



工程及系統部負責規劃、統籌和提供香港航空交通管制(空管)系統、雷達、導航儀器和通訊等設備，並為香港飛行情報區提供航空電訊服務。

年內，本部繼續致力維持整個空管系統的最高服務水平，確保有關設備的運作穩定可靠。六個主要空管系統的容量和功能已提升，並於年內投入運作。衛星通訊、導航及監察／航空交通管理系統的發展計劃亦進展順利，其中五個系統構件已進行測試，以評

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 (FIR).

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. Enhancements of six critical ATC systems to increase their capacity and functionalities were completed, and the enhanced systems were put into operational use within the year. The Satellite-based

估其運作效益。至於更換長程一次監察雷達的工作則繼續進行。此外，本部進一步推行資訊科技系統，並審核處方有關資料保密的政策，以配合實行電子政府的目標。

## 航空交通管制系統的發展

### 航空交通管制系統

為配合南中國海空域實施「縮小垂直間隔」新規定，各個空管系統的改動和增強所需通訊設備的工程已在二零零二年十月完成，使空管系統得以順利和成功地於二零零二年十一月一日過渡至「縮小垂直間隔」的新規定。

六個主要空管系統的提升工程已相繼完成，並於二零零二年五月至二零零三年三月期間投入運作。這些系統計有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和航空資料庫系統。上述提升系統的工程有助顯著加強系統功能、運作能力和處理量，足以應付進一步增加的香港國際機場跑道升降架次。

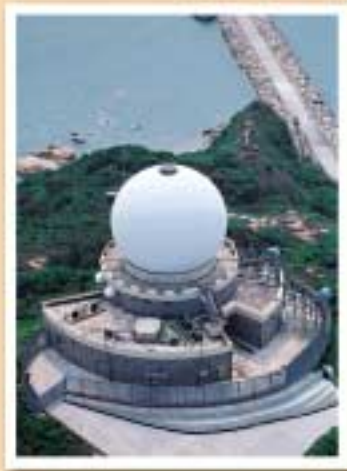
Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems project also progressed in a satisfactory manner, with five system elements put for trials so as to assess their operational benefit. Work on replacement of a long-range primary surveillance radar continued. On the other hand, the Division further implemented the necessary information technology (IT) systems and audited the relevant data security policy for the Department in line with the e-government objective.

## AIR TRAFFIC CONTROL SYSTEMS DEVELOPMENT ATC Systems

Modifications of various ATC systems and provision of additional communications equipment were completed in October 2002 to facilitate implementation of the Reduced Vertical Separation Minimum (RVSM) operations over the South China Sea. With these, there was a smooth and successful transition to the RVSM operations on November 1, 2002.

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 System were successively completed and the enhanced systems were put into operational use from May 2002 to March 2003. These upgrades significantly increase the functionalities, capabilities and processing capacities of the above systems, which can now support further increase in runway movements at the Hong Kong International Airport (HKIA).





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From left to right

位於沙洲的進場監察雷達是民航處其中一項確保飛行安全的重要裝置。

*The Approach Surveillance Radar at Sha Chau is one of CAD's major installations to ensure flight safety.*

助理處長梁煥然出席一個空管系統技術會議後，與中國民航總局空中交通管理局副局長呂小平握手。

*Assistant Director-General Mr W Y Leung shakes hand with Ms Lu Xiaoping, Deputy Director-General of Air Traffic Management Bureau of CAAC after an ATC systems technical meeting.*

### 共用雷達數據和甚高頻通訊儀器

在與鄰近地區的空管當局進行技術聯繫和合作方面，隨着西沙將設置二次監察雷達和甚高頻通訊儀器，本處已跟中國民用航空總局就共同使用有關雷達數據和通訊設施進行磋商，使二次監察雷達和甚高頻通訊的服務範圍可覆蓋整個香港飛行情報區，從而進一步提升飛行安全和空域容量。有關協議可望於二零零三年年底達成，並在二零零三年年底／二零零四年年初把雷達數據和甚高頻通訊訊號傳送到香港。

### Sharing of Radar Data and VHF Communications Facilities

On technical liaison and cooperation with adjacent ATC authorities, discussions were made with the General Administration of Civil Aviation of China (CAAC) on sharing of radar data from the secondary surveillance radar (SSR) and Very High Frequency (VHF) communications facilities to be provided at Xisha. With these, the whole Hong Kong FIR will have full SSR and VHF communications coverage. This can further enhance flight safety and airspace capacity. It is expected that the service agreement would be finalised in late 2003 with the radar data and VHF communication signals to be relayed to Hong Kong in end 2003/early 2004.

### 更換航路監察雷達

有關更換航路監察雷達的合約已在二零零二年五月十五日批出。本處遂於二零零二年六月就檢討設計的細節，與中標的供應商開會，並敲定系統的設計。雷達生產的工序進度如期，有關儀器將於二零零三年八月起陸續付運抵港。至於重置柏架山雷達站內的空調系統、防火系統和後備發電機等設備的工程已在二零零三年三月完成。現有的雷達會在二零零三年九月一日拆除，以便安裝新的雷達。後者預計於二零零三年年底啟用。

### Route Surveillance Radar Replacement

The contract for the supply of a replacement Route Surveillance Radar (RSR) was awarded on May 15, 2002. Detailed design review meeting was held with the selected supplier in June 2002 to finalise the system design. Radar production in the factory was on schedule and the equipment would be delivered to Hong Kong starting August 2003. Reprovision work on the air conditioning system, fire fighting system and standby generator, etc in the Mount Parker Station was completed in March 2003. The existing radar would be decommissioned on September 1, 2003 to make way for the installation of the new radar, which is scheduled for commissioning in end 2003.

### 航空交通管制設備的維修事宜

現時的空管設備維修服務乃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，本部繼續就更換服務的最佳方法和其過渡安排進行深入研究。此外，本處負責主持一個跨部門督導小組會議，研究日後把現時由太平山、畢拿山及鶴咀無線電站提供的技術服務外判的安排。

### 自動航站情報服務廣播

為達致國際民用航空組織(國際民航組織)對自動航站情報服務廣播作出修訂的要求，本處在二零零二年十二月完成儀器改裝工程，經甚高頻話音和數據鏈路，分別播放抵港和離港自動航站情報服務訊息。有關新服務在二零零三年一月二十三日啟用。新的自動航站情報服務訊息會一併發出風切變和湍流警告的氣象消息。

### 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和地域實施計劃，本處繼續研究系統的最新發展情況，並詳細測試系統的每個構件。有關系統的技術和運作測試均進展順利，部分技術成熟的系統構件已經投入服務，以便早日發揮衛星通訊、導航及監察／航空交通管理系統的功能，提升和優化香港空管服務的水平。

### 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 continued with in-depth investigations on the best mode of replacement service and the transition arrangement for the provision of maintenance services. The Department also chaired the Inter-departmental Steering Group Meetings on Future Arrangements for Outsourcing Technical Services currently provided at the Victoria Peak, Mount Butler and Cape D'Aguilar Radio Stations.

### ATIS Broadcast

To meet the International Civil Aviation Organization (ICAO) revised requirements on Automatic Terminal Information System (ATIS) broadcast, equipment modification on the provision of separate Arrival and Departure ATIS messages for broadcast via VHF voice and datalink was completed in December 2002, with the new services put into operational use on January 23, 2003. Additional weather information on windshear and turbulence warning was also included in the new ATIS messages.

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

To comply with the Global and Regional Implementation Plans of the 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 continued. 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.

至今，數據化自動航站情報服務、數據化遠航氣象情報服務和飛前放行指示數據鏈路服務已推出使用，並漸漸普及。現每月平均有8 400次要求提供數據化自動航站情報服務／數據化遠航氣象情報服務；平均每日有超過125架次離場飛機使用飛前放行指示數據鏈路服務。

#### 空中交通服務設施間數據通訊測試

二零零二年五月，本處與廣州就空中交通服務設施間數據通訊進行運作測試，協調透過數據鏈路把飛機管制移交，進一步的測試將繼續進行。此外，本處正與三亞和其他航空交通服務當局籌劃及／或探討空中交通服務設施間數據通訊測試的事宜。

#### 甚高頻數據鏈路模式2測試

本處自二零零二年九月起一連四個月，在香港國際機場對甚高頻數據鏈路模式2在模擬多用戶使用的情況下進行技術測試，以確定設置天線的最佳位置，並確保信號完全覆蓋香港國際機場。有關測試有助分析數據的完整性、信息傳送時間，以及與香港國際機場現有導航和通訊設備的兼容情況。

#### 航空電訊網及航空交通服務訊息處理系統測試

國際民航組織規定亞太區須於二零零五年或之前建成航空電訊網，並選定香港作為區內其中一個中樞點。為此，本處在二零零二年五月與澳洲主管當局進行航空電訊網和航空交通服務訊息處理系統的技術測試。二零零二年九月，本港與北京和曼谷就航空電訊網進行全面的三方共同測試，獲益良多，所得的結果有助識別和解決各方設備的相互運作等各種問題。本處正與新加坡籌劃航空電訊網測試的安排。此外，本處於二零零二年四月與香港天文台和國泰航空公司亦展開本地航空電訊網／航空交通服務訊息處理系統的

So far, the Digital-Automatic Terminal Information Services (D-ATIS), Digital-Meteorological Information for Aircraft in Flight (D-VOLMET) service and Pre-Departure Clearance (PDC) delivery via datalink have been put into operational use. The services were gaining popularity with a monthly average of 8 400 requests for the D-ATIS/D-VOLMET services, and a daily average of more than 125 departing flights using the PDC service.

#### AIDC Trial

An Air Traffic Services Inter-facility Data Communication (AIDC) operational trial with Guangzhou was conducted in May 2002 to facilitate transfer of aircraft control via datalink. Further trials will continue. AIDC trials with Sanya and other ATS authorities were being organised and/or explored.

#### VDL Mode 2 Trial

A VHF Digital Link (VDL) technical trial using Mode 2 communications technology was conducted at HKIA from September 2002 for four months under a multi-user scenario. The trial helped identify the most optimum antenna locations for full signal coverage on HKIA. It also benefited the analysis of data integrity, message transit time and their compatibility with the existing navigation and communications equipment operating at HKIA.

#### 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, ATN and ATS Message Handling System (AMHS) technical trials were conducted with Australia in May 2002. A comprehensive tripartite ATN trial between Beijing, Bangkok and Hong Kong was conducted in September 2002 with fruitful results in identifying and resolving various equipment interoperability issues. ATN trial with Singapore was being organised. Besides, local ATN/AMHS trials with the Hong Kong Observatory (HKO) and Cathay Pacific Airways commenced in April 2002. Tender for the supply of a more advanced AMHS trial system was invited in September



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電子工程師進行其中一項衛星通訊、導航及監察／航空交通管理系統測試。  
*An electronics engineer conducts a trial operation on one of the elements of the CNS/ATM Systems.*

數據化遠航氣象情報服務使用量日增，飛行員現可通過數據鏈路，在駕駛艙內列印有關資料，減輕工作量。  
*D-VOLMET service is gaining popularity as a pilot's workload can be reduced with the availability of information print-out inside cockpit via datalink.*

測試。至於承投提供更先進的航空交通服務訊息處理試行系統的合約則在二零零二年九月招標，並已於二零零二年十月截止投標。本處現正評核各份標書，預期在二零零三年四月批出合約。

#### 自動相關監察系統／管制員—駕駛員數據鏈路通訊系統測試

本處在二零零三年一月進一步提升現行的自動相關監察系統／管制員—駕駛員數據鏈路通訊試行系統，以支援由飛機經自動相關監察系統報告或管制員—駕駛員數據鏈路通訊系統下傳的氣象數據。年內，本處進行多項測試，把有關數據傳送至香港天文台的電腦系統作直接處理。

#### 場面活動引導和控制系統測試

本處在二零零二年十二月刊登憲報，招標承投在香港國際機場提供場面活動引導和控制系統測試服務，並已於二零零三年二月截止投標。本處正評核各份標書，預期在二零零四年年初展開測試。該新系統可把飛行區內的飛機和車輛轉為可識別的確認標誌，並能發出擅闖跑道警報。

2002 and closed in October 2002. Evaluation of the tender proposals was underway and the contract is expected to be awarded in April 2003.

#### ADS/CPDLC Trials

The existing Automatic Dependent Surveillance/Controller-Pilot Data Link Communications (ADS/CPDLC) trial system was further enhanced in January 2003 to support the downlink of meteorological data from aircraft via ADS reports or CPDLC messages. Trials were organised during the year to relay the relevant data to the computer systems of the HKO for direct processing.

#### SMGCS Trials

Tender invitation for the provision of a Surface Movement Guidance and Control System (SMGCS) trial service at HKIA was gazetted in December 2002 and closed in February 2003. Evaluation of tender proposals was underway and the trial was scheduled to commence in early 2004. The new system can generate target identification labels for aircraft and vehicles on the airfield and provide runway intrusion alert.



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工程及系統部密切監察導航設備的維修情況。  
*Maintenance of navigational aids is closely monitored by the Division.*

航空通訊員於航空固定通訊中心內，不斷提供電訊服務。  
*Aeronautical Communications Officers provide continuous telecommunication services at the Aeronautical Fixed Centre.*

### 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。

本處在重劃南中國海空域和在該區實施經修正的航空交通服務航路結構方面取得更多經驗後，遂於二零零二年六月一日進一步改進航空流動通訊中心的運作模式，達致減省人手。此外，本處亦引進新的運作程序和加強員工培訓，以配合在香港空域實施「縮小垂直間隔」的新規定。

### 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.

With more experience gained in the airspace reorganisation and the revised ATS route structure over the South China Sea, the operational mode of the Aeronautical Mobile Centre was further fine-tuned on June 1, 2002 to achieve additional staff savings. New operational procedures and staff training were introduced to tie in with the introduction of RVSM operations in Hong Kong airspace.

### 固定航空通訊服務概況

### Aeronautical Fixed Service

	二零零二／零三年度 2002/03	二零零一／零二年度 2001/02	升跌百分比(%) % change
處理電報總量 Messages handled	21 427 708	21 353 578	+0.3%

本處正測試香港與曼谷之間的航空電訊網。倘測試結果滿意，香港與曼谷之間的航空固定電訊網路預定於二零零三年轉移至航空通訊網絡的運作模式。

ATN trials were conducted between Hong Kong and Bangkok. Subject to satisfactory results, the Hong Kong-Bangkok Aeronautical Fixed Telecommunication Network circuit is planned to be migrated to ATN operation in 2003.

## 流動航空通訊服務概況

## Aeronautical Mobile Service

	二零零二／零三年度 2002/03	二零零一／零二年度 2001/02	升跌百分比(%) % change
與航機聯絡次數 Aircraft contacts	158 448	320 708	-50.6%

由於香港的飛行空域縮小，以及二零零一年十一月南中國海修正航空交通服務航路結構，加上二零零二年十一月實施「縮小垂直間隔」規定，以致流動航空通訊服務的需求和地空通訊量均較二零零一／零二年度顯著下降。

With the reduction of Hong Kong airspace and the introduction of a revised ATS route structure over the South China Sea in November 2001 as well as the RVSM implementation in November 2002, there was a significant decrease in the service demand and hence the volume of air-ground traffic as compared with 2001/02.

## 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合共216 407次氣象報告，較去年減少0.4%。

## Aeronautical Broadcast Service

During the year, the broadcast service provided a total of 216 407 weather messages to aircraft in flight. This figure was 0.4 per cent lower than the previous year.

## 資訊科技的應用

本部負責推廣處內人員更廣泛地應用資訊科技，以配合推行電子政府的目標。年內，本部把36種申請表格，包括飛機維修執照、飛機登記、預約執照考試，以及根據《香港機場（障礙管制）條例》申請臨時豁免等表格提供於本處網頁內以供下載。航空業界亦可透過互聯網把申請經營不定期航班服務的電子表格交回本處處理。此外，本處於二零零二年九月委聘顧問進行評估處內資訊科技保安的風險，結果令人滿意，本處並正分階段實施加強保安的各項建議措施。

## IT APPLICATIONS

The Division is charged with the responsibility of promoting IT applications within the Department in line with the e-government objective. During the year, a total of 36 application forms covering aircraft maintenance licences, registration of aircraft, licences examination booking, and temporary exemption under the Hong Kong Airport (Control of Obstructions) Ordinance, etc were available for downloading from the CAD website. An e-option form for permission to operate non-scheduled services can be submitted on-line to CAD for processing. An IT security consultant was employed in September 2002 to conduct an IT security risk assessment for the Department. The results were satisfactory with enhancement recommendations being implemented in phases.