

行政院及所屬各機關出國報告  
(出國類別：國際會議)

## 出席國際運輸安全協會 2004 年會報告

服務機關：行政院飛航安全委員會

出國人職稱：執行長、組長

姓名：戎凱、周光燦

出國地區：荷蘭阿培爾頓

出國期間：民國九十三年三月廿三日至廿六日

報告日期：民國九十三年四月十四日

H>/C09301517

行政院及所屬各機關出國報告提要 系統識別號 C09301517

出國報告名稱：出席國際運輸安全協會 2004 年會報告

頁數：60 含附件：是

出國計畫主辦機關：行政院飛航安全委員會

聯絡人：黃佩蒂 電話：(02) 2547-5200 分機 154

出國人員姓名：戎 凱、周光燦

服務機關：行政院飛航安全委員會

單位 / 職 稱：執行長、失事調查組組長

電話：(02) 2547-5200 分機 115、166

出國類別：1 考察2 進修3 研究4 實習5 其他

出國期間：民國九十三年三月廿日至廿八日

出國地區：荷蘭阿培爾頓

報告日期：民國九十三年四月十四日

分類號/目

關鍵詞：國際運輸安全協會、ITSA、荷蘭、

內容摘要：(二百至三百字)

國際運輸安全協會(International Transportation Safety Association, ITSA)

係一國際性專業組織，宗旨為分享各會員國之失事調查經驗以改善運輸安全。該協會之會員為各國負責運輸工具失事調查之獨立政府機關所組成，目前會員國包括：加拿大、獨立國協、芬蘭、印度、荷蘭、紐西蘭、瑞典、英國、美國及中華民國。我國係前（八十九）年獲邀加入該會。

「國際運輸安全協會」二〇〇四年年會於本（九十三）年三月廿三日起在荷蘭阿培爾頓市舉行四天，議程詳如附件一。本會執行長於會中發表「華航 CI611 及復興 GE791 水下打撈作業經驗分享」論文（詳如附件二），失事調查組周組長亦於會中報告復興航空公司 GE791 貨機失事調查事實資料。

本文電子檔已上傳至出國報告資訊網

行政院及所屬各機關出國報告審核表

出國報告名稱：出席國際運輸安全協會 2004 年會報告

出國計畫主辦機關名稱：行政院飛航安全委員會

出國人姓名/職稱/服務單位：執行長/執行長、周光燦/失事調查組/組長

出國計畫主辦機關審核意見：

- 1.依限繳交出報告
- 2.格式完整
- 3.內容充實完備
- 4.建議具參考價值
- 5.送本機關參考或研辦
- 6.送上級機關參考
- 7.退回補正,原因:
  - (1)不符原核定出國計畫
  - (2)以外文撰寫或僅以所蒐集外文資料為內容
  - (3)內容空洞簡略
  - (4)未依行政院所屬各機關出國報告規格辦理
  - (5)未於資訊網登錄提要資料及傳送出國報告電子檔
- 8.其他處理意見：

層轉機關審核意見：

- 同意主辦機關審核意見
  - 全部 部份\_\_\_\_\_ (填寫審核意見編號)
- 退回補正,原因:\_\_\_\_\_ (填寫審核意見編號)
- 其他處理意見：

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## 壹、 目的

國際運輸安全協會(International Transportation Safety Association, ITSA)係一國際性專業組織，宗旨為分享各會員國之失事調查經驗以改善運輸安全。該協會之會員為具有運輸工具事故獨立調查權責之政府機關所組成，目前會員國包括：澳大利亞、加拿大、獨立國協、芬蘭、印度、荷蘭、紐西蘭、瑞典、英國、美國及我國。我國係前（八十九）年獲邀加入該會。

ITSA2004 年年會於本（九十三）年三月廿三日至廿六日在荷蘭阿培爾頓市舉行四天，議程詳如附件一。本會執行長於會中報告「華航 CI611 及復興 GE791 失事航空器水下打撈作業經驗分享」（詳如附件二）。另，隨行之失事調查組周組長亦於會中報告「復興 GE791 貨機失事調查事實資料」（詳如附件三）。

本屆年會因理事長 Mr. Pieter van Vollenhoven (即荷蘭運輸安全委員會主席)週前完成手術，體力尚未復原，經會員國代表議決委請紐西蘭運輸事故調查委員會執行長 Mr. William Jeffries 代理。

## 貳、行程

三月廿日 啟程

三月廿二日 抵達荷蘭阿培爾頓市，

三月廿三日 歡迎酒會

三月廿四日

- 09:00 開幕式、宣布新任秘書
- 09:30 會務報告
- 09:45 共同關切之安全議題
  1. 如何平衡安全與效率
  2. 誰（個人與組織）負擔安全責任
  3. 飛航事故後之救援與消防
- 10:00 確認 2002 年會會議紀錄
- 10:45 歐盟運輸安全現況報告
- 11:30 ITSA 未來組織結構
  1. 初期組織

2. 會員國之資格要求
3. 新會員國具多種運輸工具事故 (Multi-modal) 調查權責
4. ITSA 繼任理事長任期與人選
5. ITSA 秘書處及人力
6. ITSA 未來發展方向

□ 13:30 調查人員之訓練與資格

1. 美國運輸安全委員會安全學院
2. 澳大利亞運輸安全局
3. 國際民航組織第十三號附約評鑑

□ 14:15 成立安全委員會之程序

□ 15:00 飛安改善建議之法律責任

三月廿五日

□ 航空器殘骸水下打撈作業

1. 瑞士航空公司 SW111 失事調查：加拿大運輸安全委員會執行長 Mr. David Kinsman 報告。

2. 環球航空公司 TW800 失事調查：美國運輸安全

委員會副主席 Mr. Mark Rosenker 報告。

3. 華航 CI611、復興 GE791 及 GE543 失事調查進

度報告：本會戒執行長及周組長報告

□ 德國南部兩航空器空中相撞事故報告：獨立國協航空

委員會副主席 Mr. Sergey Zayko 報告。

三月廿六日

□ 09:00 其他議題

1. ITSA 理事長輪替制度

2. 漁船事故調查及改善建議

3. 其他交通事故調查

4. 歐洲聯合管制 (EUROCONTROL) 安全改善

三月廿七日 返程

三月廿八日 抵達中正國際機場



## 參、心得與建議

- 一、 多國代表認為調查權責及組織法制化之立法經驗彌足可貴，可供其他國家建立運輸安全組織之參考。本會刻正進行調查法與組織法之法制程序，國際同業之法制經驗已經成為本會有用參考資料。
- 二、 多國代表表示其年度預算經常不能滿足業務需要，但在重大運輸事故發生後，往往能獲准增加預算，如 2002 年協和號超音速客機失事後次年，法國航空事故調查局(BEA)之預算即呈倍數增加。此與飛安界常用之『If you think safety is expensive, try an accident』之說不謀而合。另外，加拿大代表建議定期及不定期對國會議員簡報調查進度或會務現況，有助於調查相關法案之立法程序及年度預算順利通過。
- 三、 由於航空器飛航事故發生後倍受社會關注，新聞報導成為民眾了解事件發生經過及調查結果主要之媒體。各國代表均認為與媒體之關係極其重要。透過媒體正面報導調查報告，社會大眾越能了解事故可能肇因及改善建議，就越能督促相關機關及業者儘速採取改善行動，從而避免類似事

故之再度發生。

四、 透過新聞媒體之報導教育社會大眾，藉以促進安全意識是各運輸安全組織責無旁貸之職，此項工作必須持續不斷，否則功虧一簣，甚至前功盡棄。先進國家如美<sup>1</sup>、加等國之運輸安全組織，對於媒體極其重視，設有專人每天廿四小時監看電子媒體之新聞報導，以掌握時效迅速反應。本會亦宜儘速建立類似機制，使通報作業更具時效，並充分掌握調查過程各項所需資訊。

五、 雖然本會並無罹難者家屬協助之法定權責，但在失事調查期間，曾對家屬簡報打撈及調查作業進度，以釐清其疑慮，對於增進本會之公信力有相當助益。此項工作未來仍有其必要，是否應參照美<sup>2</sup>、加等國將之法制化，建請提報委員會議討論。

六、 多種運輸工具事故（Multi-modal）調查併由同一政府機關負責，已成國際潮流大勢所驅。自前年起，ITSA 即已開始倡議新會員必須具備多種運輸工具事故調查權責，否則不同意其入會。此項舉措對單一事故調查機關(如本會及獨立國協)而言為一重大警訊，本會必須積極展開調查

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<sup>1</sup>係在環球航空公司 TW800 班機失事之後，成立 24 小時作業之通信中心（Comm Center）

<sup>2</sup>亦係在環球航空公司 TW800 班機失事之後，才立法將家屬協助納入 NTSB 工作範圍。

法案之增修工作，儘速完成多種運輸工具事故調查之法制作業，以與世界先進國家並駕齊驅，將航空事故調查之專業技術及經驗導入其他運輸工具事故調查，使國內之運輸安全水準同步提昇。

- 七、 ITSA 將邀請日本及挪威之運輸安全調查機關加入成為會員，日、挪兩國均已成立多種運輸工具事故調查機關，故為 ITSA 優先考慮對象。
- 八、 近年來，部份歐盟國家如瑞典與芬蘭另已將天然災害、火災及公共設施事故列入調查範圍。另外，荷蘭國會正在審查其運輸安全委員會增加對天然災害調查權責法案，預計在今年九月通過。蓋以運輸事故之獨立調查權責，將先進成熟之科技及方法運用在天然災害調查，為經濟有效之不二法門。建議於未來研擬多種運輸工具事故調查法案時，允宜考慮將之納入調查範圍。
- 九、 除將航空事故調查技術運用在其它運輸事故調查上，美國運輸安全委員會曾派遣四十位調查員，協助太空總署調查太空梭哥倫比亞號失事案，此係獨立調查運用在其他事故之另一範例。
- 十、 歐盟曾經發出兩項有關民航安全指令（原文詳附錄四）：

(一) 1994 年 11 月 21 日發出之第 94/56/EC 號指令主旨為透過民航飛航事故調查以改善航空安全，要求其會員國於 1996 年 11 月 21 日以前依下列原則完成建置獨立之飛航事故調查機關。

- 應調查每一件航空器失事及重大意外事件，以免類似案件再度發生。
- 飛航事故之技術調查機關須與司法調查機關分離。
- 須賦予飛航事故調查員必要之公權力如：進入事故現場及事故航空器、取得證據（物）與飛航記錄器、取得各類檢驗報告（如罹難者驗屍報告）等。
- 成立永久之獨立飛航事故調查機關，並且賦予該機關得請求其他會員國協助調查。
- 發布航空器失事及重大意外事件調查報告（含飛安改善建議）。
- 追蹤相關政府機關及業者對飛安改善建議執行情形。
- 保證飛安改善建議不被用作處分或追究責任之依據。

(二) 2003 年 6 月 13 日發出之第 2003/42/EC 號指令（原文詳附錄五）主旨為改善航空安全，要求其會員國須在 2005 年 7 月 4 日以前建立資料庫，包括安全緊要資訊

(Safety-Critical Information) 之報告、搜集、保存、保護及發布機制，並進行後續之分析及追蹤，以防止類似案件再度發生。

各會員國得將報告系統之建置與運作委託其民航主管機關、飛航事故調查機關或其他獨立機構辦理。各會員國須參與資訊交流，與其他會員國將分享資料庫。為達成此目標，各國須提供各會員國相關之軟體以相互連接。

為改善飛安，強制報告系統搜集到之資料亦應發給各會員國參考。民航主管機關與飛航事故調查機關得針對此事進行磋商。

其他機關或團體亦可獲得上述資料，但僅限於其業務所需者。社會大眾亦有獲知年度安全評鑑結果之權力，必要時，將匿名化之報告摘錄公布。上述報告之資訊均須以秘件處理，而且僅能作為各收文機關內部使用。報告人及其資料須受嚴密保護，以保證自由及機密報告系統之持續運作。

除此，各會員國得建立其自願報告系統，搜集並分析可能影響飛安之缺失或潛在危險。

十一、 ITSA 自 1993 成立迄今已屆滿十年，現任理事長 Mr.

Pieter van Vollenhof 從創會至今連續擔綱，因其皇室背

景（為荷蘭女王之婿），並擔任多項公益團體負責人，多年來贊助 ITSA 會務所需費用，包括年會活動費用（即會員國代表均無需繳納註冊費）。但明年 Mr. Vollenhof 退休之後，理事長一職將採輪替制，而每年年會亦由各會員國輪流舉辦。2005 年會已決定由美國主辦，建請本會考慮爭取主辦 2006 年會，借以提昇國家形象，列略盡國際責任。

十二、 國內空運持續發展，今年俄國航線可能啟航，台灣與大陸間遲早通航，屆時俄製航空器將在國內機場起降。本會調查實驗室宜未雨綢繆，適時建立該類飛航記錄器解讀能量。獨立國協亦係 ITSA 會員，本屆年會其代表 Mr. Sergey Zayko 為該國聯邦航空委員會（Interstate Aviation Committee）之副主席，飛航記錄器解讀為其專業之一。該君已接受邀請本會代表來台授課，但需其上級之同意始能成行，本會將與該機關保持聯繫，建立技術交流管道。另，Mr. Zayko 於會後來信簡謂：「恭賀貴會同仁在 CI611 失事調查之卓越表現，本會金相專家閱讀由貴會網站下載之 CI611 事實資料報告後，認為這是一份非常好的報告，調查結果十分重要並極富參考價值。建議

貴會保留殘骸三維重建模型，對所有同業而言，這是經典之作，未來甚至可以考慮將其運往美國 NTSB 教育學院。」目前殘骸三維重建模型因存放空間借用即將期滿，建議本會考慮尋覓臨時存放場地，並且積極規劃永久安置及展示空間，供作國內外專業人士教育訓練之用。

十三、 年會主辦單位另外邀請兩位歐盟官員報告其在航空安全之政策，由歐盟委員會 (European Commission) 之能源與運輸局代表 Ms. Sophie Marinho de Bastos 報告運輸安全近期發展及失事調查 (Recent developments in transport safety and accident investigations in the EU)；另由歐洲空中航行安全組織 (European Organization for the Safety of Air Navigation) 之空中交通管理計劃處長 Mr. George Paulson 報告歐洲聯合管制之安全議題 (Eurocontrol Safety Issues including aftermath of the Zurich AIR Crash)。與會代表由此對歐盟在其空運發展過程所遭遇之安全議題有相關深入之了解，而後者由空中交通管理專業切入安全議題 (即 2002 年在德國與瑞士接鄰處發生之空中撞機事件)，更令人髮指印象深刻。國內規劃於本年六月初舉辦航管與航務研討會，已代主辦單位口頭邀請 Mr. Paulson 及其同僚來台擔

任講員，簡介歐盟在空運及航空安全之政策及相關措施，  
提供國內民航主管機關及業界第一手參考資料。

十四、 由於本會執行長將於本年底離職，本屆年會將為其最後一次參加 ITSA 之活動，與會代表們一致對戎執行長近六年來在航空安全方面之貢獻深表贊許，此次行程於是劃下完美句點。



## 肆、附錄

- 附錄一 國際運輸安全協會二〇〇四年年會議程
- 附錄二 CI611 及 GE791 水下打撈作業經驗分享
- 附錄三 復興 GE791 貨機失事調查事實資料
- 附錄四 歐盟指令：建立獨立航空器失事調查機關
- 附錄五 歐盟指令：建立民航事故報告系統
- 附錄六 國際運輸安全協會二〇〇四年會活動照片

附錄一

國際運輸安全協會二〇〇四年會議程

# 國際運輸安全協會二〇〇四年年會議程

時間：2004年3月23至26日

1. Start of the meeting at 09.00
  - 09:00 開幕典禮
  - 會務報告
  - 2003(赫爾辛基)年會會議紀錄
  - 待決事項
2. Update of EU developments - 歐盟現況報告
  - ITSA 會員國報告
3. Safety issues of general interest -荷蘭運輸安全委員會
  - 共同關切安全議題
4. Fishing vessels safety – 加拿大運輸安全委員會
  - 漁船安全
5. Incident analysis
  - 意外事件分析
6. ITSA structure and activities
  - 國際運輸安全協會結構與活動
7. Training and qualification
  - 訓練與資格
8. Procedures for the establishment of Safety Boards
  - 成立安全委員會之程序

8. Specific issues,

- 特殊議題

9. Continuation Thursday 25<sup>th</sup> & Friday 26<sup>th</sup>, 2004

- 繼續會議

10. Additional issues raised

- 其他議題

## 附錄二

### **CI611 及 GE791 水下打撈作業經驗分享**

# **CI611 & GE791 Wreckage Recovery Operations and Lessons Learned**

**Dr. Kay Yong**

**March 25, 2004**

**Aviation Safety Council**



## **OUTLINE**

- ❖ **ENVIRONMENTAL CONDITIONS**
- ❖ **WRECKAGE and RECORDERS  
SURVEY AND RECOVERY**
- ❖ **COMPARISON BETWEEN TWO  
ACCIDENTS**
- ❖ **LESSONS LEARNED**
- ❖ **RECOMMENDATIONS**



## **CI611 Accident Background**

- ❖ On May 25 2002, China Airlines Flight CI611, B747-200 crashed into Taiwan Straits approx. 26 NM north of Penghu Islands.
- ❖ Radar data indicated the aircraft experienced an in-flight breakup at about 35,000 feet.
- ❖ CI611 a scheduled flight from CKS Airport to Hong Kong.
- ❖ All 225 occupants on board perished.

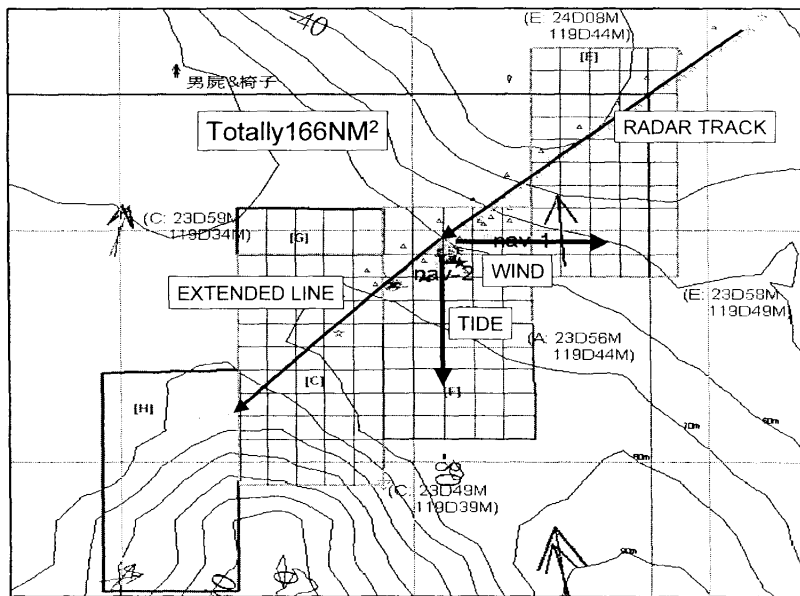
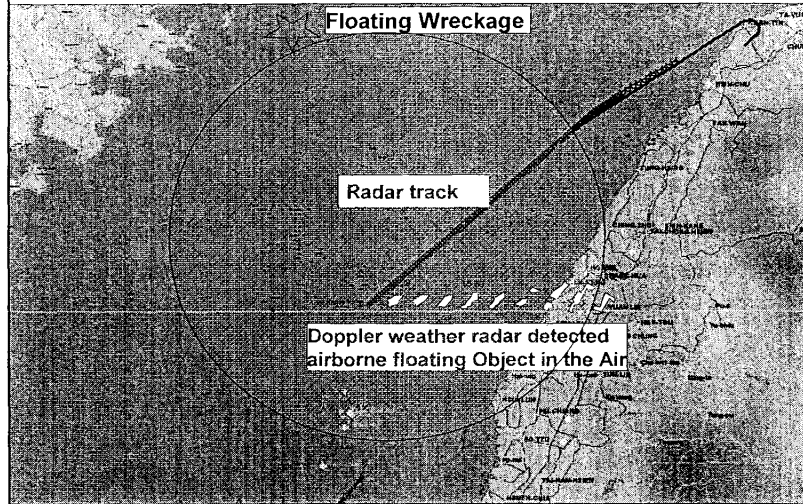


## **WEATHER AND MARINE METEOROLOGY**

- ❖ Wind Speed : 8 ~ 21kts G40kts
- ❖ Wind Direction : N-SW
- ❖ Current Speed: 2~5 kts, 0~2 kts  
8~12hrs/day
- ❖ Current Direction: N-NW
- ❖ Depth: 50 ~ 70m
- ❖ Sea bed: Sandy and flat
- ❖ Wave: 1m ~ 2m



# ACCIDENT SITE





## Recorder Surface Search

- ❖ Environment: quiet
- ❖ Current : not strong
- ❖ Pinger : two pinger's transmissions identified on day 4 after the accident
- ❖ Last transponder vs. actual site : near (1.18km to FDR, 1.71km to CVR)
- ❖ Equipment : pinger receiver, omni direction hydrophone

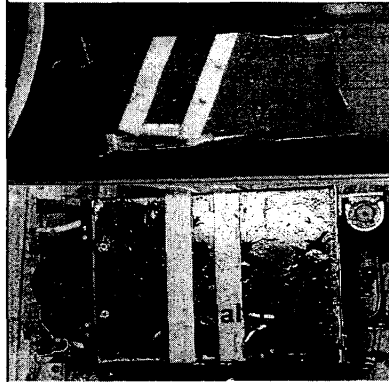
ASC

## Recorder Underwater Search

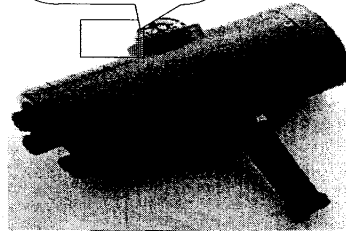
- ❖ Depth : 70m
- ❖ Time of current < 2kts : 8-12 hrs/day
- ❖ Vessel : DP II
- ❖ Diving : Saturation
- ❖ ROV : 100hp
- ❖ Recovered by : divers from both JanSteen and Navy
- ❖ Distance between the two boxes : 610m
- ❖ Surveyed position vs. actual recovery position : 168m(FDR) & 469m(CVR)

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## FDR/CVR - CI611



Built-in compass

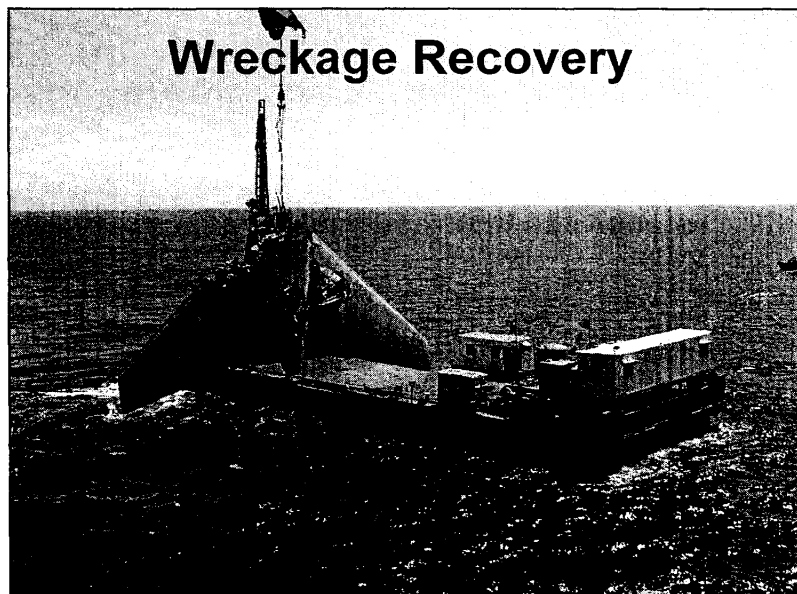
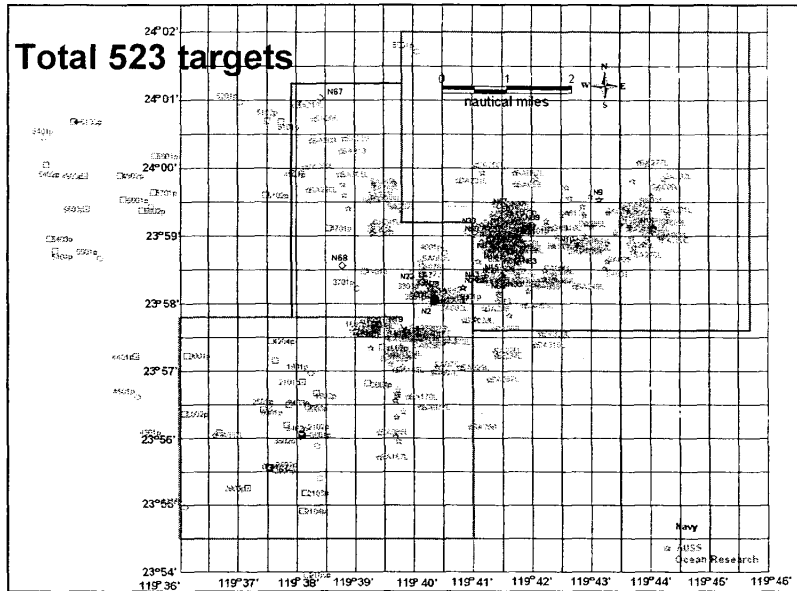


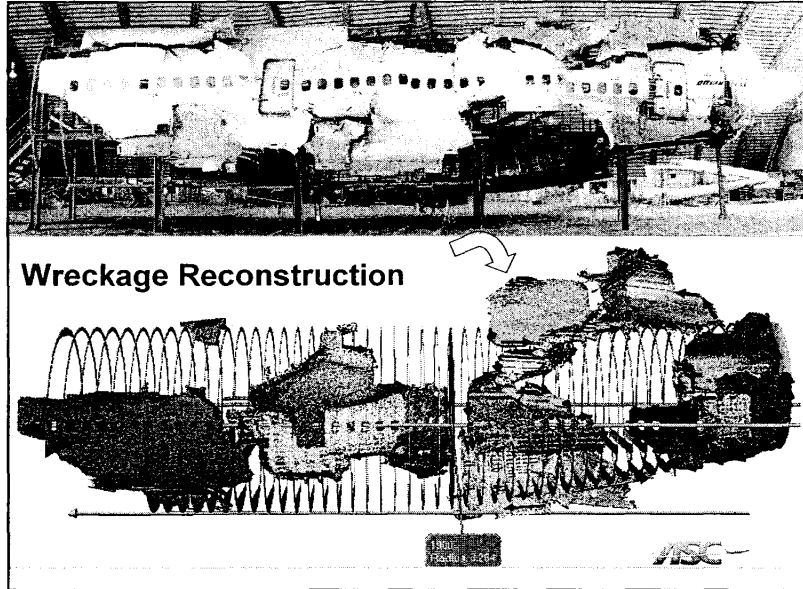
Bone conduction phone



## Wreckage Search and Survey

- ❖ Distance between last transponder location and recovered main wreckage : 2.5km
- ❖ Survey area : 166nm<sup>2</sup>
- ❖ Accuracy of SSS : 50m ~ 100m
- ❖ Equipment : side scan sonar (SSS), Active Sonar, Multi-beam sensor, ROV by Navy, Research Institutes, and Jan Steen

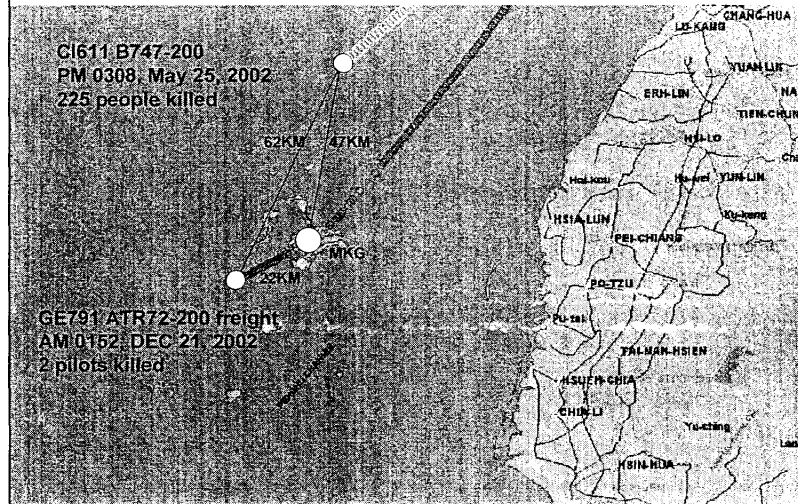




## **GE791 Accident Background**

- ❖ December 21, 2002, 0152AM Taipei time, TransAsia Airways Flight GE791, ATR72-200 freighter (Registration No. B22708), crashed into Taiwan Straits approx. 12 NM SW of Makung Airport, Penghu Islands of Taiwan.
- ❖ GE791 with two pilots disappeared from radar 47 minutes after departing CKS Airport for Macao.

## CI611 & GE791 ACCIDENT SITES

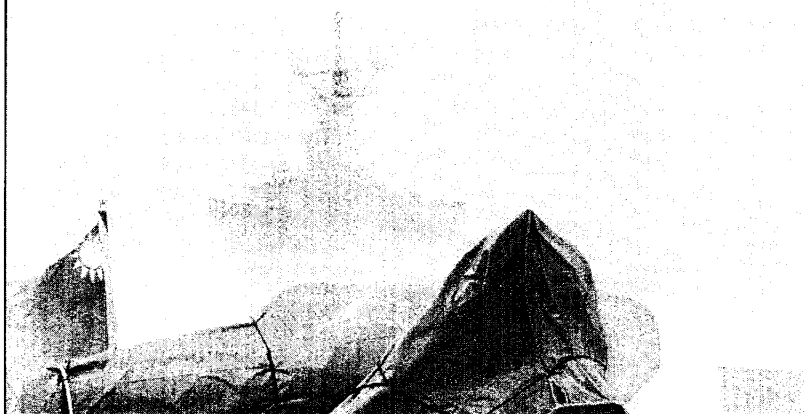


## WEATHER AND MARINE METEOROLOGY - GE791

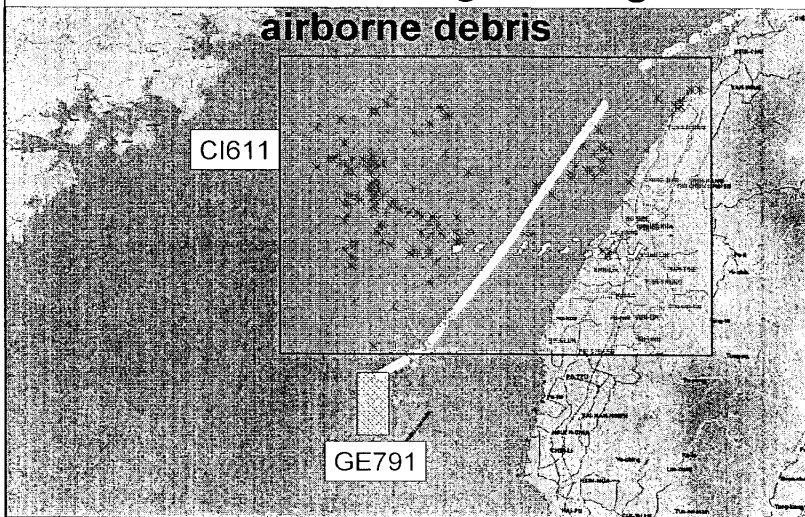
- ❖ Wind Speed: 13~33kts G55kts
- ❖ Wind Direction: NE monsoon
- ❖ Current Direction: SE-NW
- ❖ Current Speed: 3~7kts,  
0~2kts : 0hr/day
- ❖ Depth: 60 m
- ❖ Seabed: coral reef
- ❖ Wave: 2m~6m

105

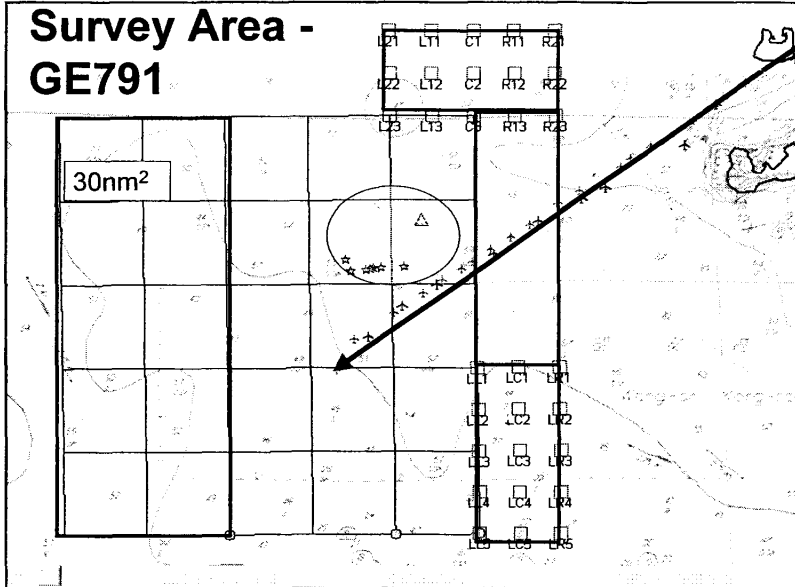
## Marine Weather in Taiwan Strait



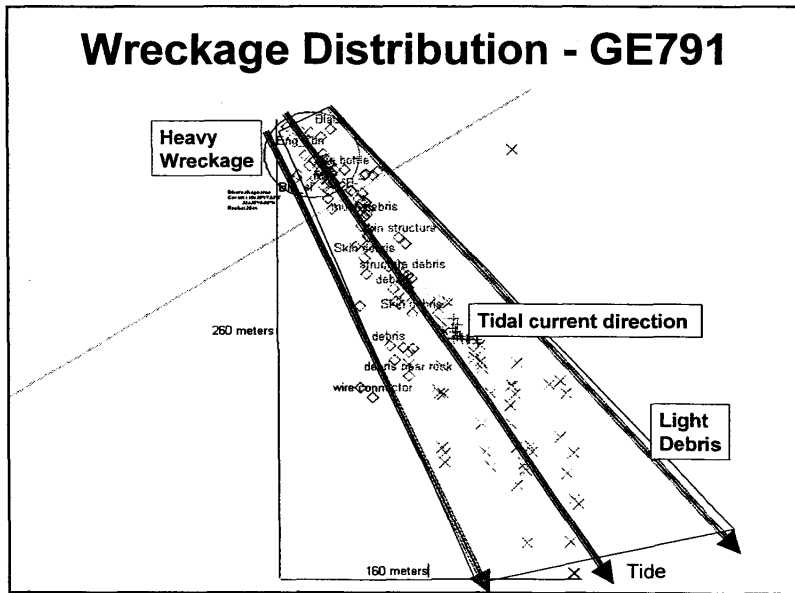
## CI611&GE791 floating wreckage and airborne debris



# Survey Area - GE791



# Wreckage Distribution - GE791



## **Wreckage Underwater Search**

- ❖ Depth : 60m
- ❖ Current <2kts : 0 hr
- ❖ Targets : 35
- ❖ Visual check : 15
- ❖ Wreckage found : 8
- ❖ Distribution area : 260mX160m

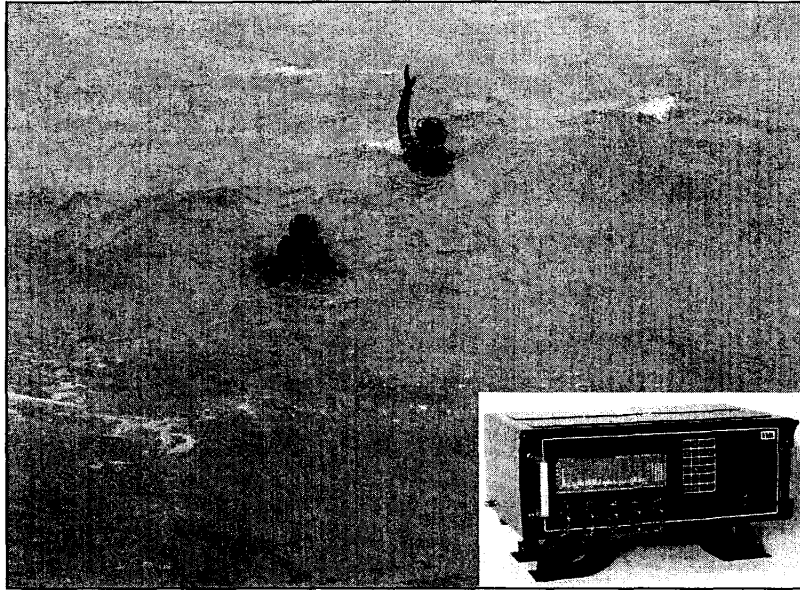


## **Recorder Search - Underwater**

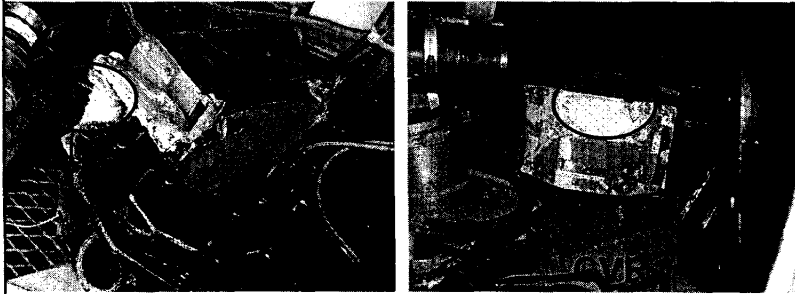
- ❖ Depth : 60m
- ❖ Time of current <2kts : 0 hr/day
- ❖ Vessel : DP I
- ❖ Diving : non-saturation
- ❖ ROV : 250hp
- ❖ Recovered by : ROV
- ❖ Distance between the two boxes : d<10m
- ❖ Surveyed position vs. actual recovery position : 113 m







## FDR/CVR - GE791



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## Comparison between Two Accidents

	<u>CI611</u>	<u>GE791</u>
❖ Duration of Operation	5 month	1 month
❖ Marine Weather	Mostly good	Hazardous
❖ Area of wreckage coverage	540 kmxkm	200 mxm
❖ % of recovered wreckage	75%	10%
❖ Recorders recovered by	Divers	ROV
❖ Cost of recovery	11.8 M	2.5 M
❖ Cost of Recon.(both H/W &S/W)	1.2 M	N/A



## Lessons Learned

- ❖ Weather and marine meteorology are primary factors for underwater recovery
- ❖ Accuracy of radar track plays major role in setting area and initial reference point
- ❖ Adequate equipment is vital
- ❖ Good planning is a must
- ❖ Site survey before recovery is vital but may not be accurate



## Lessons Learned

- ❖ Floating wreckage less significance
- ❖ Wreckage distribution pattern affected by, in flight breakup, impact breakup, flight path, impact speed, wind and ocean current
- ❖ Positioning system of SSS, ROV, diving and vessel affects efficiency of recovery.
- ❖ Political conflict / interference almost inevitable

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## Recommendations

- ❖ In search of recorders :
  - ◆ Small and quiet boat with pinger receiver is good for surface survey
  - ◆ Large vessel with equipment similar to UT2000 for surface survey, if weather is bad
  - ◆ Pinger receiver with bone conduction phone and compass is more user-friendly to divers
  - ◆ Using pinger receiver with ROV, when diving is not possible.

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## Recommendations

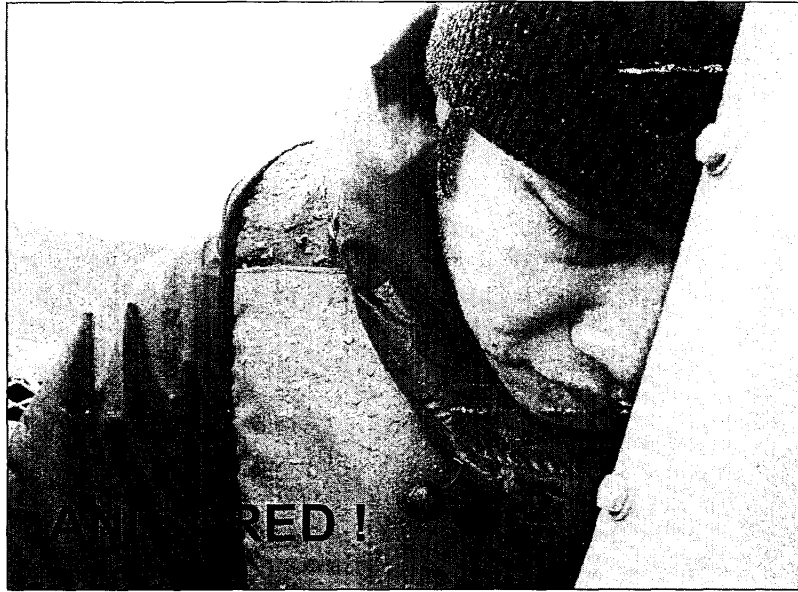
- ❖ **In wreckage recovery :**
  - ❖ **Precise SSS survey required ( tow fish with beacon / IRS)**
  - ❖ **Powerful ROV required if current is high**
  - ❖ **Diver needed for huge wreckage recovery**
  - ❖ **Contour of seabed effects recognition of wreckage sonar**



## Discussion

- ❖ **Difficulty: Who shall be responsible for the expense of wreckage recovery ?**
  - ❖ **Not covered by law in Taiwan.**
  - ❖ **If operator has financial difficulty or no willingness to pay.**
  - ❖ **Balancing recovery cost, how much is enough?**





**The End**

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### 附錄三

復興 **GE791** 貨機失事調查事實資料

# **GE791 Accident Investigation Factual Data Report**

**KF Chou  
Mar. 25, 2004  
Aviation Safety Council**



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## **Flight History**

**❖ On Dec. 21, 2002, at 0152 Taipei local time, Trans Asia Airways freighter GE791, ATR72-200, encountered a severe icing during flight and crashed into the sea 17 km southwest of Makung, Penghu Islands. Both pilots on board were missing.**

<http://www.asc.gov.tw>



2

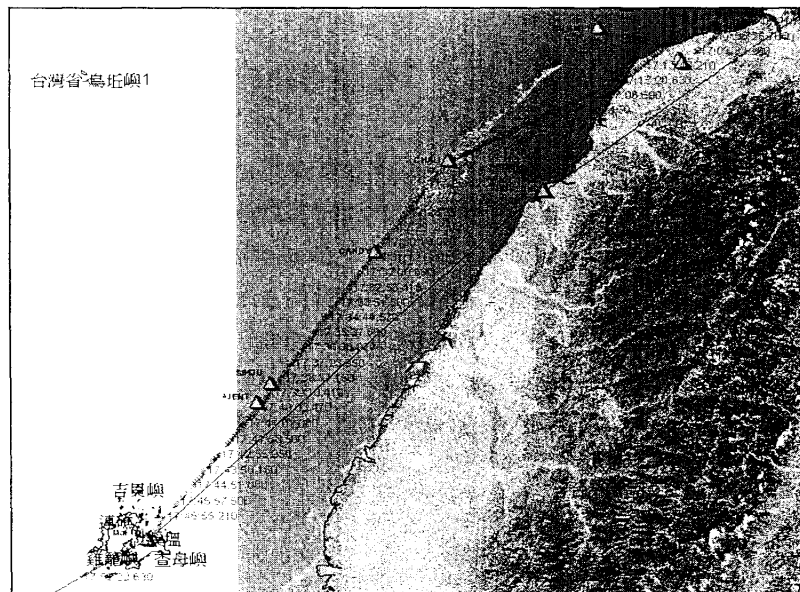
## ATC Recording

01:51:50,GE791 requested descent from FL180 to FL160.

01:51:58,GE791 reported reaching FL160.(Last transmission)

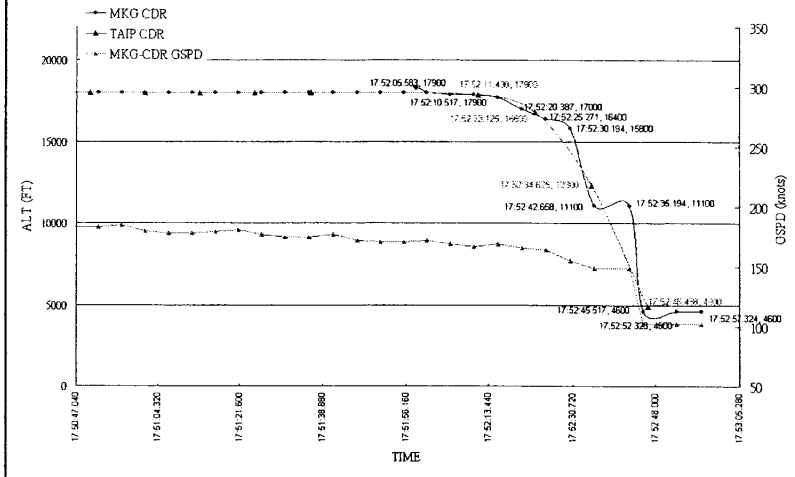
01:52, GE791 target disappeared from radar screen, approx. 27KM southwest of Makung (23.25N/119.24E)  
Last altitude readout was 4,600ft.

<http://www.asc.gov.tw>





# GE791 Radar Trajectory



## Milestones

- ❖ Dec 21, '02 accident occurred
- ❖ Jan 12, '03 FDR recovered
- ❖ Jan 13, '03 CVR recovered
- ❖ Jan 21, '03 CVR transcript verified
- ❖ Mar 14, '03 Recovery Ops terminated
- ❖ Oct 25, '03 Factual report released
- ❖ Jul 15, '04 Technical Review Meeting
- ❖ Dec 3, '04 Final report release

<http://www.asc.gov.tw>



7

## Findings

- ❖ Flight crewmembers' lack of :
  - ❖ awareness icing/severe icing
  - ❖ response to all levels of Icing Conditions

<http://www.asc.gov.tw>



8

## Findings

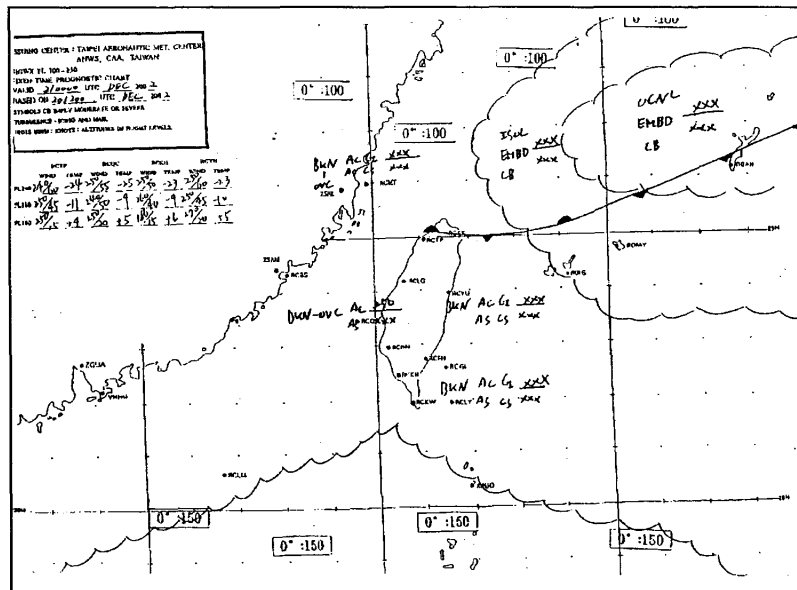
- ❖ 17:21:57 - FL180 request approved
- ❖ 17:32:34 - 1st voice re. Icing
- ❖ 17:34:28 - 1st single chime caution  
and 2nd voice re. Icing
- ❖ 17:34:31 - 2nd single chime caution
- ❖ 17:41:20 - 3rd single chime caution
- ❖ 17:44:46 – 3rd voice re. icing
- ❖ 17:50:28 – 4th voice re. icing

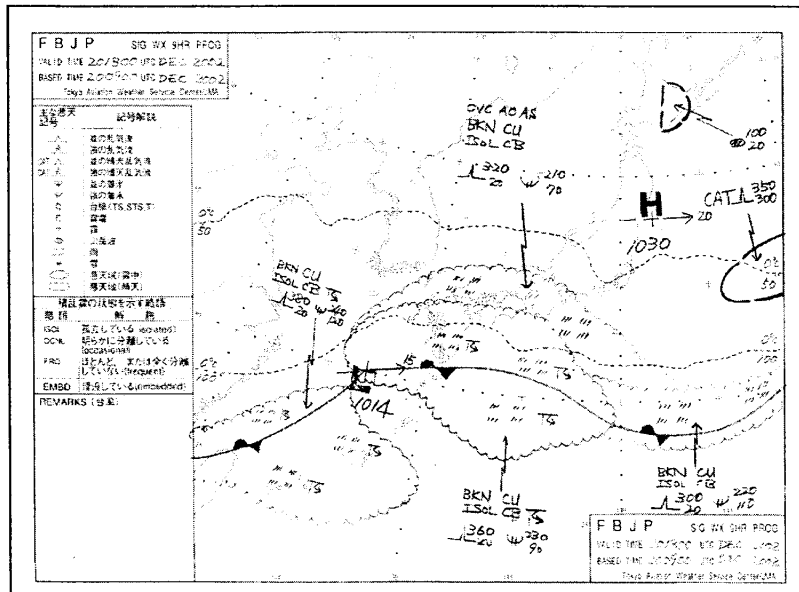
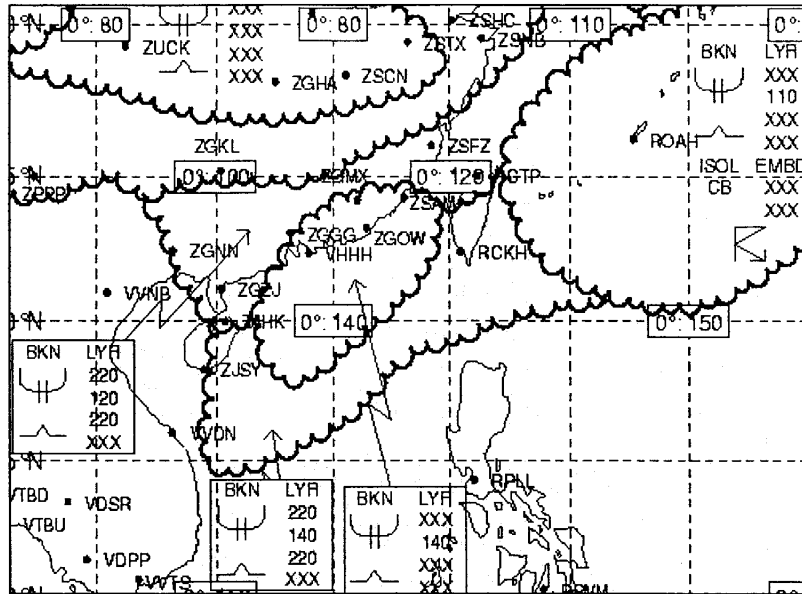
## Findings

- ❖ 17:50:54 – found speed slow down from  
200 - 170
- ❖ 17:51:37 – 5th voice re. icing
- ❖ 17:51:50 – Request FL160
- ❖ 17:52:07 – 6th voice re. icing
- ❖ 17:52:10 – Beginning of stall warning and  
stick shaker
- ❖ 17:52:12 – Autopilot disengaged
- ❖ 17:52:24 – Last voice
- ❖ 17:52:28 – Overspeed warning
- ❖ 17:52:50 - End of recording

## Findings

- ❖ According to the SIGWX charts for FL100-FL250, issued from Taipei Aeronautical Meteorological Center, there were no icing and turbulence indicated on the route of GE791.
- ❖ Moderate icing and turbulence were forecasted on the route of GE791 from the SIGWX charts issued from Hong Kong Observatory.






## Safety Recommendation

- ❖ Recommend all operators with turboprop aircraft review their training programs to ensure the program contains necessary training for pilots to recognize and effectively respond to all levels of "Icing Conditions."
- ❖ also recommend operators to emphasize additional training in pilot's situation awareness of icing conditions.

<http://www.asc.gov.tw>



 <b>ATR 72</b> F.C.O.M.	<b>EMERGENCY PROCEDURES</b>	2.04.05	
	<b>MISCELLANEOUS</b>	P 9	001
		JUL 00	
<p><b>SEVERE ICING</b>          This procedure is applicable to all flight phases from initial climb to landing. Monitor the ambient air temperature (SAT). While severe icing may form at temperatures as cold as - 18°C, increased vigilance is warranted at temperatures around freezing with visible moisture present.</p> <p><b>DETECTION</b></p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;">           Visual cue identified, with severe icing is characterized by ice covering all or a substantial part of the unheated portion of either forward side window, possibly associated with water splashing and streaming on the windshield.         </div> <div style="text-align: center; margin-bottom: 5px;">and / or</div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px; width: fit-content; margin-left: auto; margin-right: auto;">           Unexpected decrease in speed or rate of climb         </div> <div style="text-align: center;">and / or</div> <p>The following secondary indications :</p> <ul style="list-style-type: none"> <li>. Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.</li> <li>. Accumulation of ice on the lower surface of the wing aft of the protected areas.</li> <li>. Accumulation of ice on the propeller spinner farther aft than normally observed.</li> <li>- The following weather conditions may be conducive to severe in-flight icing :             <ul style="list-style-type: none"> <li>. Visible rain at temperatures close to 0°C ambient air temperature (SAT).</li> <li>. Droplets that splash or splatter on impact at temperature close to 0°C ambient air temperature (SAT).</li> </ul> </li> </ul>			

<b>PROCEDURE</b>	
<b>SEVERE ICING</b>	
R	<p>■ <b>If severe icing as determined above is encountered accomplish the following :</b></p> <ul style="list-style-type: none"> <li>- Immediately increase and bug the minimum maneuver/operating icing speeds by 10 kt. Increase power, up to MAX CONT if needed</li> <li>- Request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions.</li> <li>- Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.</li> <li>- Do not engage the autopilot.</li> <li>■ <b>If the autopilot is engaged,</b> hold the control wheel firmly and disengage the autopilot.</li> <li>■ <b>If the flaps are extended,</b> do not retract them until the airframe is clear of ice.</li> <li>■ <b>If an unusual roll response or uncommanded roll control movement is observed,</b> maintain the roll controls at the desired position and reduce the angle of attack by : <ul style="list-style-type: none"> <li>- Pushing on the wheel as needed,</li> <li>- Extending flaps to 15,</li> <li>- Increasing power, up to MAX CONT if needed.</li> </ul> </li> <li>■ <b>If the aircraft is not clear of ice :</b> <ul style="list-style-type: none"> <li>- Maintain flaps 15, for approach and landing, with reduced flaps APP/LDG icing speed <math>\pm</math> 5 kt.</li> <li>- Multiply landing distance flaps 30 by 1.91</li> </ul> </li> <li>- Report these weather conditions to Air Traffic Control.</li> </ul>
Eng : PW124	

<b>ATR 72</b>	<b>EMERGENCY</b> Eng : PW124	<b>1.09</b>
		JUL 00 001
<b>SEVERE ICING</b>		
<p>This procedure is applicable to all flight phases from initial climb to landing. Monitor the ambient air temperature (SAT). While severe icing may form at temperatures as cold as -18°C, increased vigilance is warranted at temperatures around freezing with visible moisture present.</p>		
<b>DETECTION</b>		
<p>Visual cue identified with severe icing is characterized by ice covering all or a substantial part of the unheated portion of either side window, possibly associated with water splashing and streaming on the windshield.</p>		
and / or		
<p>Unexpected decrease in speed or rate of climb.</p>		
and / or		
<p>The following secondary indications :</p> <ul style="list-style-type: none"> <li>. Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.</li> <li>. Accumulation of ice on the lower surface of the wing aft of the protected areas.</li> <li>. Accumulation of ice on the propeller spinner farther aft than normally observed.</li> </ul>		
<p>The following weather conditions may be conducive to severe in-flight icing :</p> <ul style="list-style-type: none"> <li>. Visible rain at temperatures close to 0°C ambient air temperature (SAT).</li> <li>. Droplets that splash or splatter on impact at temperature close to 0°C ambient air temperature (SAT).</li> </ul>		

#### PROCEDURE

■ If severe icing as determined above is encountered, accomplish the following :

- Immediately increase and bug the minimum maneuver/operating icing speeds by 10 kt. Increase power up to MAX CONT if needed.
- Request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the severe icing conditions.
- Avoid abrupt and excessive maneuvering that may exacerbate control difficulties.
- Do not engage the autopilot.

■ If the autopilot is engaged, hold the control wheel firmly and disengage the autopilot.

■ If the flaps are extended, do not retract them until the airframe is clear of ice.

■ If an unusual roll response or uncommanded roll control movement is observed, maintain the roll controls at the desired position and reduce the angle of attack by :

- Pushing on the wheel as needed,
- Extending flaps to 15,
- Increasing power, up to MAX CONT if needed.

■ If the aircraft is not clear of ice :

- Maintain flaps 15 for approach and landing with "reduced flaps APP/ LDG icing speed" + 5 kt.
- Multiply landing distance flaps 30 by 1.91

- Report these weather conditions to Air Traffic Control.

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## Investigation Organization

❖ A total of 36 Investigation Team members:

- ❖ ASC
- ❖ BEA
- ❖ CAA
- ❖ ATR
- ❖ Trans Asia Airways

❖ Groups:

- ❖ Air Traffic Services,
- ❖ Flight Operations,
- ❖ Wreckage Recovery,
- ❖ Recorders,
- ❖ Systems,
- ❖ Structure,
- ❖ Maintenance Records



## 附錄四

歐盟指令：建立獨立航空器失事調查機關  
( Establishing Fundamental Principles  
Governing The Investigation Of Civil Aviation  
Accidents And Incidents )



## Aviation safety: civil aviation accidents and incidents

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### 1) OBJECTIVE

To facilitate investigations into civil aviation accidents in order to improve air safety.

### 2) ACT

**Council Directive 94/56/EC of 21 November 1994 establishing the fundamental principles governing the investigation of civil aviation accidents and incidents [Official Journal L 319 of 12.12.1994].**

### 3) SUMMARY

The purpose of this Directive is to improve air safety by facilitating the expeditious holding of investigations, the sole objective of which is the prevention of future accidents and incidents.

It applies to investigations into civil aviation accidents and incidents which have occurred in the territory of the European Community or involving aircraft registered in a Member State or operated by an undertaking established in a Member State, when such investigations are not carried out by another State. Obligation to investigate every accident or serious incident with the aim of preventing any reoccurrence thereof.

Distinction between judicial inquiry (to establish liability) and technical investigation (the status of which is stepped up).

List of actions which investigators are authorised to carry out (free access to the site of the accident and to the aircraft, listing of evidence, immediate access to flight recorders, access to the results of examination of the bodies of victims or of tests made on samples taken from the bodies of victims, etc.).

Permanent and independent nature of the body responsible for the inquiry.

This body may request the assistance of bodies or entities from other Member States.

Obligation to publish an accident (or incident) report, containing safety recommendations where appropriate.

Monitoring by Member States of the action the interested parties take in response to these recommendations.

Establishment of the principle that a safety recommendation must in no case create a presumption of blame or liability for an accident or incident.

<b>Act</b>	<b>Date of entry into force</b>	<b>Final date for implementation in the Member States</b>
Directive <u>94/56/EC</u>	01.01.1995	21.11.1996

## 附錄五

歐盟指令：建立民航事故報告系統  
(Occurrence Reporting In Civil Aviation)



## **Aviation safety: occurrence reporting in civil aviation**

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### **1) OBJECTIVE**

To improve air safety by ensuring that safety-critical information is reported, collected, stored, protected and disseminated in order to facilitate its effective analysis and follow-up, with a view to preventing future accidents and incidents.

### **2) ACT**

**Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation [Official Journal L 167 of 04.07.2003].**

### **3) SUMMARY**

The accident rate in civil aviation has remained fairly constant over the last ten years. However, the increase in air traffic could lead to an increase in the number of accidents in the near future. To enhance the safety of civil aviation, better knowledge of occurrences is required in order to facilitate analysis and prevent accidents.

The Directive covers occurrences (accidents, incidents and serious incidents) which endanger or which, if not corrected, would endanger an aircraft, its occupants or any other person.

Occurrence reports must be collected, evaluated, processed and stored in a database. Member States must entrust this task to a competent authority, which may be the national civil aviation authority, the investigating body established under Directive 94/56/EC or any other independent body or entity entrusted with this function.

Member States must participate in a mutual exchange of information by making all the information stored in their databases available to the competent authorities of the other Member States and the Commission. To facilitate this

exchange, the Commission must provide them with software enabling them to establish the appropriate interconnections.

Information gathered from mandatory reporting will be disseminated with a view to improving safety. It may therefore be consulted by each national civil aviation authority and by civil aviation accident investigation entities. Other interested parties may also receive information for their own use, information which may be restricted to what is strictly necessary. The public will also be informed of the level of aviation safety by the publication of an annual safety review and, if necessary, by extracts from disidentified reports (from which all personal details concerning the reporter and the technical aspects have been removed).

The information exchanged and disseminated is confidential and may be used solely for the purpose of the activities of participants and addressees.

Reporters and the information they supply are protected in order to guarantee free and confident reporting.

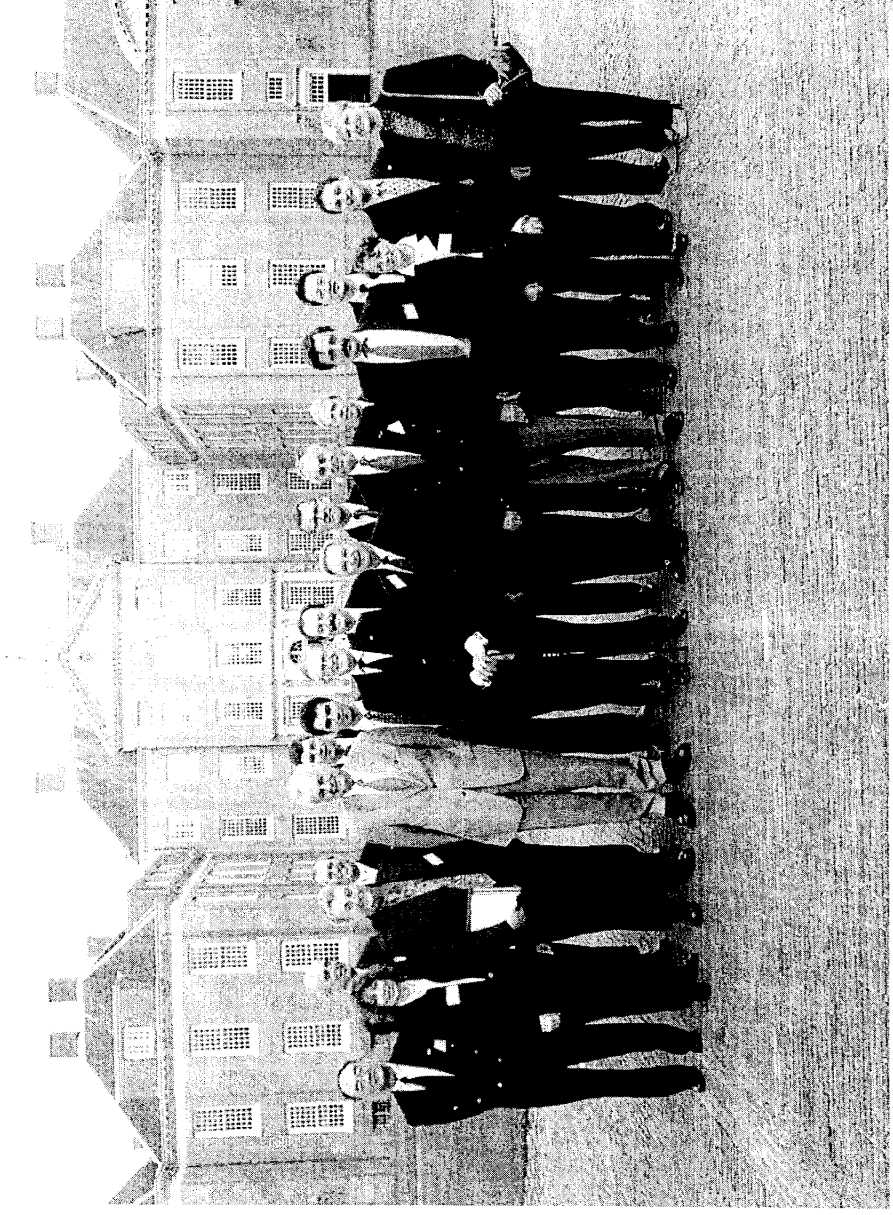
In addition to the system of mandatory reporting, Member States may put in place a system of voluntary reporting to collect and analyse information on observed deficiencies in aviation which are not required to be reported under the system of mandatory reporting, but which are perceived by the reporter as an actual or potential hazard.

The Commission is assisted in the implementation of the Directive by the committee set up by Article 12 of Regulation No 3922/91 on the harmonisation of technical requirements and administrative procedures in the field of civil aviation.

<b>Act</b>	<b>Date of entry into force</b>	<b>Final date for implementation in the Member States</b>
Directive <u>2003/42/EC</u>	04.07.2003	04.07.2005

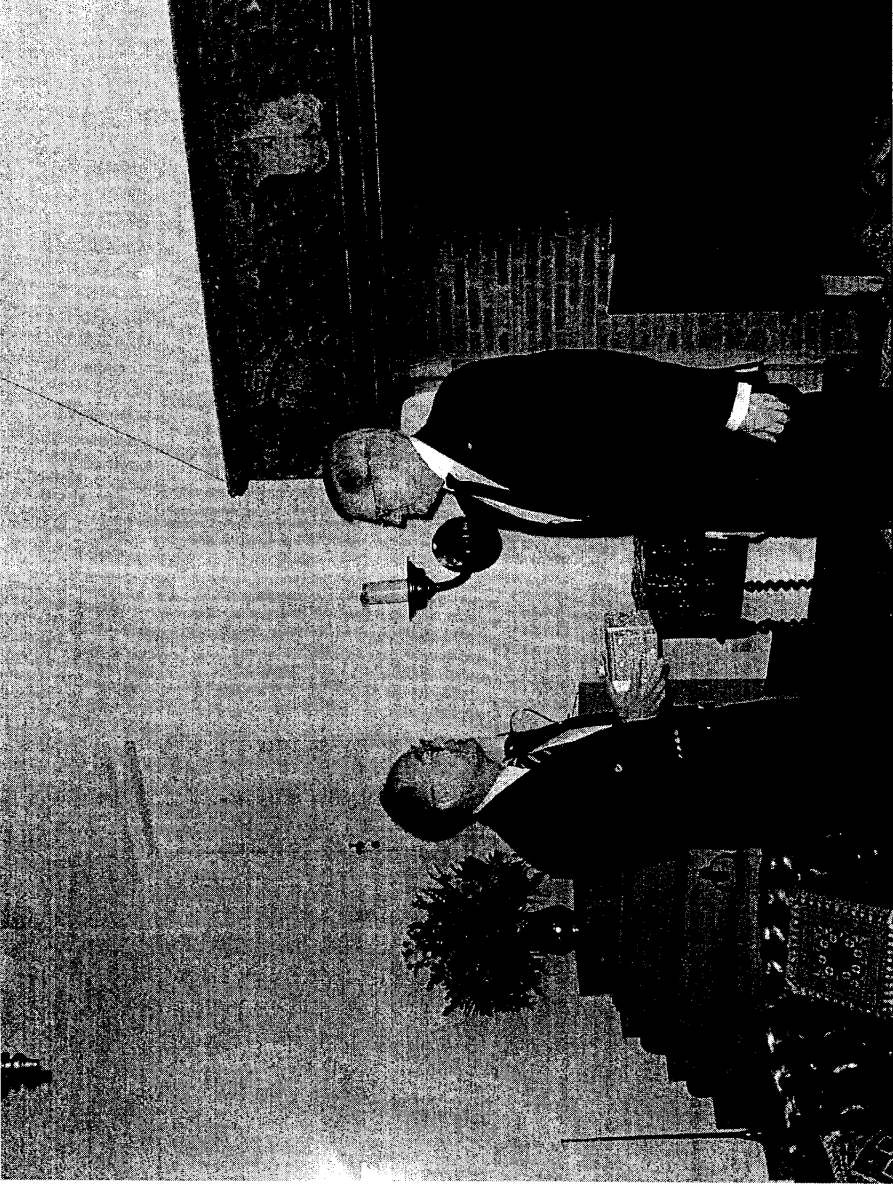
## 附錄六

國際運輸安全協會二〇〇四年會活動照片

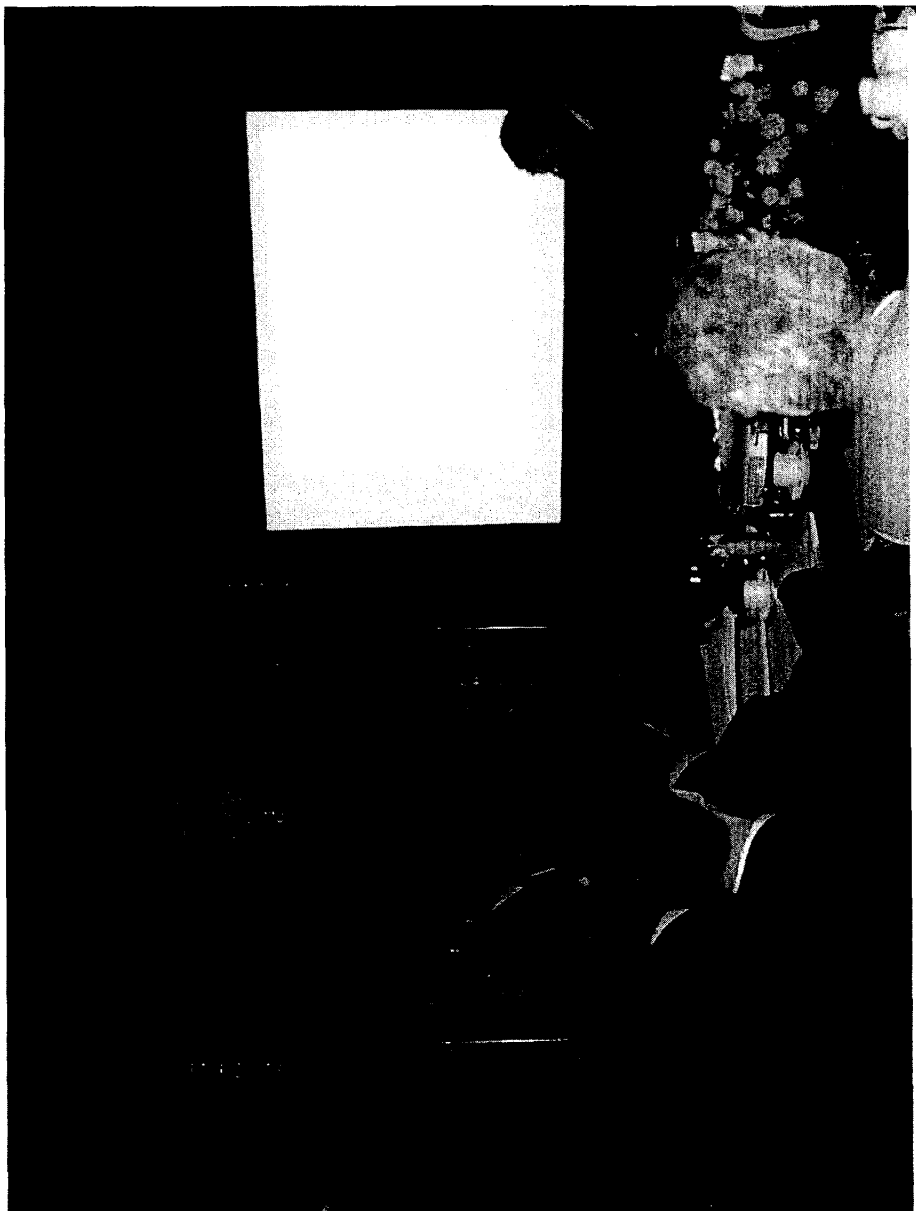


國際運輸安全協會 2004 年會代表於羅宮 (Het Loos) 前合影

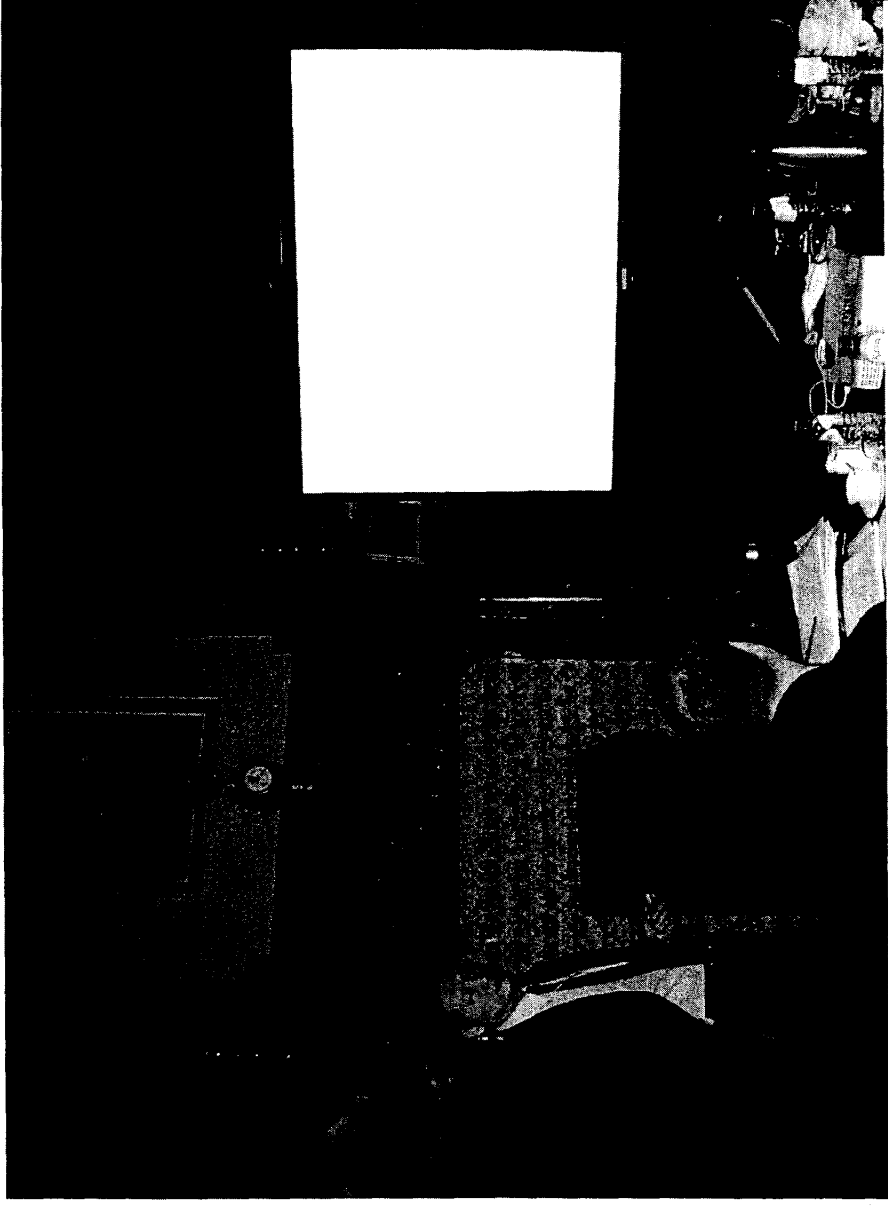




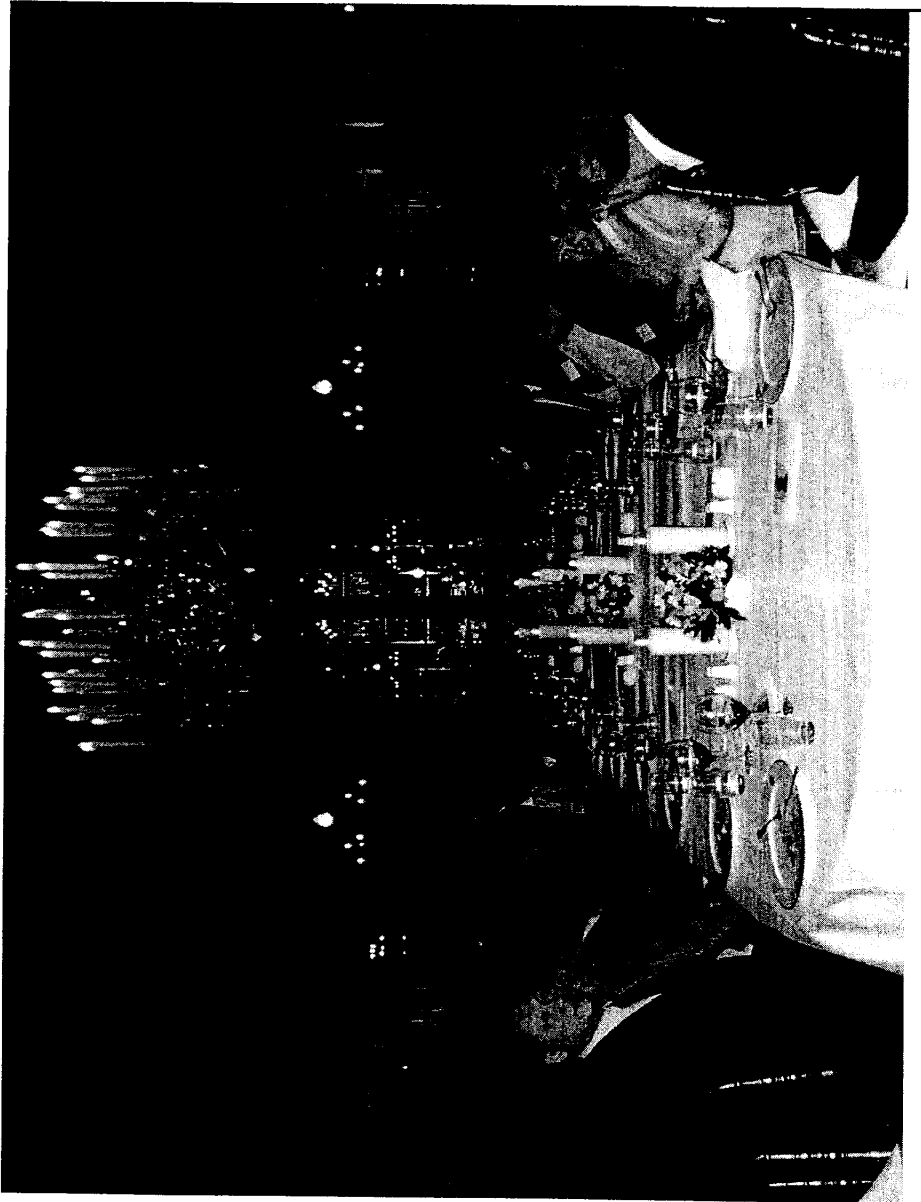
戒執行長凱致贈 ITSA 會長紀念品



戎執行長凱報告 CI611GE791 水下打撈作業



周組長光燦報告 **GE791** 貨機失事調查事實資料



國際運輸安全協會 2004 年會晚宴