

For information

Legislative Council Panel on Economic Services

**Power Interruption Incident at the
Hong Kong International Airport –
Final Report Submitted by the Airport Authority**

Introduction

The Airport Authority's (AA) preliminary report on the power interruption incident at the Hong Kong International Airport on 10 June 2004 was submitted to Members at the meeting on 28 June 2004 (LC Paper No. CB(1)2246/03-04(01)). This paper submits for Members' information AA's final report on the incident at **Attachment**.

Attachment

Final Report

2. Apart from confirming the cause of the incident as identified in the preliminary report, AA's final report also outlines the improvement works that have been commissioned to enhance the electrical system of the Passenger Terminal Building.
3. The government welcomes the AA's efforts in improving the reliability of the electrical systems concerned in order to avoid further incidents of power interruption.
4. Members are invited to note the contents of this paper.

Economic Development and Labour Bureau
August 2004

Attachment

REPORT ON POWER INTERRUPTION ON 10 JUNE 2004

A disruption to the power distribution system occurred at 1900 hours on Thursday, 10 June 2004. Power was lost to all levels of the southern part of the Passenger Terminal Building (PTB). Power was restored gradually in phases from 1935 hours, with all power networks restored at 2030 hours. Airport operations resumed normal at 2045 hours. During the interruption, the Airport Emergency Centre (AEC) was activated at 1930 hours and contingency procedures were implemented. With the support of the airport community, disruption to operations had been kept to a minimum. During this period, 2 out of 46 flights were delayed, 77 out of 4,800 bags were short-shipped. Details of the incident are listed in **Annex I**, titled "Power Interruption in PTB on 10 June 2004"

Management did not only focus its efforts on finding the cause of the disruption, it has also conducted a review of the power distribution system and has identified enhancements that will minimize the risk of re-occurrence in the event of power interruption in the future. Improvement works as approved by the AA Board in June has started and all projects are expected to be completed in 2005. The enhancement works are outlined in **Annex II**, titled "Improvement Works".

AIRPORT AUTHORITY
16 August 2004

Annex I

**POWER INTERRUPTION IN
PASSENGER TERMINAL BUILDING
ON 10 JUNE 2004**

POWER INTERRUPTION TO PTB ON 10 JUNE 2004

1. SYNOPSIS

A disruption to the power distribution system occurred at 1900 hours on Thursday, 10 June 2004. Power was lost to all levels of the southern part of the Passenger Terminal Building (PTB). Power was restored gradually in phases from 1935 hours, with all power networks restored at 2030 hours. Airport operations resumed normal at 2045 hours. During the interruption, the Airport Emergency Centre (AEC) was activated at 1930 hours and contingency procedures were implemented. With the support of the airport community, disruption to operations had been kept to a minimum. During this period, 2 out of 46 flights were delayed, 77 out of 4,800 bags were short-shipped.

2. SEQUENCE OF EVENTS

Time	Description
<u>10-6-04</u> 1900	Power interruption noticed in AOCC. Subsequently it was reported that power supply at southern part of PTB, including Processing Terminal south, East Hall south, South Concourse, customs hall south, office block and Level 2 baggage hall were out. All facilities in these areas were affected.
1902	Power supply to half of the affected areas restored. Public announcement was made immediately and at five minutes interval thereafter to advise passengers of the power interruption.
1915	Power supply to Level 6 East Hall extension and 7 East Hall food court was restored.
1919	Re-allocation of check-in counters for the affected airlines commenced.
1925	Baggage of all arrival and departure flights at basement were diverted to north hall laterals. All transfer baggage were routed via the remote transfer facility for handling.
1926	APM operation was suspended because of shut down of escalators.
1930	AEC was activated.
1935	Power supply to part of the shops and tenants facilities at the central area of East Hall, part of high level lighting at Level 7 East Hall, part of south check in hall, Level 5 immigration area, some tenant areas at Level 4 East Hall and other individual areas was restored.

Time	Description
1955	Power supply to Level 5 M&G hall & Level 6 offices was restored.
2000	Two switches at substation PB tripped again and power supply to part of the central area of East Hall and some other areas was affected again.
2006	The whole power network was put to manual mode control, after it was confirmed that that tripping of the High Voltage switches at substation PB was caused by malfunctioning of the computer control system.
2030	All power networks resumed normal.
2045	Minor services/facilities were restored to normal.
2045	Press conference by AA was held at aisle G.
2130	AEC stood down.

3. IMPACTS ON OPERATION AND ACTIONS TAKEN

3.1 There were only minor impacts to the flight schedule :

- 2 flights (out of 46) delayed (one for 32 minutes and the other for 78 minutes), due to the need of diversion to other loading bridges.
- 77 out of 4,800 baggage were short-shipped.
- No disruption to arrival flights as all passengers and baggage were diverted to the north hall.



Annex II

IMPROVEMENT WORKS

IMPROVEMENT WORKS

1. TECHNICAL INVESTIGATION AND FINDINGS

- 1.1 The Authority had conducted a detailed investigation to identify the main cause that led to the power outage in the Passenger Terminal Building (PTB) on 10 June 2004. It was concluded that the faulty Remote Terminal Unit (RTU) at HV switch station “PB” had generated false signals to the High Voltage Supervisory Control and Data Acquisition (HV SCADA) computer server and initiated a supply transfer and load shedding sequence for PB substation even though the CLP supply was healthy. The electrical supply transfer sequence was completed for only half of the circuits before it was stopped by a false signal transmitted by the RTU.
- 1.2 Apart from finding the main cause of the disruption, the Authority has conducted a review of the electrical system with a view to identify improvements and enhancements that will help to minimize the risk of re-occurrence as well as reduce the operational disruption in the event of power failure in the future.

2. IMPROVEMENT AND ENHANCEMENTS

2.1 **Action Item 1 – Replace Communication Processing Cards to the HV SCADA System**

The faulty hardware card was replaced for the affected HV substation “PB” and the SCADA system has returned to normal status. The faulty card had been operated for 7 years while the design working life for a similar product is about 10 years. All the hardware cards in the SCADA system will be replaced to minimize the risk of re-occurrence. The works will take 5 months to complete.

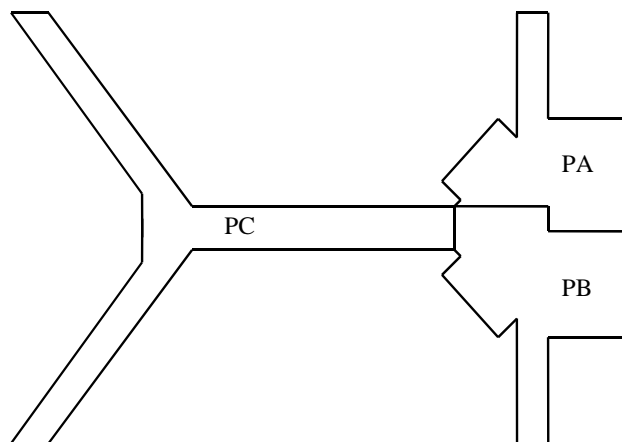
2.2 **Action Item 2 – Install a Communication Validation System to the HV SCADA System**

The system investigation revealed that faulty signals were transmitted from Remote Terminal Unit (RTU) to the main system. To prevent similar occurrence, the HV SCADA will be enhanced with a validation process to check and ensure that the signal is valid before transmission.

The estimated period to complete this modification will be 2 or 3 months.

2.3 **Action Item 3 – Modification to the Total Electrical Power Distribution System**

The current distribution network is serving the areas as shown:



Any power failure to HV substation “PA”, “PB” or “PC” will affect one third of the terminal operation. The Authority will reconfigure the power distribution network so that if there is any power failure to one of the substations, it will not result in total power loss of one third of the terminal.

The revised network will have the entire building configured as one zone and any single substation failure will result in the loss of about 25% of the power distributed across the building.

Emphasis will be placed to ensure that critical systems or areas will continue to operate. Standby power distribution system will be modified to provide non interruptible air conditioning supply to the building.

This enhancement project involves significant amount of new cabling and alteration to electrical switchboards. It will take 1 year to complete.

2.4 **Action Item 4 – Install Additional Emergency Generator**

The current system will shed chiller plants in case of power disruption. The impact of loss of chiller plant to the PTB can be quite significant with the rapid temperature increase especially in the summer season. An additional emergency generator will be installed to provide backup power to support the



chiller system.

The additional generator and the associated cable installation and modification of system control will take 1 year to complete.