
處理電報總量 Messages handled	21 353 578	18 564 466	+15%

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. The Unit also provides expert advice on operational communications matters.

The airspace reorganisation and the revised ATS route structure over the South China Sea was successfully implemented on November 2, 2001. To cater for such change, the operations of the Aeronautical Mobile Centre had been reviewed. Further organisational review is planned to be completed by mid-2002.

Aeronautical Fixed Service



民航處不停為航機提供電訊服務。
Telecommunications services are provided to aircraft around the clock.

二零零一年五月八日，香港與廣州之間的航空固定電訊網線路提升至每秒2 400比特運作。

The Hong Kong-Guangzhou Aeronautical Fixed Telecommunication Network (AFTN) circuit was upgraded to 2 400 bps operations on May 8, 2001.

香港與三亞之間的航空固定電訊網線路於二零零一年八月九日起提供服務，並以每秒2 400比特運作，配合重劃南中國海飛行空域的通訊要求。

The Hong Kong-Sanya AFTN circuit operating at 2 400 bps was implemented on August 9, 2001 to meet the communications requirement of the airspace reorganisation over the South China Sea.

香港與馬尼拉的航空固定電訊網線路於二零零一年十二月二十一日提升至300波特速度運作。

The Hong Kong-Manila AFTN circuit was upgraded to 300 bauds operations on December 21, 2001.

流動航空通訊服務概況

Aeronautical Mobile Service

	二零零一／零二年度 2001 / 02	二零零零／零一年度 2000 / 01	增減幅度 (%) % change
與航機聯絡次數 Aircraft contacts	320 708	293 539	+9.2%

航空氣象廣播服務概況

Aeronautical Broadcast Service

在氣象廣播服務方面，電訊組年內為航機提供共217 326次氣象報告，較去年增加3%。

During the year, the broadcast service provided a total of 217 326 weather messages to aircraft in flight. This figure was 3 per cent higher than the previous year.