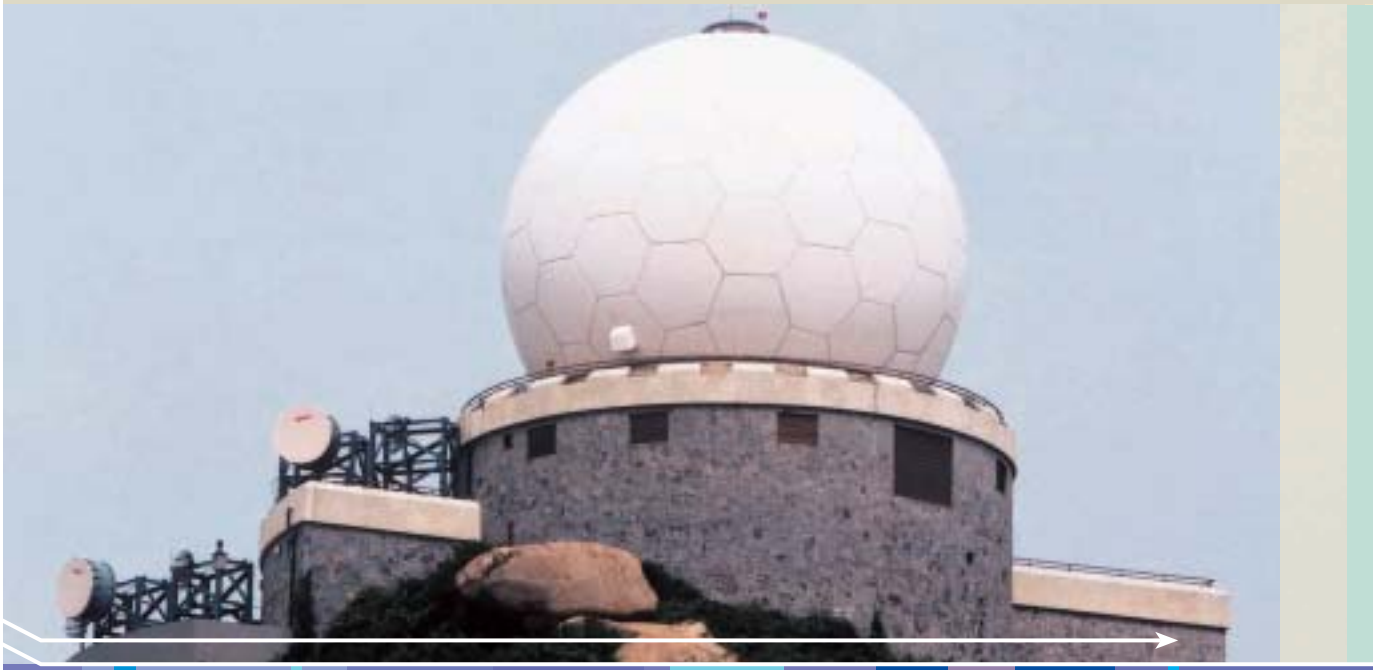


# 第六章 工程及系統
# Chapter 6 Engineering and Systems

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，本部繼續致力把整個空管系統維持於最高服務水平，確保有關設備運作穩定可靠，支援各項空中交通服務。柏架山的航路監察雷達在年內更換妥當，並已啟用。東龍洲多普勒甚高頻全向無線電信標及測距設備的更換工程亦已經展開，進度令人滿意。衞星通訊、導航及監察／航空

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 to support air traffic services. The replacement Route Surveillance Radar at Mount Parker was installed and put into operational use within the year. Work on replacement of the Doppler Very High Frequency Omni-directional Radio Range and

交通管理系統的發展計劃進展順利，三個系統構件已投入運作，其餘四個正接受測試，以評估運作效益。此外，本部亦進一步推行資訊科技系統，擴大部門的資訊基建，以配合實施政府服務電子化的目標。

Distance Measuring Equipment (DVOR/DME) on Tung Lung Island commenced and was progressing well. The Satellite-based Communications, Navigation and Surveillance/Air Traffic Management (CNS/ATM) Systems project continued to progress in a satisfactory manner, with three system elements now in operational use and four on trials to assess their operational benefit. On the other hand, the Division further implemented the necessary information technology (IT) systems and expanded the IT infrastructure of the Department in line with the e-government objective.

位於柏架山的舊航路監察雷達正進行清拆工程。
The old RSR at Mount Parker is being demissioned.

## 航空交通管制系統的發展

### 停用航路監察雷達

航路監察雷達於一九七八年裝置，多年來雖然表現穩妥，但由於機件老化及難以採購零件，故必須更換。更換雷達的合約批出後，該雷達按照更換計劃於二零零三年九月一日停用，以便安裝新的雷達。舊雷達的顯示螢幕已捐贈予康樂及文化事務署作為博物館的展品。

### 更換航路監察雷達

二零零三年八月，新雷達完成在廠驗收測試後付運來港，安裝工程於九月中展開。新雷達於二零零三年十二月通過校飛驗證後，驗收程序於十二月三十一日完成。其後，我們對雷達的性能作進一步優化和評估。二零零四年三月三十日，民航處處長主持啟用儀式後，新雷達隨即投入運作。

## AIR TRAFFIC CONTROL SYSTEMS DEVELOPMENT

### Decommissioning of Route Surveillance Radar

The Route Surveillance Radar (RSR) was installed in 1978 and the performance had been very reliable and satisfactory. However, in view of its age and the difficulty in obtaining the spare parts, replacement was necessary. Following the award of the contract for the new replacement radar and the planned replacement schedule, the RSR was decommissioned on September 1, 2003 to make way for the installation of the new radar. The old radar performance monitor was donated to the Leisure and Cultural Services Department for museum display.

### Route Surveillance Radar Replacement

With the satisfactory completion of the factory acceptance test, delivery of the replacement radar to Hong Kong commenced in August 2003. Installation then started in mid-September. Commissioning flight check was conducted in December 2003 and the new radar was accepted on December 31, 2003. Upon completion of further optimisation and evaluation of the radar performance, the radar was put into operational use immediately after the new RSR launching ceremony by the Director-General of Civil Aviation on March 30, 2004.

位於柏架山的新航路監察雷達正進行安裝工程。
Installation of the new RSR at Mount Parker is in progress.

電子工程師於東龍洲檢查多普勒甚高頻全向無線電信標及測距儀。倘獲得撥款，該儀器將會被更換。
Electronics Engineer carries out checking on DVOR/DME on Tung Lung Island. The equipment will be replaced subject to funding approval.

## 更換東龍洲多普勒甚高頻全向無線電信標及測距設備

現時位於東龍洲的多普勒甚高頻全向無線電信標及測距設備(信標及測距設備)已連續使用超過19年，已再沒有零件可供替換，維修工作難以進行，而維修費用也日趨高昂。在航空交通諮詢委員會和立法會經濟事務委員會的支持下，我們計劃於二零零四年四月向立法會財務委員會提交撥款申請。倘申請獲得通過，更換信標及測距設備的工程將於二零零六年五月展開。

## 共用雷達數據和甚高頻通訊儀器

隨著西沙將設置二次監察雷達和甚高頻通訊儀器，本處繼續就共同使用有關雷達數據和通訊設施的事宜，與中國民用航空總局進行緊密技術聯繫和合作。有關協議可望於二零零四年年底達成，並在二零零四年年底／二零零五年年初把雷達數據和甚高頻通訊訊號傳送到香港。此後，二次監察雷達和甚高頻通訊的服務範圍會覆蓋整個香港飛行情報區，有助進一步提高飛行安全和空域容量。

## Replacement of Doppler VHF Omni-Directional Radio Range and Distance Measuring Equipment on Tung Lung Island

The existing Doppler Very High Frequency (VHF) Omni-Directional Radio Range and Distance Measuring Equipment (DVOR/DME) on Tung Lung Island has been in continuous service for more than 19 years and it has become increasingly costly and difficult to maintain as spare parts are no longer available. With the support of the Aviation Advisory Board and the Legislative Council Panel on Economic Services, the replacement proposal will be submitted to the Finance Committee of the Legislative Council in April 2004 for discussion and approval. Subject to funding approval, the replacement DVOR/DME will be commissioned in May 2006.

## Sharing of Radar Data and VHF Communications Facilities

Close technical liaison and coordination continued with the General Administration of Civil Aviation of China (CAAC) on sharing of radar data from the secondary surveillance radar (SSR) and 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 agreements would be finalised in late 2004 with the radar data and VHF communications signals to be relayed to Hong Kong in end 2004/early 2005.

鶴咀無線電台是其一個考慮外判技術和維修服務的外站。
Cape D'Aguilar Radio Station is one of the out stations being considered to outsource its technical and maintenance services.

## 航空交通管制設備的維修事宜

現時的空管設備維修服務是根據一項中央合約提供的。由於該合約將於二零零六年九月三十日屆滿，本部已就更換服務的最佳方法及其過渡安排完成深入研究，並採取積極措施，確保空管設備的運作和維修能夠在二零零六年九月以後，繼續維持現時的卓越水平。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。

## ATC Equipment Maintenance

The ATC equipment maintenance services are currently provided under a central contract, which is due to expire on September 30, 2006. The Division had completed the in-depth investigations on the best mode of replacement service and the transitional arrangement for the provision of maintenance services. Action are being actively taken to ensure that the current high standards of ATC equipment operations and maintenance can be maintained after September 2006. 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.

# 衞星通訊、導航及監察／航空交通管理系統

為配合國際民航組織就衞星通訊、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，以便早日發揮衞星通訊、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。

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，而且繼續漸趨普及。現時，每月平均有12 000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134架次離場飛機使用飛前放行指示數據鏈路服務，約佔香港國際機場每日離場飛機架次43%。

# 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.

So far the Digital-Automatic Terminal Information Service (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 continued to gain popularity with a monthly average of 12 000 requests for the D-ATIS/D-VOLMET services, and a daily average of 134 departing flights using the PDC service, representing approximately 43 per cent of the daily departing flights from Hong Kong International Airport (HKIA).

本部聯同鄰近地區的航空交通管制當局積極進行多項航空電訊網技術和運作試驗。
The division works proactively to conduct ATN technical and operational trials with neighbouring air traffic control authorities.

## 空中交通服務設施間數據通訊測試

年內，本處先後與三亞和海口就空中交通服務設施間數據通訊進行技術測試。為及早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，本處正與廣州及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運作測試的事宜。

## 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，亞太地區必須在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，本處與北京、曼谷及新加坡的航空當局安排和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。二零零三年十二月，我們與曼谷的航空電訊網運作測試更逐步擴展到每天24小時不停進行。測試所得的經驗，不但有助識別和解決各方設備的相互運作等各種問題，更令香港在亞太區轉移到以航空電訊網和航空交通服務訊息處理系統運作的過程中，擔當領導的角色。按照目前的計劃，香港與曼谷之間的航空電訊網將於二零零四年年中開始運作，成為亞太區首個投入運作的航空電訊網。屆時，數據交換和保安的完整性均會加強。此外，本處繼續與香港天文台和國泰航空公司進行本地航空電訊網及航空交通服務訊息處理系統測試，並取得令人鼓舞的成果。

本處於二零零三年四月二十八日批出提供更先進的航空交通服務訊息處理試行系統的合約，驗收程序也於二零零四年一月二十日完成。我們會與日本當局就新的試行系統進行測試。

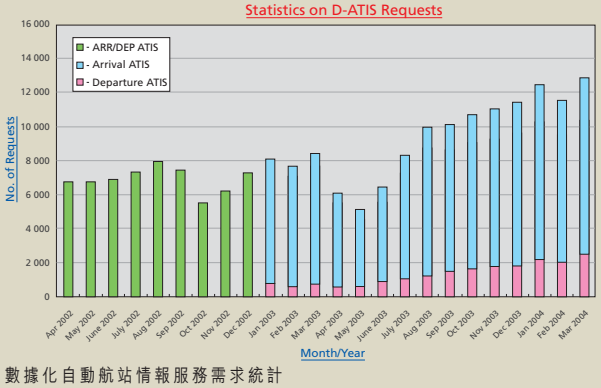
## AIDC Trial

The Air Traffic Services Inter-facility Data Communication (AIDC) technical trials were conducted initially with Sanya and later with Haikou during the year. Further trials will continue to facilitate early transfer of aircraft control via datalink. AIDC operational trials with Guangzhou and other ATS authorities were being organised and/or explored.

## 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 comply with this initiative, ATN and/or ATS Message Handling System (AMHS) trials were arranged and conducted with Beijing, Bangkok and Singapore. Furthermore, the ATN operational trial with Bangkok was progressively extended to 24 hours a day in December 2003. The experience so gained helps identify and resolve various equipment interoperability issues, and allows Hong Kong to assume the leading role in the Asia Pacific Region in migrating towards the ATN/AMHS operations. It is currently planned to put the Hong Kong - Bangkok ATN circuit into operational use in mid- 2004 to enhance the integrity performance on data exchange and security. This will be the first operational ATN circuit in the Asia Pacific Region. Besides, local ATN/AMHS trials with the Hong Kong Observatory (HKO) and Cathay Pacific Airways continued with encouraging results.

The contract for the supply of a more advanced AMHS trial system was awarded on April 28, 2003 and the system was accepted on January 20, 2004. The new AMHS trial system will be used for trials with Japan.




數據化自動航站情報服務需求統計
Statistics on D-ATIS Requests

場面活動引導和控制系統
Surface Movement Guidance and Control System

## 場面活動引導和控制系統測試

為香港國際機場提供場面活動引導和控制系統測試服務的合約已於二零零三年十二月十二日批出，系統設計的檢討和詳細實地勘察工作隨即在二零零四年一月初進行。有關設備已在二零零四年二月交付，並正進行系統安裝。預計驗收測試將如期在二零零四年四月進行。新系統可把機場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。

## 空中交通管制快速模擬系統

快速模擬系統是一套有助快速評估新訂空中交通管制程序的工具。提供該系統的合約於二零零三年十二月二十九日批出，有關設備已於二零零四年三月初在香港國際機場進行安裝。現時，系統正進行測試，並計劃於二零零四年五月啟用。

## 由航機下傳氣象報告

本部和香港天文台及國泰航空公司緊密合作，安排由國泰航機利用飛機通信定址及發送情報系統下傳天氣報告，包括航道的風向、風速及溫度等資料，然後轉送給天文台處理。由於南中國海區域的氣象數據稀少，由航機下傳天氣報告有助為該區提供更準確的天氣預報。

## SMGCS Trials

The contract for the provision of a Surface Movement Guidance and Control System (SMGCS) trial service at HKIA was awarded on December 12, 2003. System design review and detailed site surveys were conducted in early January 2004. Delivery of the equipment commenced in February 2004 and the system is being installed. It is expected that the Acceptance Test would be conducted in April 2004 as scheduled. The new system can generate the target identification labels for aircraft and vehicles on the airfield and provide runway incursion alert.

## Air Traffic Control Fast Time Simulation System

The contract for the provision of a Fast Time Simulation System, a useful tool to expedite the evaluation of new ATC procedures, was awarded on December 29, 2003. The equipment was delivered and installed at HKIA in early March 2004. Testing is underway and system commissioning is planned for May 2004.

## Downlink of Meteorological (MET) Reports from Aircraft

The Division has worked in close collaboration with HKO and Cathay Pacific Airways on the downlink of weather reports from aircraft of Cathay Pacific via Aircraft Communication, Addressing and Reporting System (ACARS) and relay of such information to HKO for processing. The weather reports contain information on wind direction, wind speed and temperature along the aircraft flight path, which help improve the accuracy of weather forecast over the data-sparse South China Sea Area.

### 全球衞星導航系統

有關全球衞星導航系統信號的質素研究及分析已於二零零三年四月展開。從所得的全球衞星定位系統數據所見，系統信號的可用性符合國際民航組織有關航路導航和終端導航的要求。就使用全球衞星定位系統後新的區域導航離場程序，飛行校驗已於二零零四年三月展開，預期校驗工作會於二零零四年五月完成。倘校驗結果滿意，本地航空公司將於二零零四年年中對區域導航程序展開運作評估。

## 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。

隨著西沙計劃把二次監察雷達和甚高頻通訊訊號傳送到香港，我們已著手進行研究，檢討航空流動通訊中心日後的安排，確保訊號傳送服務符合成本效益。

### Global Navigation Satellite System

Global Navigation Satellite System (GNSS) signal quality study and analysis commenced in April 2003. With the Global Positioning System (GPS) data collected so far, the GPS signal availability was found meeting the ICAO requirements for en-route and terminal navigations. Flight check of the new RNAV departure procedures using GPS commenced in March 2004 and is expected to be completed in May 2004. Subject to favourable flight check results, operational evaluation of the above RNAV procedures by local airlines will commence in mid-2004.

## TELECOMMUNICATIONS SERVICES

The Telecommunications Unit is responsible for the provision of aeronautical fixed, mobile and broadcasting services as well as communication services for search and rescue. The Unit also provides expert advice on operational communications matters.

With the planned availability of the SSR and VHF communications signals from Xisha to Hong Kong, a study was initiated to review the future arrangement of the Aeronautical Mobile Centre for the delivery of a cost effective service.

航空通訊員於航空固定通訊中心內，提供無間斷的電訊服務。
Aeronautical Communications Officers provide continuous telecommunication services at the Aeronautical Fixed Centre.

## 固定航空通訊服務情況 Aeronautical Fixed Service

| | 二零零三／零四年度 2003/04 | 二零零二／零三年度 2002/03 | 升跌百分比(%) % change |
|---|---|---|---|
| 處理電報總量 Messages handled | 21 682 475 | 21 427 708 | +1.2% |

儘管嚴重急性呼吸系統綜合症（「沙士」）爆發，導致航空交通量下降，但電報處理量在年內仍有輕微增長。香港與曼谷之間的航空固定電訊網路預定於二零零四年年中轉移至航空通訊網絡的運作模式。

Despite the outbreak of SARS and the resulting drop in air traffic, the number of messages processed in the year still achieved a slight growth growth. The Hong Kong-Bangkok Aeronautical Fixed Telecommunication Network (AFTN) Circuit is planned to be migrated to ATN operation in mid-2004.

## 流動航空通訊服務情況 Aeronautical Mobile Service

| | 二零零三／零四年度 2003/04 | 二零零二／零三年度 2002/03 | 升跌百分比(%) % change |
|---|---|---|---|
| 與航機聯絡次數 Aircraft contacts | 124 089 | 158 448 | -21.7% |

「沙士」爆發令航機升降數目減少，以致地空通訊服務需求較二零零二／零三年下降。

Due to the outbreak of SARS, there was a decrease in flight movements and hence the service demand for air-ground traffic as compared with 2002/03.

## 航空氣象廣播服務情況 Aeronautical Broadcast Service

在氣象廣播服務方面，電訊組年內為航機提供合共216 357次氣象報告，數字與去年大致相若。

During the year, the broadcast service provided a total of 216 357 weather messages to aircraft in flight. This figure was roughly the same as in previous year.

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

## 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，以配合政府服務電子化的目標。目前，本部已把36種申請表格，包括飛機維修工程師執照、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備於本處的網頁，可供下載。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。本處於二零零二年九月委聘顧問就本處的資訊保安進行評估，顧問建議加強保安的所有各項措施已在二零零三年九月推行。部門正準備於二零零四年四月一日成立資訊科技管理組，以加強規劃、推行和支援部門內的資訊科技系統和應用系統。

## IT APPLICATIONS

The Division is charged with the responsibility of promoting IT applications within the Department in line with the e-government objective. 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 are now 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. The enhancement measures as recommended by the IT security consultant engaged by the Department in September 2002 were all implemented in September 2003. Work is on-going on the establishment of the IT Management Unit (ITMU) for the Department on April 1, 2004 to enhance and strengthen the planning, implementation and support on IT systems and applications within CAD.