INTERNATIONAL CIVIL AVIATION ORGANIZATION

REPORT OF THE ICAO SEARCH AND RESCUE SEMINAR & SAREX

CHENNAI, INDIA, 7 – 11 MARCH 2005

The views expressed in this Report should be taken as those of the
SAR Seminar and not of the Organization.

Adopted by the SAR Seminar/SAREX
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PART I – BACKGROUND OF THE SEMINAR

1.   **Introduction**

1.1   The Search and Rescue (SAR) Seminar hosted by the Airports Authority of India (AAI) was held at the Trident Hilton Hotel, Chennai, India on 7-8 March 2005, and was followed by a SAREX held on 9 and 10 March, with a debriefing meeting on 11 March.

2.   **Attendance**

2.1   The meeting was attended by 141 delegates from twelve (12) States: Bangladesh, Brunei Darussalam, Cambodia, India, Indonesia, Japan, Macao China, Malaysia, Republic of Korea, Singapore, Sri Lanka, Thailand, and one (1) SAR satellite service provider, Copas-Sarsat, United Kingdom. A list of participants is at **Appendix A** to this report.

3.   **Inauguration**

3.1   Mr. S.K. Saraswati, Regional Executive Director, Southern Region, Airports Authority of India welcomed delegates to the ICAO SAR Seminar and SAREX. He was honoured that this important international event was taking place in Chennai and the Southern Region of AAI. It was particularly important to be holding this event in this region in light of the tragic circumstances associated with the earthquake and tsunami on 26 December 2004. The role of search and rescue was extremely crucial to the saving of lives and he wished delegates a successful seminar, which would contribute to improving the provision of SAR in the region.

3.2   The Seminar was inaugurated by a ceremony of lighting of a lamp and addresses by the official party of Mr. K. Ramalingam, Chairman, Airports Authority of India, Vice Admiral A.K. Singh, Director-General of the Coast Guard and Chairman of the National SAR Board, Mr. David Moores, Regional Officer Air Traffic Management, ICAO Asia and Pacific Office, Bangkok, Thailand, and Mr. Brian Day, Technical Officer, Air Traffic Management Air Navigation Bureau, ICAO Headquarters, Montreal, Canada.

3.3   Mr. David Moores extended to delegates warm greetings and best wishes on behalf of the President of the Council of ICAO, the Secretary General of ICAO and Mr. L.B. Shah, Regional Director Asia and Pacific Office, and thanked the Airports Authority of India for hosting this International Search and Rescue Seminar and SAREX at Chennai.

3.4   Mr Moores highlighted that the provision of SAR services by ICAO Contracting States is a fundamental obligation under the Convention on International Civil Aviation and in accordance with Annex 12 — *Search and Rescue* to the Convention. SAR is essentially a humanitarian activity with the primary goal of saving lives. Today, more than ever, the role of disaster response agencies has grown even more critical. The ever changing nature of the aviation industry and new threats posed by man and nature, as was tragically witnessed in the United States of America on 11 September 2001and through the catastrophic results of the earthquake and tsunami that struck the Bay of Bengal coastal areas on 26 December 2004, serve to highlight the importance of effective SAR. This seminar would not only provide up to date information on SAR activities but afford an opportunity to hear from those most closely involved in the tsunami emergency, and to hear of lessons learnt that would better prepare search and rescue organizations to respond to emergencies in the future. Mr Moores thanked delegates for attending this important and timely event.

3.5   On behalf of ICAO, Mr Moores wished to recognize and commend the heroic efforts made by all involved in the tsunami emergency and on going recovery. There has been an amazing outpouring of support from every corner of the globe which has brought the world closer together.

3.6   In his opening address, Mr. K. Ramalingam warmly welcomed delegates to Chennai and this timely and important SAR Seminar and exercise (SAREX) coming at a time following the deadliest earthquake and tsunami to have been experienced by mankind. There was much to learn from those States in the coastal areas of the Indian Ocean who had been affected. The holding of regular SAR seminars and exercises was very important and he expressed his appreciation to ICAO Asia and Pacific Office for inviting India to host this seminar, which AAI was honoured to do. India has over the years made substantial enhancements to its SAR capabilities. The National Search and Rescue Board was constituted on 28 January 2002 with the Director General Coast Guard as Chairman.

3.7   India's SAR communications are being enhanced with the provision of remote controlled VHF communications through VSAT terminals at Bangalore and Lucknow to be brought into service during 2005-06. The AAI in association with the Indian Space Research Organization (ISRO), planned to implement a satellite-based augmentation system (GAGAN). The implementation of controller-pilot data link communications (CPDLC) and automatic dependent surveillance (ADS) was now underway and would be completed at the end of this year, leading to the substantial enhancement of flight safety.

3.8   In considering the importance of the SAR obligations of States, India has taken a proactive lead and this seminar has been organized with the objective of keeping abreast with the latest developments in SAR techniques and practices. This seminar also provides a forum for exchange of views and sharing of experiences to benefit all and would also promote international understanding and cooperation in SAR. He was honoured that India had been nominated to host this seminar for the Asia and Pacific region. He wished the seminar and SAREX all success.

3.9   Vice Admiral A.K. Singh welcomed all delegates from various national and international organizations representing the vibrant and professional aviation sector to this International Search and Rescue Seminar. As Chairman of the Indian Maritime Search and Rescue Board and the Director General of Indian Coast Guard, it was appropriate and a privilege for him to address the distinguished audience. India has a Search and Rescue Region (SRR) of 4.6 million square kilometers, which is 50 percent larger than the land mass of India (2.99 million square kilometers). As per statistics, over 60,000 ships and numerous aircraft are known to transit the Indian SRR each year. In addition, over a million fishermen are engaged in fishing in the waters surrounding the Indian sub-continent. The promptness and alacrity with which the marine community has come forward to help/rescue-distressed people at sea is indeed noteworthy. The timely rendition of assistance has resulted in saving of numerous lives in the past. Since its constitution in January 2002, the Indian National SAR Board has been actively involved in implementing its SAR charter as required by the International Maritime Organization's (IMO) SAR convention of 1979. First and foremost is the National SAR Plan, which was prepared and implemented on 22 April 2003.

3.10   In considering the tsunami disaster of 26 December 2004, which wrought havoc on this part of the world, the damage caused was unprecedented; numerous lives were lost, while countless others lost their homes, relatives and livelihood. The search and rescue response by the Indian Coast Guard and various other agencies ensured that all national resources were optimized. The incident has once again highlighted the need to further strengthen the existing SAR organization. He conveyed greetings to all present and wished the seminar every success.

3.11   Mr. Brian Day thanked Mr. K. Ramalingam and the Airports Authority of India for inviting ICAO Headquarters to participate at this seminar and for the kind support provided. In preparing and conducting SAR missions, it was important to keep at the forefront of our objectives that SAR was first and foremost a humanitarian activity that places saving of human life as the highest goal we could aspire to. Those who choose to dedicate themselves in this service, demonstrate the best of all human virtues. He was honoured to be part of this gathering which represented the best of humanitarian service that had been put to the extreme test during the tsunami disaster. There was much to learn from each other and this seminar provided an opportunity to up date on SAR developments from the ICAO perspective, as well from the State and local level. Mr. Day looked forward to an informative sharing of experiences and lessons learnt.

PART II – REPORT ON SEMINAR PRESENTATIONS

1.   Seminar programme

1.1   The Seminar adopted the programme as shown below.

Monday, 7 March

Inauguration

                          Mr. K. Ramalingam, Chairman, Airports Authority of India

                          Vice Admiral A.K. Singh, Director General Coast Guard and Chairman
                          National Search and Rescue Board

                          Mr. David Moores, Regional Officer ATM, ICAO Asia and Pacific
                          Office, Bangkok, Thailand

                          Mr. Brian Day, Technical Officer ATM, Air Navigation Bureau, ICAO
                          Headquarters, Montreal, Canada

Session 1:   Moderator: DIG K. C. Pande, Director (OPS), Indian Coast Guard

                          Role & Organization of National SAR Board of India and International
                          Cooperation in M-SAR
                          Comd. Kulpreet Yadav, Indian Coast Guard

                          ICAO: Who We Are and What We Do - An Overview
                          Mr. Brian Day, Technical Officer ATM, ICAO Headquarters

                          Obligations and Benefits of State SAR Systems
                          Mr. Brian Day

Session 2:   Moderator: Mr. Asha Ram, Executive Director (Aviation Safety), AAI

                          Search and Rescue System – Indian Context
                          Mr. N.U.B. Rao, General Manager (Aero), AAI

                          Disaster Management Post-Tsunami–Local Agencies Perspective
                          India (Government of Tamil Nadu)
                          Mr. S.K. Dogra, Director of Fire and Rescue Services, Tamil Nadu

                          Human Factors in the Organization of SAR Services
                          Mr. Brian Day

Session 3:   Moderator: Mr. A. Bhaskaranarayana, Director, Satcom Programme,
                          ISRO

                          COSPAS-SARSAT System Overview
                          Ms Cheryl Bertoia, Principal Operations Officer, Cospas-Sarsat
                          Secretariat

Regional SAR activities and Contingency Planning
Mr. David Moores, Regional Officer ATM, ICAO Asia and Pacific Office

Maritime SAR in Indian SAR region and Case Study-Search and Recovery of Sea King Helicopter
Lt. Cdr. R. S Sunil, Indian Navy

Tuesday, 8 March

Session 1:   Moderator: Captain Dilip Kharkar. Chief Flight Operations Inspector, Director General of Civil Aviation, India

Options for funding a SAR System
Mr. Brian Day

COSPAS-SARSAT Future Technologies: MEOSAR, Beacons and Ship Security Alerting
Ms Cheryl Bertoia

Indian Mission Control Centre (IMCC) for SAR –Facilities, Performance and Contribution
Mr. P. Soma, Group Director, MOHA, ISTRAC, ISRO, India

Session 2:   Moderator: Cmde. U.N. Chitnavis, Commander, CGR (East)

Post-Tsunami Relief Operations
Cdr. Sunil Srivasatav, Indian Navy

Low Cost Beacon
Mr. S. Satanarayana, Head, RFAFD, VSSC, ISRO, India

Tsunami Emergency Response (Mega Disaster and SAR Operations – Post Tsunami)
Dep Comrr Pankavt Verma, Indian Coast Guard

Session 3:   Moderator: Group Captain H.C. Srivastava, Director Operations (Air Traffic Services), IAF

Tsunami Emergency Responses:

Indonesia
Mr. Zulkifli, Air Traffic Services Manager, Medan

Malaysia
Major Murali P.V. Bhaskaran, Staff Officer SAR, Royal Malaysian Air Force (RMAF)

Sri Lanka
Mr. N. De Silva, Air Navigation Services Inspector, Civil Aviation Authority

Thailand
Mr. Vichai Prateepprecha, Deputy Director General, Department of Civil Aviation

ICAO's Role in Disaster Preparedness, Planning and Response
Mr. David Moores

2.   Summary of the Seminar

7 March - Session 1

2.1   *Role & Organization of National SAR Board of India and International Cooperation in M-SAR*

2.1.1.   Commander J.G. Kulpreet Yadav presented information on the role and organization of the Indian Coast Guard constituted on 1 February 1977. The Coast Guard is responsible for assistance to fishermen in distress, safety of life and property at sea, maritime search and rescue, and sharing of SAR data with other organizations. On 28 January 2002 the Indian Government constituted the SAR Board with the Director General, Indian Coast Guard as chairman, which meets annually. In February 2003, the Indian (Maritime) Search and Rescue Computerized Ship Reporting System (INDSAR) developed by the Coast Guard was instituted for maintaining plots of ships transiting through the Indian SRR region. The system is being used for monitoring of shipping traffic for timely response in case of any eventuality. It is a voluntary system and information sent to INDSAR is protected, and used only for a maritime emergency. In its future SAR cooperation/exercise plan, the Coast Guard will participate with the Seychelles, Myanmar, Oman, Iran, Thailand, Singapore, Kenya, Reunion (France), Madagascar, Mauritius, Malaysia, Indonesia, and Bangladesh.

2.1.2.   Several case studies were presented on search and rescue missions carried out. A number of lessons were learnt for the benefit of others, including the need for coordination and regular exercises, synergy with other State organizations, planning of SAR missions, sustenance of operation, judicious resource allocation, cohesion and coordination between various organizations, proactive approach, and well documented procedures.

2.2.   *ICAO: Who We Are and What We Do - An Overview*

2.2.1.   Mr. Brian Day presented a summary of the background to the establishment of ICAO, the Convention on International Civil Aviation, and the structure and role of the Organization. ICAO provides the machinery for the achievement of international cooperation in the air. The primary way in which ICAO accomplishes this is through the establishment of international Standards and Recommended Practices (SARPs) which cover the technical fields of aviation. These SARPs are incorporated into the eighteen Annexes to the Convention on International Civil Aviation (Chicago, 1944).

2.2.2.   ICAO has a sovereign body, the Assembly, and a governing body, the Council. The Council, the Air Navigation Commission, and various committees, (Air Transport, Legal, Joint Support of Air Navigation Services, Finance, Unlawful Interference, Personnel and Technical Cooperation), provide the continuing direction of the work of the organization. Corresponding to each committee, division and the Air Navigation Commission, is a section of the ICAO Secretariat made up of staff members competent in their fields of specialty. The Secretariat is headed by a Secretary General. The foregoing functions are located at the ICAO Headquarters, Montreal, Canada.

2.2.3.   Shortly after the establishment of ICAO in 1944, the Interim Council recognized a need to divide the world into air navigation regions in order to facilitate the planning and implementation of ground services and facilities necessary for international air transport operations. There are seven regional offices which are located in Bangkok, Cairo, Dakar, Lima, Mexico City, Nairobi and Paris. Each is accredited to a group of Contracting States and is charged with assisting those States in the application of the ICAO SARPs as stipulated in the ICAO Annexes, and with implementation of the regional air navigation plans.

2.2.4.   Since 1944, ICAO has been, and continues to be a highly successful and important international organization. In continuing to develop and improve the 18 Annexes to the Convention on international Civil Aviation, ICAO plays a critical part in ensuring that commercial aviation continues to be the safest form of transportation available to mankind.

2.3.   *Obligations and Benefits of State SAR Systems*

2.3.1.   Mr. Brian Day presented information on the obligations and benefits of States having effective SAR systems. The obligations of Contracting States for the provision of SAR are contained in the Convention on International Civil Aviation (the 'Chicago Convention') and other international conventions. These obligations also establish a framework for regional cooperation to handle a major aviation disaster. The goal of ICAO, and its maritime equivalent, the International Maritime Organization (IMO), is to provide an effective world-wide system, so that wherever on the globe people fly or sail, SAR and other rescue services will be available if needed. International conventions and agreements create a legal responsibility for the signatory States. By signing these documents, States formally acknowledge the need for countries to work together for the collective good of the global community including rendering assistance to persons in distress. These agreements are based on the three fundamental principles of international law: good faith; consent; and international responsibility.

2.3.2.   An important aspect of worldwide SAR planning over recent years has been the increased level of cooperation between ICAO and IMO. These organizations have been working together to harmonize aviation and maritime SAR procedures, training and emergency equipment. The goal of ICAO and IMO is to provide an effective worldwide system so that safety services will be available.

2.3.3.   Every State retains responsibility in its sovereign air and sea space to provide for appropriate search and rescue services and should have plans ready to respond to accidents at airports, on land, and at sea either individually or in regional cooperation. Some States undertake to provide these services over portions of the high seas or areas of undetermined sovereignty. These States establish Rescue Coordination Centres (RCC) to coordinate response activities across the search and rescue regions for which they have responsibility.

                Session 2

2.4.   *Search and Rescue System – Indian Context*

2.4.1.   Mr. N.U. Bhaskara Rao presented information on Indian's SAR mission to civil aviation. The primary objectives were to search and locate missing aircraft, rescue the occupants of aircraft, provide medical assistance, provide survival aids and medical evacuation of critical persons. Other important factors to be taken into account were: to safeguard wreckage/property, handing over the undisturbed wreckage to the investigating authority, facilitating injured passengers and relatives, and identification of fatalities and delivery to relatives after legal formalities are concluded.

2.4.2.   The AAI was responsible for SAR for civil aviation in the Indian SRR and provided RCCs at its Area Control Centres. In conducting SAR operations, the activities undertaken included, search and rescue planning, collection and dissemination of relevant information, coordinate with government and non-government organizations for SAR, and monitoring of operations and determining when to cease operations. Major resources that could be called upon are provided by the defence services, semi–defence services, Central/State Government organizations, airline operators, non-government organizations, volunteers and the public.

2.4.3.   In regard to training, the AAI trained its own safety services personnel at two colleges at Delhi and Kolkatta, and at the Civil Aviation Training College for training ATCOs in search and rescue, as well as sending them abroad. Regular monthly hot fire and emergency drills were carried out and regular seminars and SAR exercises held. In meeting its SAR obligations, AAI recognizes the importance of SAR and accords priority to undertaking SAR mission objectives. It continuously strives to update and improve SAR resources, and provides continuous training to SAR personnel.

2.5.   *Disaster Management Post-Tsunami–Local Agencies Perspective*

2.5.1.   Mr. S.K. Dogra presented a briefing on the Tamil Nadu Fire and Rescue Services experiences of search and rescue, relief and recovery operations carried out during the tsunami emergency that struck the Chennai coastal area on 26 December 2004. For Tamil Nadu, a major State in the southern part of India, which had handled many disasters like floods, cyclones and drought on a regular basis in the past, the tsunami was a new and nightmarish experience. The suddenness and the ferocity with which the waves entered the habitations along the 1076 km coastline, caused unprecedented damage, death and destruction, and posed the greatest challenge to the State administration.

2.5.2.   Disaster management assumed a new meaning and urgency in India after the super-cyclone that hit the State of Orissa in 1999 and killed 8495 persons, and the earthquake that devastated large parts of the State of Gujarat on 26 January 2001 and claimed more than 13,800 lives. The observance of the decade 1990-2000 by the United Nations as the International Decade for Natural Disaster Reduction and the emergence of television as a powerful medium of communication, helped to bring disaster management into sharper focus. Coincidentally, these developments took place at a time when Tamil Nadu was assessed to be in Zone III, that is, a moderate risk zone for vulnerability to earthquakes.

2.5.3.   During the past two years, a Disaster Management Policy, which focused more on prevention, pre-disaster preparedness and mitigation rather than post-disaster activities of relief, rehabilitation, restoration and reconstruction has been in place, and the State has made great strides in this direction. A Disaster Management Authority with the Chief Secretary of the State as the Chairperson has been constituted to advise the Government on all policy issues relating to disaster management. Secretaries of all the related departments in Government, the Director General of Police, the Additional Director General of Home Guards and the Director of Fire and Rescue Services are members of the Authority. The Commissioner of Revenue Administration, who is the nodal officer for disaster management in the State, is the Member-Secretary. Although, in the absence of a tsunami warning system, the evacuation of the people living in vulnerable areas could not be undertaken before the tsunami struck, once the tsunami hit the disaster management system so assiduously built by the State over the years ensured that rescue and relief operations were mounted on a war-footing.

2.5.4.   A year ago Tamil Nadu Fire and Rescue Services had raised Search and Rescue Teams in each of the 30 districts in the State. Each team comprises 20 commandoes and 4 Station Officers and is headed by an Assistant Divisional Officer. These teams, which had been given regular training during the past one year, were now rushed to the affected areas from the neighbouring districts. Nearly half a million people had to be evacuated and 412 relief centres were opened in schools, colleges and marriage halls to accommodate them.

2.5.5.   The enormity of the tragedy can be seen from the following figures: human lives lost - 8010; number of children orphaned - 338; livestock killed - 17404; number of persons missing - 1143; population affected - 0.98 million; number of persons evacuated - 0.488 million; relief centres opened - 412; number of persons housed in relief camps - 0.4 million, etc.

2.5.6.   The tsunami disaster also brought out the best in human conduct, cutting across barriers of race and religion, caste and community. The size and speed of the response has been overwhelming. Non-government organizations, religious and social groups and civil society activists arrived in hundreds from the day of the tragedy, and tried to do their small piece to provide relief. Coordinating their activities was no doubt a challenging task in itself, but their enthusiasm and eagerness to participate in relief work is commendable. The tsunami disaster has shown that a lot has to be done to promote awareness about the need for preparedness especially the need for a tsunami warning system.

2.6.   *Human Factors in the Organization of SAR Services*

2.6.1.   Mr. Brian Day presented information on the human role in the way that the provision of SAR is evolving as technology provides tools to effect change. The ICAO goal for the organization of SAR services is to provide a world-wide SAR system that will provide assistance to all persons in distress regardless of nationality or circumstance. It is considered that the fastest, most effective and practical way to achieve this goal is to develop regional systems associated with each ocean area and continent on the basis of need and risk.

2.6.2.   Regionalization will introduce issues of an institutional and legal nature including the use of third party systems, particularly satellite communication and navigation constellations. In this respect, SAR already utilizes highly effective consensual arrangements set in place by the parties and participants to the Cospas-Sarsat system.

2.6.3.   A thorough understanding of cultural differences and cross-cultural influences is essential if projects to strengthen SAR along regional lines are to succeed. Understanding the pervasive, yet seemingly unconscious effects of culture upon attitude and behaviour is a necessary pre-requisite to successful interaction and operational communication and co-ordination across the globe.

2.6.4.   The overall safety and efficiency of the aviation system depends on human operators as the ultimate integrators of the numerous system elements. Experts consider that this dependence is unlikely to decrease and may even increase in unanticipated ways as additional advanced technology is implemented. To a greater extent than ever before, understanding and accounting for the role of humans will be important to maintaining and improving safety while improving efficiency.

2.6.5.   A number of States have, for a long time, had difficulties in establishing a viable SAR system. An arrangement of several regional organizations, prudently and sensitively introduced into areas of demographic suitability, could input to the SAR service the essential elements of a system that may be beyond the capacity of some individual States. In aggregate, these regional organizations could greatly improve the effectiveness of the global SAR plan to which the policies of ICAO and IMO are directed. Secondly, in organizing regionally, it is imperative that the barriers and safeguards that make for a safe system are set in place and that they be comprehensive and mutually supportive. In considering changes in the way SAR is provided, the place of the human operator must be thoroughly understood and appropriate provision made in integrating the human element in any change proposed to the SAR system.

Session 3

2.7.   *Cospas-Sarsat System Overview*

2.7.1.   Ms Cheryl Bertoia presented an overview of the Cospas-Sarsat system. The Cospas-Sarsat system provides distress alert and location information to search and rescue service free of charge to the end user in distress anywhere in the world. There are 37 countries and organizations formally associated with Cospas-Sarsat, operating low-earth orbiting (LEOSAR) and geostationary (GEOSAT) satellite systems and a global ground segment. In 2003, Cospas-Sarsat provided sisters alerts for 366 SAR incidents, assisting in the rescue of 1414 lives.

2.7.2.   In order to benefit from receipt of Cospas-Sarsat alerts, countries not formally associated with the programme should contact the Cospas-Sarsat Secretariat (cospas-sarsat@imso.org) to designate a SAR Point of Contact. Countries wishing to associate formally with the Cospas-Sarsat Programme can find the procedure described on the website www.cospas-sarsat.org.

2.8.   *Regional SAR activities and Contingency Planning*

2.8.1.   Mr. David Moores presented information on the role of the Regional Offices to undertake its tasks and responsibilities, which included implementation of ICAO policies, decisions, Standards and Recommended Practices, to maintain continuous liaison with States to which they are accredited, to maintain currency of regional air navigation plans with its focus on safety-related issues, and to provide technical assistance to States when requested.

2.8.2.   In regard to the Asia and Pacific Office's work programme for air traffic management, which includes responsibility for search and rescue matters, a primary focus of its work is to implement the regional plan for CNS and ATM systems in accordance with the planning priorities established by the Asia and Pacific Regional Planning and Implementation Regional Group (APANPIRG). These activities are determined based on operational requirements of States and users of the air navigation system. In effecting any change to airspace and airports and related operational procedures, under Annex 11 — *Air Traffic Services*, ICAO requires that Contracting States effect change through application of safety management programmes. In this regard, the primary focus of ICAO's work on ATM was on safety.

2.8.3.   In the provision of safety services, it is important to be cognizant of the characteristics of the operational environment, whether at airports or en-route airspace. In a search and rescue context, it is important that SAR providers keep informed of the way in which changes are being made in the air navigation system, as well as aircraft that operate in the system. In the Asia and Pacific Region in recent years there have been major changes to the way in which aircraft operate. The seminar was informed of major changes introduced, such as reduced vertical separation minimum between FL 290-FL 410 inclusive (RVSM), required navigation performance (RNP), reduction in aircraft separation and introduction of data link services for surveillance and communications.

2.8.4.   In regard to SAR, APANPIRG assists States to meet their SAR obligations including an annual review of the status of States' SAR capability (**Appendix B** to the seminar report refers). The requirement for States to provide SAR facilities and services were contained in the Asia and Pacific Air Navigation Plan (ANP, Doc 9673), maintaining a list of deficiencies of non-compliance with the ANP requirements, maintaining a registry of SAR agreements (**Appendix C** to the seminar report refers) and by supporting and facilitating SAR activities such as seminars and SAREX's. The representatives of States present at this seminar were requested to bring to the attention of their administrations, APANPIRG's requirements for the provision of SAR, especially in providing the SAR facilities and services listed in the APAC ANP, and to establish SAR agreements with neighbouring States. Also, the Seminar was reminded of the importance of reviewing their national Contingency Plans in light of the earthquake and tsunami

disaster. Also, establishing contingency plans to maintain the provision of ATS was a requirement under Annex 11. Information on contingency planning is provided in **Appendix D** to the seminar report.

2.9.   *Maritime SAR in Indian SAR region and Case Study-Search and Recovery of Sea King Helicopter*

2.9.1.   Lt. Cdr R.S. Sunil presented a detailed briefing on how the Indian Navy recovered one of its Sea King helicopters in April 2003 that had ditched at sea in March 2003 whilst operating on a training mission. The crew had been rescued successfully. The recovery of the helicopter was important for accident investigation and it was determined that the condition and location of the wreckage on the sea bed could be recovered. Using a submersible vehicle, the Navy undertook the task and successfully recovered the fuselage. The techniques and equipment used ably demonstrated the extensive capability of the Indian Navy.

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2.10.   *Options for Funding a SAR System*

2.10.1.   Amongst many other advantages, the ICAO/IMO policy of promoting regional SAR services on the basis of need and risk gave promise of greater cost benefit than the now outdated policy of having each State provide SAR services only within its own airspace, regardless of capacity and demand. In this regard, it is notable that the ICAO policy document *Manual on Air Navigation Services Economics* (Doc 9161), discusses different forms of international cooperation for economic provision and operation of air navigation services and makes provision for the establishment of a multinational funding facility for joint financing administered by an umbrella entity for services extending beyond State airspace that are included in regional ANPs. Such arrangements are provided for in the Chicago Convention, Chapter IV.

2.10.2.   Mr. Day reminded the seminar that ICAO Doc 9161 gives guidance that costs attributable to the provision of equipment and personnel for civil aviation search and rescue services provided by a permanent establishment can be included in the cost basis for air navigation services charges (and therefore can be met from such charges) but that SAR services provided by parties or entities that do not fall within that category (for example military forces and maritime SAR) should not. At the same time, States should refrain from imposing charges that discriminate against international civil aviation in relation to other modes of international transport. Further, no costs should be recovered from international civil aviation operators that are attributable to SAR services directed to other sectors.

2.11.   *Cospas-Sarsat Future Technologies: MEOSAR, Beacons and Ship Security Alerting*

2.11.1.   Ms Cheryl Bertoia presented information on Cospas-Sarsat future developments. Cospas-Sarsat will terminate 121.5 MHz satellite alerting services from February 2009. The approximately 700,000 distress alerting beacons operating worldwide at this frequency must be replaced with the technically superior 406 MHz beacons. These newer 406 MHz beacons provide SAR services with greater position accuracy (5 km, or 1200 m if a GPS position is encoded in the beacon message), or a shorter alert time (205 minutes) and easier false alert prosecution through use of beacon registry information.

2.11.2.   To make beacon registration information more widely available to SAR services, Cospas-Sarsat will implement an International Beacon Registration Database (IBRD) in 2005. The IBRD will allow States to control national database entries or to allow users to register beacons directly and SAR services will access beacon owner information such as emergency contacts and vessel/aircraft description through the Internet. To obtain more information on the IBRD, States can download documentation from www.cospas-sarsat.org.

2.11.3.   Cospas-Sarsat has implemented a Ship Security Alerting System and also provided information concerning ICAO's (Annex 6 and Annex 10) requirement, effective 1 January 2005, that all aircraft operated on long-range over-water flights or over designated land areas be equipped with ELTs (Emergency Location Transmitters) which transmit simultaneously at 121.5 MHz and 406 MHz and feature automatic activation on at least one of the installed ELTs.

2.11.4.   The United States of America, the Russian Federation and the European Space Agency will include 406 MHz SAR repeater instruments on their next-generation global navigation satellites (e.g. GPS). These constellations of medium-altitude earth orbiting (MEO) will provide significant distress-alerting benefits including near-instantaneous global and resilient beacon-to-satellite links. The NEOSAR system will be fully compatible with existing Cospas-Sarsat 406 MHz beacons and new technologies involved may make possible low-cost beacons compatible with the new system. MEOSAR initial operational capability is planned for 2012.

2.12.   *Indian Mission Control Centre (IMCC) for SAR – Facilities, Performance and Contribution*

2.12.1.   Mr. P. Soma presented a comprehensive briefing on the Indian Mission Control Centre's (MCC) programme for SAR, its facilities, performance and contribution to SAR. Recognizing the potential of satellite based search and rescue, an Inter Agency Steering Committee (IASC) was setup in April 1986 represented by Coast Guard, Defence Service (Army, Navy, Air Force), and the Directorate General of Shipping, Civil Aviation, Department of Telecommunication and Department of Electronics with the Department of Space as nodal agency. Two Indian Local user Terminals (LUTs) were established at Bangalore and Lucknow. The Bangalore LUT is co-located with the MCC, which is responsible for coordination with RCCs (Mumbai, Chennai, Delhi and Kolkata) operated by AAI. The India LUTs provide a substantial coverage of the Indian Ocean region. The MCC provides Cospas-Sarsat alerting services to seven neighbouring countries: Bangladesh, Bhutan, Maldives, Nepal, Sri Lanka, Seychelles and Tanzania.

2.12.2.   The main objectives of the Indian SAR programme are to:

       a)   provide humanitarian services through space based technology application;

       b)   fulfill international obligation;

       c)   self-reliance for national requirements (services to national user community: airlines and shipping industries); and

       d)   promote regional/international cooperation (services are offered to 7 neighbouring countries)

2.12.3.   In its future developments, the MCC plans include the following:

       a)   international 406 MHz beacon registration database (global);

       b)   development of low cost beacons;

       c)   internet-based data communication system (FTP, Email);

       d)   development of MEOSAR system (SAR Instruments on GNSS (GLONAS/GPS/Galileo satellites); and

       e)   implementation of Ship Security Alarm System (SSAS)

Session 2:

2.13.   *Post-Tsunami Relief Operations*

2.13.1   Comdr Sunil Srivastav presented information on the Indian Navy's contribution to the post-tsunami search and rescue and relief operations, which were undertaken through operations code-named as follows:

- Operation Madad – Indian Peninsula
- Operation Seawaves – Andaman and Nicobar Islands
- Operation Rainbow – Sri Lanka
- Operation Castor – Maldives
- Operation Gambhir – Indonesia

2.13.2   The first earthquake occurred at 0629 hrs on 26 December 2004 off the western coast of Sumatra, and the second struck at 0953 hrs on the same day. Within minutes, the tsunami waves reached Andaman and in two hours they reached the Tamil Nadu coast on the East Coast of India. The origin of the earthquake and the angle of slip were the major reasons behind the movement of tsunamis and where they stuck the coastal areas with the most energy.

2.13.3   The Indian Navy mobilized soon after receiving the information of the earthquake at Port Blair, South Andaman and on the East Coast. Operations were immediately launched for rendering assistance on the East and West Coast of India. At Naval Headquarters the following action was taken on receipt of the initial information on the earthquake:

- 0900 – the operations team at the war room was ordered to "close up"
- 0930 – all ships and aircraft at the eastern naval command were ordered to come to immediate readiness
- 1200 – Operation Madad was launched

2.13.4   Subsequently, Operation Rainbow for assistance to Sri Lanka and Operation Castor for assistance to Maldives were also launched later on in the day. By evening of 26 December 2004, the Navy had deployed 19 ships, 4 aircraft and 14 helicopters promptly and with a high sense of urgency. 2 ships and 1 helicopter were also dispatched to Indonesia. At 0600 hrs on 28 December 2004, the first ship with relief supplies arrived at the Maldives. As of 1 January 2005, the Indian Navy had deployed around 37 ships, 20 helicopters and 4 fixed wing aircraft towards disaster relief.

2.13.5   As a contingency, the Navy also converted three survey ships into hospital ships in a record time of 14 hours. One such ship is deployed at Trincomalee in Sri Lanka, one at Meulaboh in Indonesia and one ship in the Andaman and Nicobar Islands. These ship carried facilities for 46 patients with 4 in an intensive care unit, an operation theatre, an x-ray and pathological laboratory and supplies for major surgery.

2.13.6   Under Phase I, the concept of operation was to undertake the following:

a) search and rescue of marooned people along the coast;
b) damage assessment;
c) immediate supply of drinking water, clothing and cooked food;
d) medical first-aid; and
e) diving operations for retrieval of bodies.

2.13.7   Under Phase II, the concept of operation was to undertake the following:

   a) set up medical camps and provide medicines for treatment of survivors;
   b) set up relief camps and supply of provisions, clothing etc for camps;
   c) prevention of epidemics and rehabilitation;
   d) salvage operations, debris clearance and hydrographic surveys;
   e) self-sufficiency in drinking water by restoring plants and cleaning of wells;
   f) repair/supply of generators; and
   g) repair of infrastructure to restore normalcy.

2.13.8   Under Operation Madad, to carry out relief assistance to the coastal areas of the mainland, 7 ships, 6 helicopters and 4 aircraft were deployed. In addition, medical and relief teams were mobilized for assistance on the East and West Coast of India. To date, more than 8,000 patients have been treated in these areas and 612 tons of relief supplies has been distributed. Diving teams have also undertaken extensive salvage operations at Vizag, Chennai, Nagapattinam, Vellar River and at Kollam in Kerala. Also, 9 medical/relief camps and mobile camps were set up in Nagapattinam, Karaikal, Kanyakumari and Shertallai (Kerala) and over 7200 patients treated.

2.13.9   The following is a summary of the operations carried out by the Indian Navy:

	Ship Days	Helicopter Sorties
Op CASTOR (Maldives)	28	46
Op MADAD (East & West Coast of India)	70	86
Op SEAWAVES (Andaman &Nicobar Islands)	389	175
Op RAINBOW (Sri Lanka)	135	123
Op GAMBHIR (Indonesia)	32	20

2.13.10   In regard to providing relief assistance to neighbouring countries, the Indian Navy responded promptly to the humanitarian needs of its neighbours whilst undertaking its own relief tasks. This demonstrated India's capability to discharge tasks commensurate with India's regional responsibilities. The people of Indonesia, Maldives and Sri Lanka have felt and benefited by the genuine concern of India.

2.14.   *Low Cost Beacon*

2.14.1.   Mr. S. Satyanarayana presented information on the work being undertaken by avionics engineers at the Vikram Sarabhai Space Centre (VSSC), Trivandrum to develop a low cost SAR emergency beacon. In considering the need for developing low cost beacons, this would benefit a large and varied group of users. It was noted that India has a long east and west coast where a large population depends upon fishing. There are also large mountaineering areas for recreation climbing and a large population of small aircraft used for civil aviation and other requirements. It would be highly desirable for personal safety, to make carriage of an emergency beacon mandatory. However, the current cost of beacons was not affordable for many potential users in the above groups.

2.14.2.   In considering the cost of manufacturing low cost beacons, the major sub-systems of the SAR beacon to be considered are:

    a) Carrier Generator;
    b) Digital code generator;
    c) Modulator;
    d) Power Amplifier; and
    e) GPS receiver and GPS antenna.

2.14.3.   In considering how to reduce the cost of beacons, commercial of the shelf (COTS) components for the above equipment were available from multi-vendors in the market place. It was estimated that following this approach a beacon could be produced for approximately US $200.

2.14.4.   The Seminar noted the promising developments and the desirability of producing low cost beacons to a much wider user community, which would greatly benefit personal safety and encouraged the continued development and manufacture of this product

          Session 3:

2.15.   *Tsunami Emergency Response (Mega Disaster and SAR Operations – Post Tsunami)*

2.15.1.   Deputy Commander Pankavt Verma presented information on the Indian Coast Guard's tsunami emergency response and relief effort. The earthquake which occurred at 06:28:53 hrs was the strongest earthquake to rock South East Asia with the epicenter 160 km west of Sumatra (the extreme western end of the "ring of fire"). This was in an earthquake belt that accounts for 81 percent of the world's largest earthquakes. The magnitude was 9.0 on the Richter magnitude scale, the largest since the 1964 Alaska earthquake and the fourth largest earthquake since 1900. The following are some statistics on the extent of the tsunami:

    •   deadliest tsunami by far in all of recorded history;
    •   total energy of tsunami – five megatons of TNT;
    •   greatest strength of tsunami was in an east/west direction (the reason why Bangladesh was less affected than even Somalia); and
    •   the tsunami wave took 15 minutes to 7 hours of traveling time.

2.15.2   The following were the main objectives of the Coast Guard relief operations;

    •   rescue of stranded persons from remote locations;
    •   evacuation of injured / ill personnel initial damage assessment;
    •   evacuation of tourists;
    •   supply of relief material until civil administration reaches; and
    •   study/photograph damage to ecology and geophysical aspects of Andaman and Nicobar Islands and well being of the indigenous tribes.

2.15.3   The following information highlights the relief effort by the Coast Guard for the mainland of India:

    •   lives rescued – 1348;
    •   persons provided medical aid – 3850;
    •   relief material distributed – 100 tons;
    •   no of aircraft sorties – 172; and
    •   no of ships deployed – 20

2.15.4   The following information highlights the relief effort by the Coast Guard for the Maldives and Sri Lanka:

- lives rescued – 4;
- persons provided medical aid – 300;
- relief material distributed – 300 tons;
- no of aircraft sorties – 58;
- no of ships deployed – 3; and
- no of aircraft deployed – 3 helicopters and 2 Dorniers (fixed wing).

2.15.5   On the east coast of India, the tsunami hit at 0910 hrs the coastal belt of Tamil Nadu, Pondicherry and Andhra which were badly affected. The following information summarizes the impact:

Tamil Nadu and Pondicherry

- villages effected – 376 (896,163);
- human lives lost – 7968;
- cattle loss – 9559;
- boats damaged – 45,000;
- total relief camps – 412; and
- people in 412 camps – 309,379.

Andhra

- deaths – 114, and
- displaced – 15,927.

2.15.6   Medical Camps were set up at Karaikal Medu and Pattinam Cherry providing the following services;

- medical aid - 354 patients, and
- 1 ton relief material.

2.15.7   The medical camp at Ponneri/Pulicat provided:

- medical aid - 550 patients, and
- 1 ton relief material.

2.15.8   For the Andaman and Nicobar Islands the following summarizes the relief operations;

- persons evacuated/rescued – 1323;
- persons provided medical aid – 2946;
- relief material distributed –72 tons;
- number of ship days for relief – 78;
- number of ships deployed – 5;
- number of aircraft sorties – 89 (161 hours);
- number of helicopter sorties – 54 (91 hours); and
- number of aircraft deployed – 3.

2.15.9   In regard to the earthquake and tsunami effects on the geo-physics of the Andamans, the islands shrunk in size, most of the beaches sunk, vegetation close to coast was destroyed, there was large scale soil erosion, fresh water sources were contaminated, corals were exposed and are dying, and sea grass was also exposed and dying.

2.15.10   The relief work at most of the locations was taken over by civil administrations and non-government agencies by the first week of January 2005. The Coast Guard continues its support to administrations for relief work and to the scientific community for research work.

2.16.   *Tsunami Emergency Responses*

              Indonesia

2.16.1.   Mr. Zulkifli informed the meeting of the effects of the earthquake and tsunami disaster on the Indonesian air traffic services (ATS). The Tower cabin at Sultan Iskandar Muda, (Banda Aceh) Airport, Banda Aceh experienced minor damage from the earthquake and the building was considered to be unsafe for continued operation. Temporary air traffic services were provided from the top of the passenger terminal building for two weeks until a mobile tower was delivered by sea by the Singapore Government on 10 January 2005. Land transportation at Banda Aceh had became fully inoperative and most of the humanitarian relief missions carried out by Indonesia and the international community operated by air. This resulted in a major increase in air traffic movements. At Polonia Airport, Medan air traffic movements increased by 200 percent (highest number of movements 277) as shown below. At Banda Aceh Airport traffic increased by more than 20 times (highest number of movements 180).

**Traffic Movement from 27 Dec 2004 - 15 Jan 2005
at Polonia Airport**
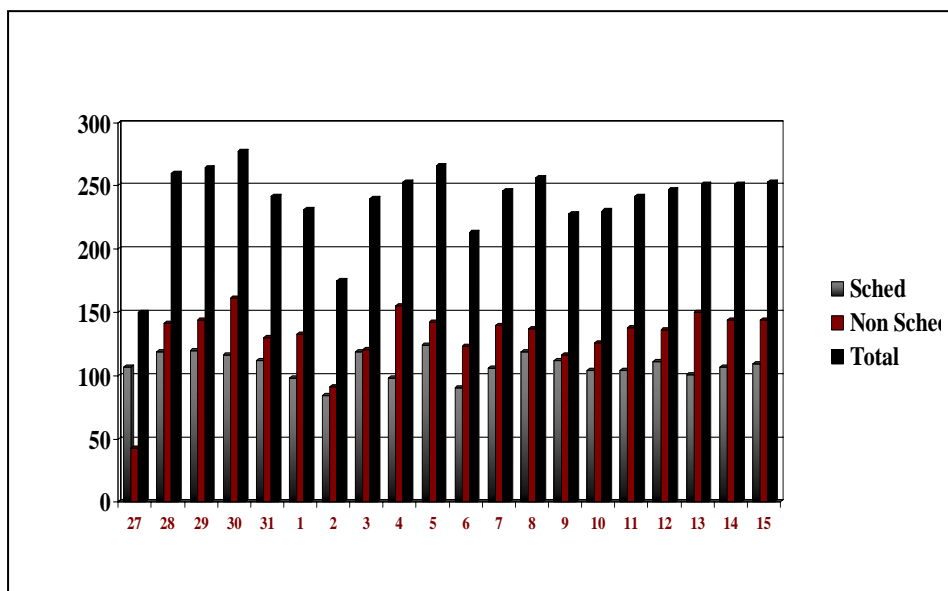
2.16.2.   An Emergency Operation Center was established in Jakarta and Medan to regulate air traffic flow to and from Banda Aceh Airport. The ATS at Banda Aceh Airport was downgraded from an Aerodrome Control Service to an Aeronautical Flight Information Services (AFIS).

2.16.3.   The hours of operation of Banda Aceh Airport were extended from 17 hours to H24. Because of limited apron capacity at Polonia and Banda Aceh Airports, 90 percent of scheduled flights were delayed by 2 to 10 hours and some diverted to airports in Malaysia. Two accidents occurred at Banda Aceh Airport: A Boeing 737 hit a cow on landing early on Tuesday, 4 January and blocked the runway. Specialised lifting equipment (airbags) had to be brought in by helicopter from Singapore and, after 15 hours, the aircraft was and pushed to the side clear of the runway and operations resumed. On Monday, 10 January a U.S. Seahawk helicopter attempting to land near Banda Aceh Airport, the main tsunami relief airport, crashed in a paddy field with injuries to ten military personnel on board.

Malaysia

2.16.4.   Major P.V. Bhaskaran Murali presented information on the SAR organization in Malaysia and assistance provided to the United Nations humanitarian relief to tsunami affected areas.

2.16.5.   In regard to its SAR organization, the principal objectives of the Malaysian National Aeronautical and Maritime SAR organization was as follows:

   a) to direct, coordinate and control Aeronautical and Maritime SAR missions within SRRs in Malaysia; and

   b) to provide the organizational basis for-operation between the different Aeronautical and Maritime SAR Authority and assisting Aeronautical and Maritime SAR Agency.

2.16.6.   The RMAF supported the tsunami operations in Medan and Banda Aceh, Indonesia and initial deployment of RMAF aircraft was as follows:

   - 2 x C-130H   -   28 December 2004
   - 1 x CN 235   -   30 December 2004
   - 2 x SK-61A   -   31 December 2004

2.16.7.   The United Nations Joint Operation Centre (UNJOC) was established on 6 January 2005 at RMAF Subang airbase and operated as a hub to support UN humanitarian relief to the affected areas of tsunami in Aceh. To facilitate the UN logistics support and air operation requirements, the RMAF Subang air base was selected to mount the UN relief operations. Subang was chosen for the following reasons:

   - strategic location to the affected areas;
   - good and sufficient airfield facilities for all types of aircraft;
   - availability of parking space - 24 parking space of various types of aircraft (4 x B747-400 at all times);
   - easy access to refueling facilities – hydrants;
   - competent aircraft ground handler from Malaysia Airline System (MAS) and RMAF;
   - capable of providing air movement and ramp services;
   - sufficient warehouse space - permanent and temporary.; ample office space for administration and joint operation room; and
   - good cooperation and coordination between RMAF and other agencies – Department of Civil Aviation, Malaysian Airport Berhad (MAB), Royal Malaysian custom and excise, immigration department and other agencies.

2.16.8.   The RMAF undertook the following activities:

   - coordinate and monitor all UN related air activities on humanitarian mission to Aceh and Medan from Subang Air Base;

- liaise with UN Air Services (UNHAS) for the tasking of un aircraft to Aceh and Medan;
- to coordinate slot time for aircraft to Banda Aceh and Medan via RMAF AOC in Medan; and
- monitoring cargo in and out, liaise and coordinate with other agencies to ensure the smooth flow of air operations.

Sri Lanka

2.16.9.   Mr. N. De Silva presented information Sri Lanka's SAR organization and the tsunami emergency in Sri Lanka. The Civil Aviation Authority, Sri Lanka is responsible for the implementation of ICAO Annex 12 compliance. It has through the service provider, Airport and Aviation Services Sri Lanka LTD, delegated this responsibility for providing SAR.

2.16.10.   The main operational unit of SAR Services is the RCC, which is part of the Area Control Centre and located at Ratmalana. This is also the base for most Sri Lanka Air Force (SLAF) transport aircraft. The RCC alerts and initiates all local SAR activities. It is dormant until activated. All ATS unit control towers act as alerting posts.

2.16.11.   Under the RCC organizational system, Rescue Sub-coordination Centers (RSC) were also set up. The RSC established at Katunayake acts as a forward base but can work independently. It also coordinates all SAR operations and launching of search and rescue units (SRUs) for SAR, which could be foreign or local. The SRUs available for SAR are the aircraft of the SLAF, SAR maritime units of the Sri Lanka Navy, and SAR Jungle Rescue Units of the Sri Lanka Army, which are Commando Units. They are trained in jungle rescue operations and are on standby for jungle/mountain rescue covering the Island.

2.16.12.   Due to the civil war in Sri Lanka, this has destroyed most civil SAR infrastructure and SAR is now under the military. There is a lack of proper charts for plotting, SAR trained pilots and other SAR personnel. Further, there were no ocean current and wind histories for maritime SAR, inadequate charts and no emergency contingency disaster plan. In addition other SAR limitations include:

- no droppable supplies available;
- no heli-boxes or other means;
- winch capability very low;
- mobile hospitals non existing;
- coordinaton of resources very poor;
- no electronic search capability; and
- no computer aided SAR facility.

2.16.13.   On 26 December 2004, at approximately 0903 local time the first tsunami waves hit the east coast of Sri Lanka. There were two distinct waves, the first about 10 m high and the next at 20 m+ which struck with awesome fury. It took about 5 to 6 minutes for the waves to curl round the island. They hit the southwest coast with little let down in fury. People were taken completely by surprise, and in 5 to 10 minutes 30,000 plus were just drowned or were smashed to death in the fury. The waters reached 1.5 to 2 kilometers inland from the coast.

2.16.14.   The authorities had no plan at all for this "assault." The first to react was the local media who rallied people in the area to search and rescue themselves. They also collected local rations. SLAF copters took off for airborne rescue as best as they could. Fixed wing SLAF aircraft monitored the situation. The SLAF aircraft operated totally independent of the civil authority. Some measure of civil operations was to follow later.

2.16.15.   Affected areas lost regular telephone contact with Colombo and other areas. Mobile and some satellite phones worked but they were soon overloaded. Mobile communication towers collapsed, and no one knew much about what was happening in those areas. At first, the north east of the Island was very isolated. By the evening of 27 December, radio hams setup "mobile" stations in the south. This enabled direct contact to be established with the Prime Minister's office and the ham stations. With communications and portable generators coming in to the affected areas, normal high power communication was established. At first it was difficult to tabulate who was lost, dead, found or saved.

2.16.16.   Among the very first to assist Sri Lanka was the Indian Navy and Coast Guard. They showed a lot of professionalism, particularly as they were familiar with the Bay of Bengal area. Others like the European navies and the US navy and marines came in later.

2.16.17.   Once the foreign media gave wide publicity, thousands of foreigners assisted Sri Lanka. Requests to fly to/from Colombo to bring aid poured in. The magnitude was such that it saturated the airport. With just 17 parking stands, there were up to 30 to 40 aircraft coming at once. To deal with the bottleneck, the CAA took direct control of the aprons and had a 24 hour slot system set up, limiting parking, and imposing some restrictions. In all about 628 wide-bodied transport aircraft (of these 46 percent were IL76 aircraft) were handled at Colombo International Airport, outside the major scheduled traffic for 3 months. This did not include any foreign air force or military operations

2.16.18.   In regard to foreign SAR aircraft, the Indian Air Force provided fixed wing and Chetek/ MI 8 helicopters. The Pakistan Air Force provided C130 aircraft and the Bangladesh Air Force provided C130 aircraft and MI8 helicopters. The Italian embassy provided two CL12 amphibian aircraft.

2.16.19.   Some difficulties were experienced operating civil relief flights due to there being two regulators, civil and military. Operations of civil aircraft have to obtain prior Ministry of Defence clearance and private U.S. puma helicopters, which were permitted to operate at first, were subsequently prohibited by the military.

Thailand

2.16.20.   Mr. Vichai Prateepprecha, Deputy Director General, Department of Civil Aviation Thailand provided information on the aeronautical and maritime search and rescue in Thailand. The main bodies of the SAR system are the National SAR Coordinating Committee, RCC, SAR Units and Alerting Post. The Duties and Responsibility of the National SAR Coordinating Committee are as follows:

    a) to determine the policy and principle of Aircraft and Maritime Search and Rescue;

    b) to seek measures for SAR operation in the area of responsibility;

    c) to organize the annual Search and Rescue Exercise (SAREX);

    d) to give advice to the Minister and the units concerned;

    e) operational procedures and making agreement with other countries with regard to aircraft and Maritime SAR; and
    f) to appoint sub-committees for SAR operations as required.

2.16.21.   The Department of Disaster Prevention and Mitigation (DPM) is the principle government agency designated to shoulder the task and responsibility on disaster management so as to ensure that Thailand remains as an inhabitable and secure country. The following resources are available:

- Manpower: Civil Servants - 2,272
                   Permanent Employees - 2,339
- Equipment/ Tools: 2,548 items

2.16.22.   The DPM was the organization designated to take responsibilities for the tsunami management in 6 provinces in the south of Thailand. The number of dead, injured and missing as last updated on 1 March 2005 were as follows:

- Dead   5,395;
- Injured   8,457; and
- Missing   2,959.

2.16.23.   On 26 December 2004, the DPM ordered the province governors to set up temporary co-ordination and command posts to deal with the situation, approved emergency funds for 50 million Thai Baht for each province and assigned the Navy Commander of the southern part of Thailand to be responsible for arrangement of aircraft and helicopters for rescue.

2.16.24.   On 27 December 2004, Prime Minister Thaksin was on the scene at Phuket province. He set up a joint command post at Phuket headed by Minister of Interior, assigned a Minister responsible each province affected and assigned the military units to set up a temporary communications system in 6 provinces.

2.17.   *ICAO's Role in Disaster Preparedness, Planning and Response*

2.17.1.   Mr. David Moores presented information on ICAO's role in disaster preparedness, planning and response. He reminded the seminar that the foundation for the global SAR structure is the agreement by States contracted to the Chicago Convention to cooperate in the application of Standards that govern response to events of aeronautical distress. Cooperation is the mainstay of the system at all its levels. It is the subject of clear reference in Annex 12 and of wide application in the IAMSAR Manual. Many of these principles have a common application to management of disasters over a wider scope; indeed the role of aviation, if not central to the distress, is likely to be one of prominent support and thus, itself, requiring prudent management.

2.17.2.   Standards can only be effective when an infrastructure is in place. Many States are hard pressed to provide a complete system. The most practical method to provide an effective world-wide SAR service is to develop regional systems offering improved services, more resources and wider coverage at reduced cost.

2.17.3.   Attention was drawn to a major challenge to SAR planners and administrators to manage globalization in the context of accelerating technological and organizational change. Further, it is critical that a region-wide planning policy take close account of independent States' sensitivities and the cultural differences that characterize regional areas.

2.17.4.   Mr. Moores discussed the nature of aeronautical SAR activity and highlighted the high consequences of error and inefficiency. Reference was made to the paradoxical nature of change affecting international SAR: its benefits and its demands, and investigates the intersection between organizational structure and individual and group performance.

3.   Recommendations of the Seminar

3.7.   The seminar, in its review of the information provided and discussions held, made the following recommendations:

1)   The seminar was of the view that the establishment of RCCs should be made on the basis of need and risk. This strategy allows for, on the one hand, regionalized SAR service provision in areas of light traffic density and few resources, and, on the other hand, dedicated facilities in States with high traffic density of sufficient justification to warrant RCC staff appropriately trained and specializing in SAR;

2)   Rapid and accurate collation and dissemination of SAR information is essential to ensure timely and appropriate SAR response to operational units. This could be most effectively achieved by using up to date and automated technology which can be supported by an appropriate specialized infrastructure and States should take full advantage of such systems in equipping their RCCs.

3)   The seminar highlighted the importance of including in the seminar all organizations involved in providing emergency services for search and rescue, therefore, annual exercises should be held involving all parties concerned.

4)   The seminar recognized the importance of clearly specifying the duties and responsibilities of all participating organizations in a search and rescue operation. Therefore, procedures should be provided that specify coordination requirements including reporting, lines of responsibility and standardized formats for documentation. This work can be best facilitated by the establishment of an appropriately representative Search and Rescue Coordinating Committee in the development of a National SAR Plan.

5)   SAR agreements with neighbouring States should take into harmonized account both maritime and aeronautical requirements giving due balance to matters of sovereignty and expeditious mutual access by foreign SAR aircraft.

6)   The seminar recognized that an aircraft crash involving a large commercial jet into a densely populated area could result in a major disaster of wide ramifications and appropriately specialized parallel disaster management units need to coordinate with civil aviation SAR agencies in the development and execution of broadly based plans.

7)   In light of the earthquake and tsunami disaster on 26 December 2004 and lack of public awareness of the large-scale risk to life and property posed by this natural phenomena, the seminar considered that there needs to be a public awareness programmes targeting all sections of the community regarding earthquake and tsunami etc, and precautions and actions to be taken to minimize the loss of life and property.

8)   The seminar, in considering the response by the international community to the tsunami emergency relief, recognized that there had been an urgent and rushed response that significantly increased air traffic in a short period of time to air lift aid to the disaster areas. In some notable cases, the airport capacity, resources and infrastructure were inadequate. This could significantly impede the delivery

of humanitarian relief supplies. Therefore, the Seminar requested that ICAO consider undertaking a study with the States concerned to examine the air operations that took place and provide appropriate guidelines on handling major disaster situations.

9)   States should review the ICAO SAR capability table compiled by APANPIRG and update the Asia and Pacific Regional Office accordingly.

10)   The seminar acknowledged the highly successful large-scale land and sea search and rescue exercises that were held involving multi-disciplinary emergency response units, and urged ICAO to organize annual regional SAR seminars and SAREX's similar to the one held in Chennai.

11)   The seminar urged the States to hasten completion of SAR Letters of Agreement and to provide a copy to the Regional Office.

12)   The seminar recognized the vital operational and economic contribution made to effective SAR service provision by the Cospas-Sarsat system and recommended that States participate as a matter of priority.

13)   The seminar, noting the promising developments and the desirability of producing a low cost SAR emergency beacon for a much wider user community which would greatly benefit personal safety, encouraged the continued development and manufacture of this product.

4   Closing of the Seminar

4.1   Mr. David Moores summarized highlights of the seminar and thanked the Airports Authority of India for providing the excellent venue and support. The participants represented a broad cross section of SAR and emergency response organizations in India and from States in the region. The Seminar had afforded an excellent opportunity for the exchange of information and views on SAR and the emergency response to the earthquake and tsunami disaster. He thanked the presenters for the high quality of their presentations and for the dedicated team from AAI who organized and made all the arrangements, and also to the hotel staff for their support and excellent catering that had greatly contributed to the success of the event.

4.2   The Seminar was closed by Mr. Srikrishan Executive Director, ATM, AAI, who expressed appreciation on behalf of the Airports Authority of India to the international and local delegates for attending and contributing to the success of the seminar. He also thanked the personnel of AAI who had made the excellent arrangements and supported the seminar. He also thanked the hotel for their outstanding services.

PART III – REPORT ON THE SAREX

Summary of the Land Exercise

1.1   The land SAR exercise was held on the morning of Wednesday, 9 March 2005 organized by AAI in conjunction with Indian Air Force, Tamil Nadu State Government authorities such as Police, Fire Services, Medical Services and Private Hospitals. The purpose of the exercise was to evaluate the preparedness of various local emergency response organizations to respond to and conduct a practical real time aircraft crash exercise outside the Chennai Airport fire and rescue services area of responsibility.

1.2   The exercise scenario involved a twin engine Dornier aircraft with 20 persons on board operated by Shasta Airlines (fictitious) en route from Trivandrum Airport to Chennai. The aircraft when on final approach to Chennai Airport at 1106 hrs (local time), approximately 15 kms to the southwest, crashed in a field in the Vandalur area at 1108 hrs (0538 UTC). Chennai ATC activated the crash alert and notified the Chennai RCC of the details of the flight. The RCC activated the search and rescue plan to alert the local search and rescue and medical services who immediately responded to and deployed their forces towards the area of the crash. At the same time, the Indian Air Force (IAF) was alerted and prepared to dispatch a MI8 helicopter to search the area.

1.3   At the crash site, the aircraft emergency locator transmitter (ELT), simulated by a personal locator beacon (PLB) equipped with GPS, was manually turned on at the crash site, and transmitted on 121.5 MHz (international emergency frequency) and on 406 MHz (designed for use with Cospas-Sarsat) at 1108 hrs (0538 UTC). The Cospas-Sarsat search and rescue satellite system received the 406 MHz signal within a minute of transmitting from a geostationary (GEO) satellite, and this was automatically sent to the Cospas-Sarsat Mission Control Centre (MCC) at Bangalore. The GPS receiver in the PLB was not functioning and Cospas-Sarsat was unable to determine the position of the beacon.

1.4   The 406 MHz emergency beacons digitally transmit their identification (owners of these beacons are required to register their identification information to the authority responsible) and position when integrated with a GPS receiver. The signal is picked up by a GEO satellite (operated by the US National Oceanic and Atmospheric Administration (NOAA) and equipped with a SARSAT receiver, provided by Canada and France to detect signals from emergency beacons), and within seconds can calculate the beacons position using the GPS transmitted position data from the beacon ,and downlink this position to a Local User Terminal (LUT), which relays the information to a MCC for alerting of search and rescue services.

1.5   A similar SAR system known as COSPAS is operated by Russia on its navigation satellite system (GLONAS). If the GPS navigation information is not available, the GEO satellite will detect the 406 MHz signal but not the position. This can be obtained from low earth orbiting (LEO) satellites that pass over the area at regular intervals, and they will also detect 121.5 MHz signals (analog). Because the satellites are moving, the signal source can be determined by the Doppler shift method. The interval between satellite passes at mid-latitudes is about 30-40 minutes.

1.6   In regard to the exercise, the next LEO satellite pass over the crash area was due 20 minutes after the crash occurred at 1108. When the LEO satellite passed over the area and detected the emergency signals it fixed the position of the emergency beacon at 1251.896N 0806.125E, which was within 2 km of the actual position.

1.7   At the time the crash scenario was activated, smoke flares were ignited and the simulated wreckage was set alight. The IAF MI8 departed from Chennai Airport at 1115 and at 1126 overflew the crash site and radioed the position to the RCC. This in turn was relayed to the ground rescue units. The helicopter remained in the area to await the arrival of the rescue services. The first ground rescue services to arrive were the State police at 1125 in 3 vehicles. They immediately deployed to cordon off the crash area and began the rescue of survivors who were simulated by persons acting with injuries dispersed around the crash site. As the less wounded survivors were located, they were taken to hospital by the police with the first vehicle departing at 1130.

1.8   At 1136, two fire vehicles of the Tamil Nadu Fire Services arrived from their nearby fire station and were followed by 3 more fire vehicles and 4 ambulances sent from the Sri Devi Hospital. The fire vehicles quickly took up position around the crash site and began fire fighting and rescue of passengers in the immediate vicinity of the burning wreckage. The medical personnel set up a triage position and assisted with the recovery of the survivors, treating them prior to sending them to hospital by ambulances. The rescue operation was in full swing at 1139.

1.9   Once the fire was under control at 1140 and the medical services were ready to airlift the injured, the IAF helicopter (MI8) was called in and flew over the site at 1145 to inspect the landing area which was being prepared. The helicopter commenced winching of an injured passenger at 1156 and departed for the nearest hospital at 1200. The crash site having been brought under full control and all passengers accounted for, the exercise was terminated at 1210.

1.10   The seminar participants had been taken by bus to the site and observed the exercise from a prepared sheltered area. The exercise was well executed and involved a large contingent of personnel from local emergency and rescue services. The participants were kept well informed of the unfolding rescue operations, which was executed in great detail with considerable realism and professionalism. This was the first occasion that these emergency response organizations had all joined together. A summary of AAI's emergency procedures for an aircraft crash for units involved in emergency response are provided in **Appendix E**.

Summary of Sea Exercise

1.11   The sea SAR exercise was held on the morning of Thursday, 10 March 2005 organized by AAI in conjunction with Indian Coast Guard (ICG) and Indian Navy to simulate a civil passenger aircraft crash at sea. Simultaneously, the Coast Guard also included a ship in distress to practice their SAR planning and alerting procedures.

1.12   The simulated crash scene was located at sea about 15 kms east of the port of Chennai with a CG ship on scene to manage the exercise area and to oversee survivors on a life raft. Two CG ships, the SAMAR (Advanced Ocean Patrol Vessel) and VAJRA (Ocean Patrol Vessel) were made available to carry the seminar participants and representatives of the press to the exercise area. The Commander ICG, Eastern Region, Commodore U.N. Chitnavis was on board the SAMAR to coordinate the SAREX.

1.13   The exercise scenario involved a civil airliner, B772 on a scheduled flight from Bangkok to Chennai with 75 passengers and crew. While approaching Chennai Airport, approximately 30 kms east of the coast, the aircraft ditched. At about the same time, a merchant ship made a distress call on HF radio and requested assistance. The exercise involved search and rescue by ships and aircraft of the ICG, Indian Navy and simulated merchant ships, including ICG ships SAMAR and VAJRA, two Inshore Patrol Vessels, one CG Dornier fixed-wing aircraft, two CG Chetak helicopters, a CG hovercraft, two Indian Navy Fast Attack Craft (T-83 and T-84), a Navy TU 142 long range maritime reconnaissance aircraft, the Chennai ACC and RCC, Maritime RCC and Bangalore MCC. The simulated ship distress would call upon the INDSAR ship reporting system to locate vessels in the distressed area.

1.14   At 0945 hrs (local time) Chennai Area Control Centre (ACC) received an emergency radio call from the pilot of the B772 that the aircraft at FL300 had a fire in its port engine and was in danger of ditching at sea off the coast near Chennai. At 0951 the aircraft crashed and its ELT activated. The emergency beacon signal were detected by Cospas-Sarsat and relayed to the MCC at Bangalore who informed the Chennai and Maritime RCCs by AFTN message. The Chennai RCC had alerted the Maritime RCC of the emergency and subsequent aircraft ditching and the SAR plan was activated. A message was immediately sent to CG and merchant ships at sea that all available ships in the area were to proceed at top speed to search for the downed aircraft and render assistance to survivors. Also, aircraft of the CG and Indian Navy were called upon to assist with the search and rescue. The SAMAR and VAJRA set sail at 1006 hrs at 12 knots towards the crash area. A merchant ship in the area had sighted the aircraft ditching and issued an emergency message. The SAMAR undertook the role of OSC and directed all SAR forces involved, assigned the search area and tasks. At 1021, a CG Dornier aircraft flew over the SAMAR and two CG Chetak helicopters were sighted heading for the crash area. The SAMAR arrived on scene at 1035 and sighted orange smoke from flares set off by survivors in a life raft. At 1041 the Dornier flew over the crash site and air-dropped a life raft with survival gear to survivors. The Navy TU 142 arrived and made a pass over the site. Other craft arrived on scene and rescue of survivors was carried out. The two Chetak helicopters winched injured survivors to the SAMAR and VAJRA where they received medical attention and then were air-evacuated to shore. The SAMAR had set up a surgical operating theatre and simulated an operation and treated other injured survivors in the ship's sick room attended by the ship's medical officer. At 1100 the exercise was completed and while some ships continued the operation in regard to search and salvage of wreckage, many ships returned to harbour.

1.15   The Maritime RCC also conducted a desktop exercise for a simulated aircraft crash at a position about about 200 NM seaward of the coast. Based on the INDSAR ship reporting system, merchant vessels near to the accident site were dispatched to the distress position and requested to render assistance. All passengers and crew from the aircraft were saved.

1.16   The SAREX had brought into play a wide range of SAR capability of the Airports Authority of India, Indian Coast Guard and other supporting defence and civilian resource agencies. The exercise scenario was multi-faceted and thoroughly tested all participants and organizations involved. The SAREX was conducted in a highly professional manner with outstanding results that clearly demonstrated that the SAR system in place and the resources available are well able to meet India's obligations in respect to the provision of search and rescue services.

SAREX Debrief

1.17   At the review of the SAREX held at the seminar conference room on Friday morning, 11 March, the debrief of the land exercise was facilitated Mr. David Moores and the sea exercise by Mr. Brian Day. The seminar delegates reviewed the exercises they observed along with representatives of the emergency organizations who participated. The seminar congratulated all involved for conducting two highly successful exercises in a realistic and professional manner.

1.18   In regard to the land exercise, recognizing that this was the first opportunity that many of local emergency response organizations had to join together to practice an aircraft crash at a remote location, there were a number of points raised for their consideration as listed below:

> a)   the State police were first on site and immediately began evacuating some survivors before medical personnel had arrived, and before full triage arrangements had been put in place. From an exercise perspective, further consideration should be given to allowing time for medical personal to practice their triage skills, to diagnose and document patients and arrange for their evacuation;

b)   more attention should to be given to clearly marking out cordoned areas and
        helicopter landing sites;

c)   the helicopter winching area should be located further away from the crash scene
        to avoid spreading of debris (for exercise purposes the helicopter had been
        positioned for the benefit of observers);

d)   to review handover procedures for the OSC function between the police and fire
        services during the first phase of fire fighting and survivor rescue, and to use
        coloured vests to identify persons in charge of various functions;

e)   to review provision for photographing aircraft wreckage and the crash scene to
        assist with accident investigation and injured passenger identification;

f)   to provide more on the ground control over the movement of persons and
        vehicles;

g)   to review positioning and distance of fire vehicles from the aircraft wreckage;

h)   the importance of locating and protecting the aircraft "black" box was
        emphasized and handover to the appropriate civil aviation official;

i)   to consider further training by local emergency organizations in aviation
        emergencies, which require specialized expertise due to the potential hazards
        that could be associated with aircraft accidents where large quantities of aviation
        fuel could be present along with hazardous materials. Also, injuries to
        passengers and crew were likely to be severe and in populated areas a crash
        could lead to a major large scale disaster. Local authorities should review their
        emergency plans accordingly;

j)   the local municipal authorities should consider and review in its zoning
        requirements, the location of facilities in relation to the airport runway final
        approach areas of ground facilities and installations that could pose hazards to
        aircraft operations, such as petrol stations and storage areas of highly
        combustible materials. In particular, in view of accident statistics that show over
        70 percent of aircraft accidents occur on or near the landing or departing
        runway, the presence of potential hazards should be identified and appropriate
        measures take to mitigate their effect.

Closing of the SAREX

1.19   Mr. Day in his summing up of the SAREX, emphasized the four basic principles of
emergency response: command, control, communications and coordination, which are inter-dependent
and need to be considered in detail at the various levels they interact. He congratulated all involved
especially the SAR organizers for the outstanding success of the event and encouraged all delegates to
bring to the attention of their administrations, the value and necessity to conduct regular exercises similar
to those held at this event.

1.20   Mr V. Somasundaram, GM (ATM) for the Airports Authority of India, thanked all participants and observers for taking part in the SAREX. The two exercise scenarios had been designed to provide participants with an opportunity to practice their rescue planning and practical skills in an interactive manner in unfamiliar terrain, and brought into play a full range of aviation and non-aviation emergency services and facilities, which combined in an effective and timely manner. It was recognized by all, that full scale representative exercises had an element of unreality about them, but they were an essential part of the aviation safety system, in particular in areas where large international airports operate close to major cities. The presence of the press at all the seminar and exercise events gave widespread coverage in the local media, and this was highly appreciated. Copies of press releases are provided in **Appendix F**.

1.21   Mr. Somasundaram was honoured on behalf of the Airports Authority of India to declare this ICAO SAR Seminar and SAREX 2005 closed, and hoped that all international and local participants had greatly benefited from the experience.

LIST OF PARTICIPANTS

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1	Shahidul Islam	Senior Assistant Secretary	Ministry of Civil Aviation
2	Rabindrakumar Das	Deputy Director (ATS/Aerodrome)	Civil Aviation Authority
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	BRUNEI DARUSSALAM		
4	Mr. Ampuan Hj.Hamdzah Bin Ampuan	SAR Officer	Civil Aviation Department
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5	Chay Pheap	Chief of RCC	State Secretary of Civil Aviation
	CHINA (MACAO)		
6	Mr. Cheang Vai Leong	Technical Officer	Civil Aviation Authority
7	Mr. Wong Man Tou	Head of Division	Marine Administration
	INDIA		
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34	P. Shambharkar	DGM [ATC	Nagpur
35	Nageshwara Rao	DGM [ATC]	Mangalore
36	A.K. Rao	Additional GM [ATC]	Mangalore
37	A.N. Vishwanatha	DGM [ATC]	Hyderabad
38	V.N. Chandran	DGM [ATC]	Trivandrum
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44	Srikrishan	ED [ATM]	CHQ
45	Asha Ram	ED [AVN SAFETY]	CHQ
46	T.F. Moosa	DGM [ATC]	Cochin
47	H.S. Rawat	GM Fire Service)	
48	S.M. Sangitwar	Deputy GM (Fire Service)	
AAI (AVIATION SAFETY)			
49	M.Dorai Rajan	Senior Manager (Aviation Safety)	
AAI (SECURITY)			
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51	K. Rajendran, IPS	IG, Operations	Chennai
52	S.R.Jangid, IPS	IG, North Zone	
53	Sanjeev Kumar, IPS	DIG, CID, Intelligence	
54	V.S. Rajhan, IPS	Superintendent of Police,	Coastal Security Group
55	K. NARAYANAMOORTHY	Inspector of Police Administration	
TAMIL NADU FIRE & RESCUE SERVICES			
56	Satish Kumar Dogra, IPS	Director Fire &Rescue Services	Chennai
57	V. Vijay Kumar	Divisional Officer	Chennai
58	D.N. Velayudhan Nair	Assistant Divisional Officer	Chennai
SHAR			
59	J.V.N. Ravi Kumar	Aerospace Engineer	Chennai
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60	K. Durairaj	Deputy Commissioner Customs	Chennai
INDIAN RAILWAYS			
61	Shyamadharam	Deputy Chief Mechanical Engineer	Chennai
62	Dr.B.V.K. Madan Mohan	Senior Divisional Medical Officer	Chennai
COAST GUARD			
63	Vice Admiral A.K. Singh, AVSM,NM	Director General	Indian Coast Guard
64	DIG R.M. Sharma,TM	Commanding Officer	CGS Samar
65	DIG B.S. Yadav	Chief Staff Officer (East)	
66	Comdt R.Kataria	JT Director (Aviation)	
67	Cmde. U N Chitnavis	Commander CG Region (East)	
68	Comdt (JG) Donny Michael	Deputy Director (ASNC)	
69	Comdt N.V. Rama Rao	Officer In Charge MRCC	Chennai
70	Comdt G Singh TM	Commanding Officer	CGS Vajra
71	Comdt V.D. Chafekar	Commanding Officer	CGAS, Chennai
72	Comdt M.B. Eshwar	Commanding Officer	744 Squadron (CG)
73	Comdt S.S. Chauhan TM	Commanding Officer	848 Squadron (CG)
74	Comdt T K S Chandran	Commanding Officer	CGS Vikram
75	Comdt (JG) P Anil Kumar	Commanding Officer	ACV H-181
76	Comdt J.S. Chaddha	Regional Aviation Officer	
77	Comdt Kuldeep Yadav	Deputy Director (SAR)	
78	DIG K C Pande	Dy. Director (ops)	
79	DIG S P Sharmaa TM	Chief Staff Officer (West)	
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86	M V Subramaniam	Assistant GM (FS), FTC	
87	S. Sundarajan	Assistant GM (FS)	Chennai
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90	S.S. Balan	Senior Manager (Operations),	Chennai
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93	Sqn Ldr M Sahadev	Staff Pilot	
94	Sqn Ldr R.A. Raghavan	Sector Director	4 AF Mlu
95	Sqn Ldr A Balasubramaniam	Staff Pilot	
96	Sqn Ldr A G Srinivasan	Air Force Station	Hakimpet
97	Flt Lt A Vijaykumar	Air Force Station	Yelahanka
98	Wg Cdr B C Christopher	Station Flight Safety & Ins Officer	
4 AFMLU			
99	Wg Cdr K. Ranjith	Commanding Officer	Chennai
INDIAN NAVY			
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101	Capt. Sanjeev Ghai	President	AIRCATS
INDIAN SPACE RESEARCH ORGANISATION			
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103	Col. H S Premkumar, VSM	Director	Bangalore
104	Lt. Col Kamal	IR Pilot	
DIRECTOR GENERAL CIVIL AVIATION			
105	Dilip Kharkar	Chief Pilot	Flight Inspector Department Headquarters
106	C.P.M.P. Raju	RCAS	Chennai
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108	Amit Gupta	Air Safety Officer,	Headquarters
109	T. Mohan Chandran	Assistant Director (Operations)	
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AIR SAHARA			
111	R.C. Panwar	Manager Operations	
112	S P S Narli	Executive Operations	
AIR DECCAN			
113	Capt Ravi Nathan	Operations Manager	
BCAS			
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METEROLOGY			
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BSNL			
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130	Tai Kit	ATC Manager	Civil Aviation Authority
131	Loke Chee Yong	ATC Officer	Civil Aviation Authority
132	George Zaccheus	ATC Officer	Civil Aviation Authority
SRILANKA			
133	N.L. De Silva	Air Navigation Service Inspector	Civil Aviation Authority
THAILAND			
134	Vichai Prateepprecha	Deputy Director General	Department of Civil Aviation
135	Jarurat Naksavee	Chief of SAR Division	Department of Civil Aviation
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137	Col. Chaivuth Yuthsilkul	Deputy Chief of Staff	Army Aviation Centre
138	Col. Somboon Ket-Intra	Deputy Director Air Operations Division	Royal Thai Army
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139	Ms. Cheryl Bertoia	Principal Operations Officer	United Kingdom
ICAO			
140	Mr. Brian Day	Technical Officer ATM	Air Navigation Bureau Headquarters Montreal, Canada
141	Mr. David J. Moores	Regional Officer ATM	Asia/Pacific Office Bangkok, Thailand

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Analysis of SAR Capability of ICAO States in the ASIA/PAC Region

	Training	Alerting	Legislative	SAR committee	Agreements	Relationships	Communications	Quality Control	Civil/Military	Resources	SAREX	Library	Computerisation	SAR programme	Supply dropping	Special equipment	SAR aircraft	Navigation	ELTs	LUT
Australia	E	E	E	E	E	C	E	E	E	E	E	E	E	E	E	E	E	E	C	E
Bangladesh	B	C	D	A	A	C	C	A	D	A	A	C	A	A	C	C	D	A	D	C
Bhutan																				
Brunei	E	E	E	E	E	E	E	E	E	E	E	E	E	E	D	D	E	E	E	A
Cambodia	B	B	B	B	B	B	C	A	B	B	A	C	A	A	A	A	B	A	A	A
China	E	E	E	E	E	E	D	D	E	D	D	C	B	A	E	E	E	E	E	A
Cook Islands	A	B	B	A	A	C	C	C	B	A	B	A	A	A	A	B	B	A	E	A
DPR Korea	B	D	B	D	A	B	D	D	D	C	B	A	A	A	B	A	C	C	A	A
Fiji	B	C	C	C	C	C	C	B	D	C	D	C	A	C	B	A	C	C	C	A
French Polynesia	C	D	D	D	C	D	E	A	E	C	C	B	A	A	E	D	E	E	E	**A**
Hong Kong, China	E	E	E	E	D	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
India	D	C	C	B	B	C	C	A	C	C	C	C	C	D	D	D	C	A	B	E
Indonesia	E	D	E	E	E	D	D	D	E	D	E	D	D	D	C	D	D	D	D	E
Japan	E	E	E	E	D	E	E	E	E	E	E	E	D	E	E	E	E	E	E	E
Kiribati																				
Lao PDR	B	A	B	B	B	A	B	A	B	B	A	C	A	A	A	A	A	A	A	A
Macau, China	E					E	E				E						E			
Malaysia	E	E	C	E	D	E	E	E	E	E	E	D	E	E	E	D	E	E	E	B
Maldives	B	A	A	A	A	A	A	A	D	A	C	A	A	A	A	A	A	A	A	A
Marshall Islands																				
Micronesia	C	B		A	A	B	C					A		B	B					
Mongolia	A	C	C	A	B	B	B	A	B	B	B	C	B	B	A	A	A	A	B	A
Myanmar	B	A	B	C	A	D	C	C	D	A	A	A	A	A	C	A	D	C	A	A
Nauru																				
Nepal	D	D	C	B	A	C	C	B	D	B	A	B	A	D	D	C	D	D	D	B
New Caledonia	C	D	D	D	C	D	E	A	E	C	C	B	A	A	E	D	E	E	E	E
New Zealand	E	E	E	E	A	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Pakistan	C	C	D	D	A	D	D	C	D	C	A	A	A	A	D	A	D	D	C	E
Palau																				
Papua New Guinea	D	E	D	C	D	D	C	C	D	C	C	D	C	C	C	A	A	A	E	A
Philippines	D	C	E	D	D	C	D	D	E	C	C	C	C	C	C	B	C	E	C	A
Rep. of Korea	C	C	C	C	C	D	E	E	E	E	C	A	D	E	D	E	E	E	E	E
Samoa																				
Solomon Islands																				
Singapore	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Sri Lanka	D	A	C	D	B	C	C	D	E	D	B	C	A	A	D	D	C	A	C	A
Thailand	E	E	E	E	D	E	E	E	E	E	E	D	B	B	E	E	E	E	E	B
Tonga	C	B	A	A	B	C	C	A	D	A	A	A	A	A	A	A	C	A	E	A
United States	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Vanuatu																				
Viet Nam	D	D	D	E	C	D	D	B	E	D	C	C	B	C	C	D	D	C	D	B

	Updated 29 June 2001

Categorisations:	
A = Not implemented	D = Meets Annex 12 requirements in most areas
B = Initial implementation	E = Fully meets Annex 12 requirements
C = Meets Annex 12 requirements in some areas	Blank = No response

STATE SAR AGREEMENTS
(updated 28 June 2004)

ID NO.	DATE	STATES	REMARKS
1	June 1982	Indonesia / Singapore	
2	August 1984	Malaysia / Singapore	
3	July 1996	Viet Nam / Singapore	
4		Singapore / Thailand	
5		Philippines / Singapore	
6	November 1990	Australia / Indonesia	Updated 5 April 2004
7	February 1999	Cambodia / Viet Nam	
8	December 2000	Malaysia / Singapore Malaysia / Philippines Malaysia / Thailand Malaysia / Indonesia Malaysia / Brunei Darussalam	
9	February 2001	Australia / Papua New Guinea	
10	September 2002	New Caledonia / New Zealand	
11	November 2002	United States / Republic of Palau	
12	1998	Lao PDR/Vietnam	LOA for provision of assistance
		New Zealand/ Cook Islands, Fiji, Samoa, Tonga and French Polynesia	Under development

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<div align="center">**APPENDIX D**</div>

NATIONAL ATS CONTINGENCY PLANNING FRAMEWORK

Amendments

Amendments to this planning document must be by page replacement, addition and deletion or by complete re-issue.

Staff amending this document must complete the Amendment Record Sheet below and ensure that all pages are current according to the Checklist of Effective Pages.

Amendment Number	Amendment Date	Amended By	Date Amended
Initial Issue			

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Subject	Pages	Issue Date
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Development of Contingency Plans		

Development of contingency plans

Introduction

ATS Contingency Planning is necessary to ensure the continuing safety of air navigation within *[insert state]* FIRs and to minimise effects on the traveling public in the event of facility failures, natural disasters, civil unrest (demonstrations), personnel shortages or industrial action. This document provides guidelines for the development of ATS Contingency Plans.

This document outlines the framework of Contingency Planning. The National ATS Contingency Plan follows on from this document. Individual Centre then group plans follow on from the National ATS Contingency plan.

Contingency plan objectives

The objective of contingency plans is to provide a timely, ordered and structured response to and recovery from, any catastrophic degradation or failure to provide Air Traffic Services. Whilst circumstances may vary, contingency plans provide for the worst case scenario. Depending on the availability of resources, a greater level of air traffic services may be provided.

Airways Contingency Committees

When necessary, Airways Contingency Coordination Committees (ACCC) will be formed to implement contingency plans, allocate times for the operation of individual flights and manage traffic restrictions. These committees may be at a National and/or Local level. Each contingency plan shall outline the ACC responsibilities and communication requirements between the ATS service provider, government agencies, aircraft operators and any other relevant party.

National Airways Contingency Coordination Committee

The National Airways Contingency Coordination Committee (NACCC) will be convened to implement the national contingency plan or during any other significant event. If any contingency plan is activated, the *[insert responsible authority]* shall be notified.

Testing and review

Regular review (biannually) and testing (annually) of contingency plans shall be undertaken to ensure validity of the plans.

Following activation of any ATS contingency plan, [insert responsible Manager] shall ensure that formal revision is undertaken involving consultation with all affected organisations (ATS, Regulator, Military and Industry).

Air Traffic Services

In ICAO Annex 11, ATS comprises:

1. an air traffic control service;

2. a flight information service; and

3. an alerting service.

Airspace over the high seas

Only an airspace classification (Classes A – G) or a Danger Area should be declared beyond Australia's Territorial Limits, however it is recognised that airspace management is necessary in the vicinity of major airports.

Considerations

Staffing

- Staff availability and manning arrangements;

- Licensing status of available staff;

- Additional resources such as briefing officers to provide particular attention to airspace, frequency and clearance requirements.

Procedures

- Consider the need to increase traffic spacing to ensure the minimum is not infringed; and

- Need to temporarily suspend the application of certain procedures , eg traffic information in Class G airspace;

- Minimise the impact on existing airspace arrangements, pilot / ATS procedures;

- The preparation of diagrammatic presentation of affected airspace changes, including frequency change details and SID / STARs suitable for transmission via AVFAX and NAIPS;

- Develop a methodology to facilitate special operations.

Facilities

- Availability of NAVAIDS and communications facilities;

- The use of other units facilities, including towers;

- The use or assistance of military ATS facilities.

Demand/Capacity

- Determine anticipated traffic levels;

- Need to limit or "flow" traffic e.g.:

  - by means of gate spacing at sector boundaries;

  - route restrictions to initiate a simplified network;

  - controlled departures times; and

  - enroute holding.

Individual plans will outline use of a time allocation system where necessary.

Options

When developing a contingency plan, the preferred options, in order, are:

a.   Consolidate functions to alternate operating positions (subject to availability of appropriately licensed staff) and, if required, implement traffic metering; or

b.   Transfer responsibility for services to another Unit / Centre and if required, implement traffic metering; or

c.   Implement traffic metering, to reduce traffic congestion, and / or

d.   Reclassify the airspace to another classification (eg Class C to Class A or Class C to Class D); or

e.   Re-designate the airspace to Restricted area; and

    (1)   implement TIBA;

    (2)   implement MBZ at certain aerodromes; or

f.   Reclassify as Class G airspace; or

Where airspace is reclassified as Class G or the normal services of Class G airspace are affected, [eg SAR alerting], issue NOTAM to define what services are not available.

Transfer of Responsibility

Where a transfer of responsibility for airspace occurs, formal Letters of Agreement shall be exchanged between Unit/Centre Managers to clearly state requirements for the transfer of responsibility. Additionally, all ATS personnel shall be trained in appropriate aspects of the responsibilities they may be required to assume under any Contingency Plan Letter of Agreement (LOA). When necessary, the LOA shall indicate training and competency requirements. When responsibility for airspace cannot be absorbed or transferred, then *Options c-g* (above) will apply. LOAs shall contain, but are not limited to the following:

a.   notification procedures where an event can be foreseen, the transfer should take place prior to any risk of failure of communications facilities;

b.   areas of responsibility with training and competency requirements;

c.   procedures and coordination arrangements;

d.   relevant Local Instructions;

e.   lateral separation diagrams; and

f.   details of a formal amendment process of the foregoing.

Procedures documentation shall detail contingency arrangements with military ATS units.

Where appropriate, en-route Centres, in conjunction with the Office of the HATC, shall establish LOAs with neighbouring States for route restrictions or the provision of services (to the extent possible) for international air traffic over the high seas or for domestic operations.

Contingency Services

During contingency periods, where a level ATS staffing is available it may be deemed necessary to provide basic services in the form of basic flight monitoring operations.

Flight monitoring service

Where it is determined that an enroute flight monitoring service can be provided, contingency services, when available, will acknowledge the following:

- when initial contact is made on the frequency;
- emergency communications; and
- when advised of changing to another frequency.

This flight monitoring system along with radar and ADS/CPDLC information will be used to assist in establishing aircraft positions during recovery from the contingency and return to the provision of normal air traffic services.

The ATS provider may not be able assure the provision of aerodrome control services. Limited aerodrome information may be provided from selected control tower locations.

Local contingency plans will detail the specific availability.

Resumption of service

Individual plans will outline the process followed to resume normal service.

Authorisation

This document is authorised by:

[Insert authority]	**Date**

1.3 CONTINGENCY PLANNING

1.3.1 Introduction

1.3.1.1 Guidelines for contingency measures for application in the event of disruptions of air traffic services and related supporting services have been approved by the Council in response to Assembly Resolution A23-12 following a study by the Air Navigation Commission and consultation with States and international organizations concerned, as required by the Resolution. Their purpose is to assist in providing for the safe and orderly flow of international air traffic in the event of disruptions of air traffic services and related supporting services and in preserving the availability of major world air routes within the air transportation system in such circumstances.

1.3.1.2 The guidelines have been developed in recognition of the fact that circumstances before and during events causing disruptions of services to international civil aviation, vary widely and that contingency measures, including access to designated aerodromes for humanitarian reasons, in response to specific events and circumstances must be adapted to these circumstances. They set forth the allocation of responsibility among States and ICAO for the conduct of contingency planning and the measures to be taken into consideration in developing, applying and terminating the application of such plans.

1.3.1.3 The guidelines are based on experience which has shown, *inter alia*, that the effects of disruption of services in particular airspaces are likely to significantly affect the services in adjacent airspaces, thereby creating a requirement for international co-ordination — hence the role of ICAO in the field of contingency planning and co-ordination of such plans, as defined by the guidelines. They also reflect the experience that ICAO's role in contingency planning must be global and not limited to airspaces over the high seas and areas of undetermined sovereignty, if the availability of major world air routes within the air transportation system is to be preserved. Finally, they further reflect the fact that international organizations concerned such as the International Air Transport Association (IATA) and the International Federation of Airline Pilots' Associations (IFALPA) are valuable advisors on the practicability of over-all plans and elements of such plans.

1.3.2 Status of contingency plans

Contingency plans are intended to provide alternative facilities and services to those provided for in the regional air navigation plan when those facilities and services are temporarily not available. Contingency arrangements are therefore temporary in nature, remain in effect only until the services and facilities of the plan are re-activated and, accordingly, do not constitute amendments to the regional plan requiring processing in accordance with the "Procedure for the Amendment of Approved Regional Plans".

1.3.3 Responsibility for developing, promulgating and implementing contingency plans

1.3.3.1 The State(s) responsible for providing air traffic services and related supporting services in particular portions of airspace is (are) also responsible, in the event of disruption or potential disruption of these services, for instituting measures to ensure the safety of international civil aviation operations and, where possible for making provisions for alternative facilities and services. To that end the State(s) shall develop, promulgate and implement appropriate contingency plans. Such plans shall be developed in consultation with other States concerned and with ICAO, as appropriate, whenever the effects of the service disruption(s) are likely to affect the services in adjacent airspaces.

1.3.3.2 The responsibility for appropriate contingency action in respect of airspace over the high seas continues to rest with the State(s) normally responsible for providing the services until, and unless, that responsibility is temporarily reassigned by ICAO to (an)other State(s).

1.3.3.3 Similarly, the responsibility for appropriate contingency action in respect of airspace where the responsibility for providing the services has been delegated by another State, continues to rest with the State providing the services until, and unless, the delegating State terminates temporarily the delegation. Upon termination, the delegating State assumes responsibility for appropriate contingency action.

1.3.3.4 ICAO will assume the responsibility for initiating and co-ordinating appropriate contingency action in the event of disruption of air traffic services and related supporting services affecting international civil aviation operations provided by a State wherein, for some reason, the authorities cannot adequately discharge the responsibility referred to in 1.3.3.1 above. In such circumstances, ICAO will work in co-ordination with States responsible for airspaces adjacent to that affected by the disruption and in close consultation with international organizations concerned. ICAO will assume the same responsibility at the request of States.

Part II.— Methods of application employed by Air Traffic Services
Section 1, Chapter 1.— Air traffic flow management and flow control

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1.3.4 Preparatory action

1.3.4.1 Time is essential in contingency planning if hazards to air navigation are to be reasonably prevented. Timely introduction of contingency arrangements requires decisive initiative and action, which again presupposes that contingency plans have, as far as practicable, been completed and agreed among the parties concerned before the occurrence of the event requiring contingency action, including the manner and timing of promulgating such arrangements.

1.3.4.2 For the reasons given in 1.3.4.1 States should take preparatory action, as appropriate, for facilitating timely introduction of contingency arrangements. Such preparatory action should include:

a) preparation of general contingency plans for introduction in respect of generally foreseeable events such as industrial action or labour unrest affecting the provision of air traffic services and/or supporting services. In recognition of the fact that the world aviation community is not party to such disputes, States providing services in airspace over the high seas or of undetermined sovereignty should take appropriate action to ensure that normal air traffic services will be provided to international civil aviation operations in non-sovereign airspace. For the same reason, States providing air traffic services in their own airspace or, by delegation, in the airspace of (an)other State(s) should take appropriate action to ensure that normal air traffic services will be provided to international civil operations concerned, which do not involve landing or take-off in the State(s) affected by industrial action;

b) monitoring of any developments which might lead to events requiring contingency arrangements to be developed and applied. States should consider designating persons/administrative units to undertake such monitoring and, when necessary, to initiate effective follow-up action;

c) designation/establishment of a central agency which, in the event of disruption of air traffic services and introduction of contingency arrangements, would be able to provide during the 24 hours of the day, up-to-date information on the situation and associated contingency measures until the system has returned to normal. A co-ordinating team should be designated within or in association with such a central agency for the purpose of co-ordinating activities during the disruption.

1.3.4.3 ICAO will be available for monitoring developments which might lead to events requiring contingency arrangements to be developed and applied. During the emergence of a potential crisis a co-ordinating team will be established in the Regional Office(s) concerned and at ICAO Headquarters in Montreal and arrangements will be made for competent staff to be available or reachable throughout the 24 hours of the day. The tasks of these teams will be to monitor continuously information from all suitable sources, arrange for the constant supply of relevant information received by the State AIS service at the location of the Regional Office and Headquarters, liaise with international organizations concerned and their regional organizations, as appropriate, and exchange up-to-date information with States directly concerned and States which are potential participants in contingency arrangements. Upon analysis of all available data, authority will be obtained for initiating the action required in the circumstances.

1.3.5 Co-ordination

1.3.5.1 A contingency plan must be acceptable to providers and users of contingency services alike, i.e. in terms of the ability of the providers to discharge the functions assigned to them and in terms of safety of operations and traffic handling capacity provided by the plan in the circumstances.

1.3.5.2 Accordingly, States which anticipate disruption of air traffic services and/or related supporting services, should advise as early as practicable, the ICAO Representative accredited to them and other States whose services might be affected. Such advice should include information on associated contingency measures or a request for assistance in formulating contingency plans.

1.3.5.3 Detailed co-ordination requirements should be determined by States and/or ICAO, as appropriate, keeping the above in mind. In the case of contingency arrangements not appreciably affecting airspace users or service provided outside the airspace of the (single) State involved, co-ordination requirements are naturally few or non-existent. Such cases are believed to be few.

1.3.5.4 In the case of multi-State venture, detailed co-ordination leading to formal agreement of the emerging contingency plan should be undertaken with each State which is to participate. Such detailed co-ordination should also be undertaken with those States whose services will be significantly affected, for example by re-routing of traffic, and with international organizations concerned who provide invaluable operational insight and experience.

1.3.5.5 Whenever necessary to ensure orderly transition to contingency arrangements, the co-ordination referred to

in this Section should include agreement on a detailed, common NOTAM text to be promulgated at a time to be notified by a special agreed message.

1.3.6   Development, promulgation and application of contingency plans

1.3.6.1   Development of a sound contingency plan is dependent upon circumstances, including the availability or not for use by international civil aviation operations, of the airspace where services have been disrupted. Sovereign airspace can be used only on the initiative of or with the agreement or consent of the authorities of the State concerned regarding such use. Otherwise, the contingency arrangements must involve bypassing the airspace, and should be developed by adjacent States or by ICAO in co-operation with such adjacent States. In the case of airspace over the high seas or of undetermined sovereignty, development of the contingency plan might, depending upon circumstances, including the degree of erosion of the alternative services offered, involve temporary re-assignment by ICAO of the responsibility for providing air traffic services in the airspace concerned.

1.3.6.2   Development of a contingency plan presupposes as much information as possible on current and alternative routes, navigational capability of aircraft and availability or partial availability of navigational guidance from ground based aids, communications capability of adjacent air traffic services units, volume and types of aircraft to be accommodated and the actual status of the air traffic services, communications, meteorological and aeronautical information services. Following are the main elements to be considered for contingency planning depending upon circumstances:

a) re-routing of traffic to avoid the whole or part of the airspace concerned, normally involving establishment of additional routes with associated conditions for their use;

b) establishment of a simplified route network through the airspace concerned, if it is available, together with a flight level allocation scheme to ensure lateral and vertical separation and a procedure for adjacent area control centres to establish longitudinal separation at entry point and to maintain such separation through the airspace;

c) re-assignment of responsibility for providing air traffic services in airspace over the high seas or in delegated airspace;

d) provision and operation of adequate air-ground communications, AFTN and ATS direct speech links, including reassignment to adjacent States of the responsibility for providing meteorological information and information on navigation aids;

e) special arrangements for making, collecting and disseminating in-flight and post-flight reports from aircraft;

f) a requirement for aircraft to maintain continuous listening watch on a specified pilot-pilot VHF frequency in specified areas where air-ground communications are uncertain or non-existent and to broadcast, preferably in English, position information and estimates on that frequency, including start and completion of climb and descent;

g) a requirement for all aircraft in specified areas to display navigation and anti-collision lights at all times;

h) a requirement and procedures for aircraft to maintain their own longitudinal separation from preceding aircraft at the same cruising level;

i) a requirement for climbing and descending well to the right of the centre line of specifically identified routes;

j) establishment of arrangements for controlled access to the contingency area to prevent overloading of the contingency system;

k) a requirement for all operations in the contingency area to be conducted in accordance with IFR, including allocation of IFR flight levels from the Table of Cruising Levels in Appendix 3 of Annex 2 of ATS routes in the area.

1.3.6.3   Notification by NOTAM to users of air navigation services of anticipated or actual disruption of air traffic services and/or related supporting services shall be dispatched as early as practicable. The NOTAM shall include the associated contingency arrangements. In the case of foreseeable disruption, the advance notice shall in any case not be less than 48 hours.

1.3.6.4   Notification by NOTAM of discontinuance of contingency measures and re-activation of the services set forth in the regional air navigation plan shall be dispatched as early as required to ensure an orderly transfer from contingency conditions to normal conditions.

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SUMMARY OF AIRPORTS AUTHORITY OF INDIA
EMERGENCY PROCEDURES FOR AN AIRCRAFT CRASH FOR UNITS
INVOLVED IN EMERGENCY RESPONSE

INTRODUCTION:-

Millions of aircraft movements are taking place annually but it is inevitable in such an operation that there will be risk of an accident occurring either on airports or at other locations. It is recorded that approximately 80% of all aircraft accidents occur in the take off or landing phase and approximately 80% these accidence occur in the vicinity of the airport. Procedures for handling accidents have been developed over the years and recommendations have been made by ICAO and IATA for adoption by both the airports authority and airlines worldwide**.**

FEATURES COMMON TO ALL EMERGENCIES:-

1. Concerned observation of flight and apron activities should be maintained from the airport fire station watch tower.
2. On receipt of the call from ATC announcing an aircraft emergency the required safety service vehicle is dispatched to the seen of the accident or to the predetermined standby positions applicable to the runway to be used.
3. When the information is received from a person other than an ATC that an aircraft accident as accrued or appears to be eminent the airport rescue and fire fighting vehicles in turnout in same manner as if the call had been given by ATC and ATC must be informed at once of the nature and situation of the emergency.
4. Rescue and fire fighting vehicles should be positioned to provide the best possible coverage of the potential crash area with a vice that at least one unit of rescue and fire fighting vehicles is in a position to reach the accident site with briefest time.
5. For emergencies involving gear mark function or tyre difficulties there is a possibility of the aircraft wearing of the runway and possibly hitting the RFF vehicles. In such cases, it is preferable for the RFF vehicles to be located near the point of touch down and then to the follow the aircraft.
6. Response by RFF vehicles to OFF – Airport accident sites should be done in accordance with existing mutual aid fire department agreement.
7. Communication should be maintained between RFF vehicles, Fire station and ATC.
8. All personnel operating directly in the crash site should be provided with productive clothing.
9. Rescue operation should be accomplished through regular dose and hatches where ever possible. But RFF personal must be trained in forcible entry procedures and they should be provided with necessary tools.
10. Rescue of aircraft occupants should proceed with the greatest possible speed. Care should be taken while evacuation of injured so as not to aggravate their injuries and remove from the fire threaten area is the primer requirement.
11. Broken fuel, Hydraulic fluid lines should be plugged immediately to reduce the spill and spread of fire.
12. If the source of heat cannot be removed and flames threaten fuel tanks exposed but not involving in fire should be produced by cooling.
13. The no smoking rule must be ruggedly informed the seen of accident and in the immediate vicinity.

AGENCIES INVOLVED IN ATTENDING CRASH AT AIRPORT:-

1. Air Traffic Services
2. Rescue and fire fighting services.
3. Airport Administration (Apron Control & Airport Manager)
4. Medical services
5. Airport Security / State Police
6. Aircraft Operators
7. Immigration / Custom Authority
8. Airport Health Organisation

AGENCIES INVOLVED IN ATTENDING CRASH AT OFF THE AIRPORT:-

1. Air Traffic Services
2. Tamil Nadu Fire and Rescue Services
3. Medical Services
4. Hospitals
5. Government Authorities
6. Military Authorities (IAF, Army, Navy and Coast Guard)

The operational objective of the Rescue and Fire Fighting service should be to achieve response times of 2 minutes and not exceeding 3 minutes to the end of each runway in optimum conditions of visibility and surface conditions. Response time is considered to be the time between initial call to the Rescue and Fire Fighting service and effectively discharging 50 % of the discharge rate specified for the category by Rescue and Fire Fighting vehicles.

ACTION BY AIR TRAFFIC CONTROL :-

On receipt of crash message the duty office at ATC will:

1. Immediately sound the siren which will have a continuous steady tone for at least two minutes and also alert the Fire Station by pressing the CRASH BELL.
2. Inform the Fire Watch Tower giving the following information:

   a. Call sign and type of aircraft.
   b. Grid Location of the site of accident
   c. Number of persons on board, if known.
   d. Quantity of fuel on board, if known.
   e. Operator of aircraft.
   f. Any other related important information**.**

3**.** Inform Apron Control.
4. Inform Airport Manager KDT/AIT
5. Inform Briefing Officer.
6. Inform, WSO who shall assume charge till such time the GM (Aerodromes) / Addl. GM (S&P), takes over the responsibility.
7. Inform Meteorological Official in the control tower who will alter the duty officer Meteorology.
8. Make proper log entries indicating the time and names of persons informed.

ACTION BY RESCUE AND FIRE FIGHTING SERVICE :-

1.   The Watch Tower should press the crash bell followed by announcement on PA system, the details for the guidance and action by the fire crew on duty.

   a.   Call sign and type of aircraft.
   b.   Grid location of the site of accident.
   c.   No of persons on board, if known.
   d.   Quantity of fuel if known.
   e.   Operator of aircraft.
   f.   Any other related information.

(The Watch Tower will also inform ATC on RT if the message of disaster is not originated from ATC, maintain extra vigil and obtain relevant information, if any may be immediately announced on the PA system.)

2.   The Fire Control Room will inform Tamil Nadu Fire and Rescue service through hotline and Asst. G.M. (Fire Service).

3.   The duty office of fire station after receipt of disaster message from ATC/Watch Tower or having observed the crash himself, shall:

   a.   Immediately ensure full scale turnout to the scene of the crash without delay continuous communication should be maintained on 121.9 MHz. With ATC for obtaining clearance for reaching the site, and all pertinent information should be relayed to ATC from time to time.
   b.   Ensure that airport rescue and fire fighting vehicles proceed via established access routes to the site of the accident.
   c.   Take control of Command post till the arrival of the senior officers.
   d.   Arrange to extricate persons from the aircraft and arrange immediate first-and and medical attention and to extinguish fire.
   e.   While rescuing the injured cabin crew their identification and location in and around aircraft must be care fully observed and recorded.
   f.   Location of passengers whether alive or dead should be recorded immediately during rescue/removal operations (Removal of injured persons for treatment must not be delayed for want of formalities with regard to the recordings as stated above)

ACTION BY APRON CONTROL:-

On receipt of crash message the official manning the Apron Control will initiate the following actions:-

   1.   Inform Duty Medical Officer.
   2.   Inform concerned airline.
   3.   Inform G.M. (O/A) / D.G.M. (GFS) / Asst. G.M. (GFS)
   4.   Inform APHO
   5.   Inform Commandant CISF
   6.   Inform Airport Police Station
   7.   Ensure availability of alternate runway in consultation with ATC.
   8.   Inform PRO custom and the duty officer immigration in case of international flight.
   9.   Send operational note to ATC, if required for the closure of the affected operational area and also stating non-availability of airport rescue and fire fighting service.

ACTION BY AIRPORT MANAGER:-

On receipt of crash message, he shall initiate following action:

1. Inform Airport Director
2. Inform A. G. M. (Airport)
3. Inform SAM
4. Inform D.G.M. (L)
5. Inform panel Doctors
6. Establish public relations cell in co-ordination with the aircraft operator to convey about the latest position about the passengers.
7. Co-ordinate with aircraft operator involved in the accident for display of information on CCTV and announcement on PA system.
8. Inform Studio to pass message to ambulance services.
9. Inform AAI telephone exchange to keep all the lines free.
10 Inform DGM Eng (Civil) and DGM Eng (Electrical).
11. Obtain passenger manifest and send the same to crash site.

ACTION BY ASST. G.M. (MEDICAL SERVICE:-

1. He will proceed to the crash site immediately on receipt of the information of crash along with the Medical assistant and establish the Triage area.
2. He will render necessary medical assists to the causalities at the site as per priority.

   a. Priority I (Red) – Immediate care.
   b. Priority II (Yellow) – Delayed care.
   c. Priority III (Green) – Minor care.
   d. Priority 0 (Black) – Zero care.

3. He will maintain a record of disposal of causalities and survivors**.**

ACTION BY ASST. G.M. (GFS):-

1. Co-ordinate with concerned agencies in case of any deficiency in quick handling of disaster situation.
2. Take over as co-ordinator in the absence of G.M. (O/A)/D.G.M. (GFS) at command post.

ACTION BY ASST. G.M. (AIRPORT):-

1. He will take over control of emergency control room and monitor functions and provide assistant till the arrival of senior officers**.**

ACTION BY BRIEFING OFFICER (ARO):-

On receipt of information the briefing officer will inform:-

1. The Regional Controller of Air Safety, CAD.
2. General Manager (Aerodromes)
3. Additional G.M. (S&P)
4. The Director of Airworthiness.
5. G.M. (Communication)
6. ATS telephone exchange to keep the lines free.

7.   Issue NOTAM in co-ordination with AAI stating that "Airport Rescue and Fire Fighting/Protection Services (Not available) (Time) or until further notice. Fire equipments/appliances committed to aircraft accident".

8.   The Briefing Officer in conjunction with WSO should make out a signal to the DGCA, Chairman and Briefing Officer IGI Airport.

ACTION BY AIRPORT SECURITY / STATE POLICE

1.   On receipt of crash message he shall immediately mobilise the CISF and dispatch the same to the crash site.

2.   He shall inform the city police control room and arrange additional help of police, if required.

3.   He shall give suitable instruction to the CISF staff posted at the gates to permit cars and ambulances carrying doctors and to guide them to the fire station.

4.   The entire site of the crash area including wreckage trail should be cordoned off.

5.   Post mortem examination and release of dead bodies.

ACTION BY AIRCARFT OPERATORS :-

1.   Immediately send their representatives to crash site, causality center and emergency control room.

2.   Dispatch one coach to gate No..2 for transportation of the CISF personnel to the crash site.

3.   Dispatch Technical/Engineering staff to the crash site to assist rescue of victims and cutting the electrical connections against fire hazard.

4.   Arrange to establish public relation cell in terminal building for the convenience of the next of kin/relative of the affected passengers and notify to the Airport Manager with the request to arrange necessary announcements on PA system /display on CCTV.

THE COMMAND POST CO-ORDINATION AND PROCEDURE:-

1.   Representative from AAI, CISF and affected airline will form the group responsible for carrying out the functioning of the command post.

2.   Affected airline representative will be substituted by IAF representative in case of crash of IAF aircraft. Airport Director AAI will be co-ordinator for this group. To identify the command personnel the following colour coats are recommended by ICAO.

RED:	CHIEF FIRE OFFICER
BLUE:	POLICE CHIEF
WHITE (RED LETTERING) :	MEDICAL COORDINATOR
INTERNATIONAL ORANGE :	AIRPORT ADMINISTRATION
LIME GREEN:	TRANSPORTATION OFFICER
DARK GREEN:	FORENSIC CHIEF

ROLE OF AIRPORT FIRE SERVICE DURING OFF AIRPORT CRASH:-

1.   In case of aircraft accident off airport, but in the vicinity of the airport, airport fire services are required to play a role in fire fighting and rescue operation.

2.   For this purpose, area up to 5 km in the approach path and other areas, 2 km around the airport boundary, is defined as the vicinity of the airport.
If an aircraft accident occurs in the vicinity of the airport, the following actions will be taken by the Airport Fire Fighting & Rescue Services:-

a. One CFT and one ambulance should be sent to the accident site if the aircraft is of length less than 30m and the fuselage width up to 5m.

b. Two CFT and one ambulance should be sent to the accident site, if the aircraft is of the size larger than what is stated in (I) above

c. One senior superintendent (FS) will lead the turnout.

d. Spare serviceable CFT should be manned by deploying off duty crew, where available to maintain the maximum possible category of airport.

e. When the category of the airport is lowered than the declared category, this information should immediately be passed on to ATC (first through telephone followed by in writing).

f. On reestablishing the declared category, ATC will again be informed promptly. In case the aircraft accident occurs, beyond the vicinity of the airport, normally no CFT should be sent to the crash site.

g. In case of off airport aircraft accident, when city fire services are available at site, the overall command will be exercised by the senior most official of city fire brigade, available at site.

CONCLUSION:-

Airport emergency procedures must be dynamic and capable of flexibility, not only in their implementation but also in their updating and planning. The successful operation of these procedures will involve close co-ordination between the emergency services and the four vital elements involved in this handling are Communications, Co-ordination, Command and Control.

PRESS RELEASES ON
THE SEMINAR AND SAREX
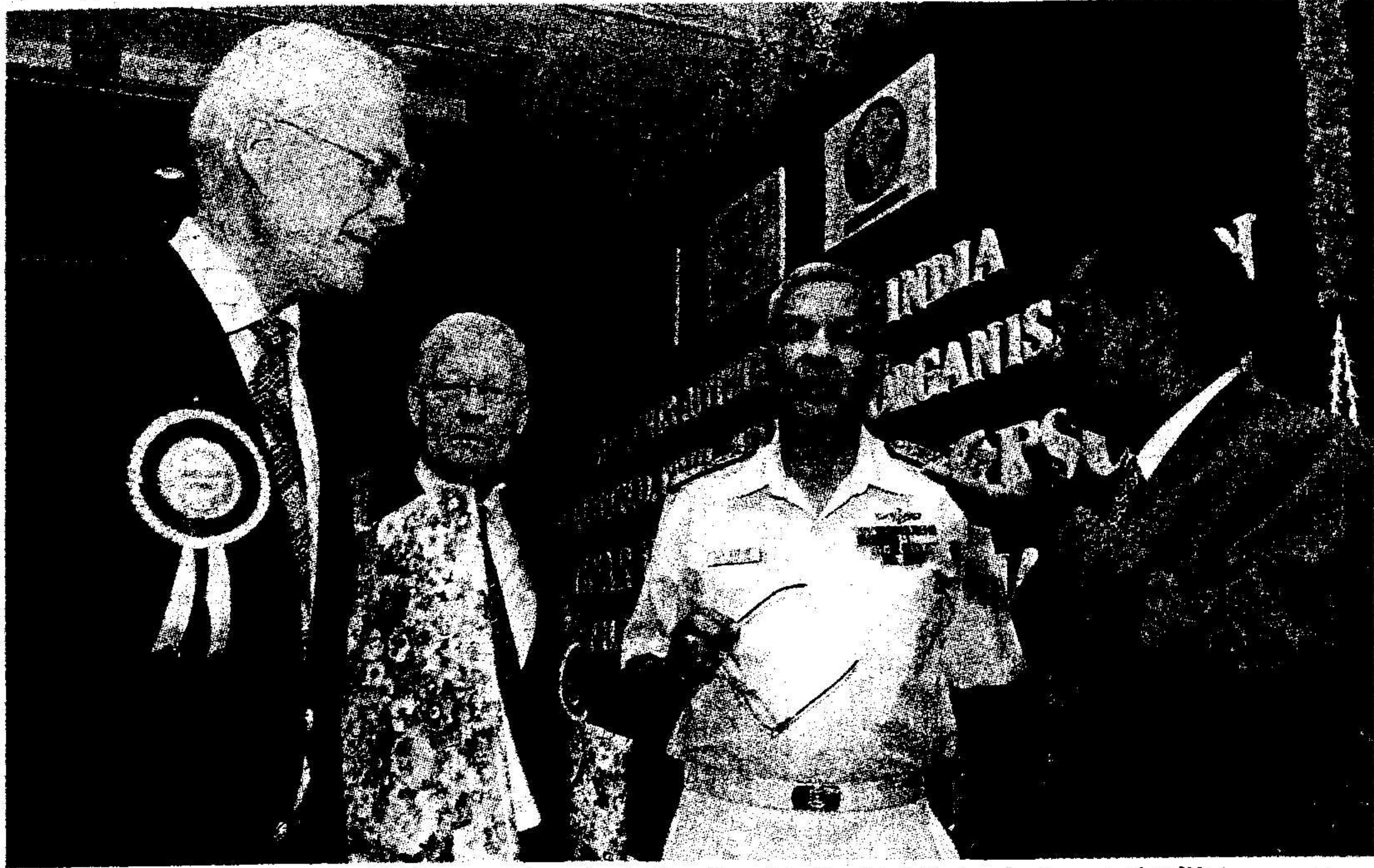
K. Ramalingam, Chairman, Airports Authority of India (right), having a word with Vice-Admiral A.K. Singh, Chairman, National Search and Rescue Board (second from right), at an international seminar in Chennai on Monday. Looking on are David Moores, air traffic management officer, International Civil Aviation Organisation, (third from right), and Brian Day of ICAO Montreal headquarters. — Photo: R. Ragu

Airports Authority project to enhance search, rescue operations

By Our Special Correspondent

CHENNAI, MARCH. 7. "India plans to provide remote-controlled air ground Very High Frequency (VHF) communication through V-SAT using Indian satellite with an exclusive transponder for civil aviation purposes. The Rs. 20-crore project, to be implemented during 2005-06, will enhance the communication capabilities for effective search and rescue (SAR) operations," the chairman of the Airports Authority of India (AAI), K. Ramalingam, said here today.

Recognising the potential of the satellite-based search and rescue system, India had taken a pro-active lead role in participating in the international programme and establishing two local user terminals in Lucknow and Bangalore. The

AAI, in association with the Indian Space Research Organisation (ISRO), planned to implement a satellite-based augmentation system, "GAGAN", to provide navigation capabilities to India and neighbouring countries.

While the map data of the New Delhi and Mumbai flight information regions were being digitised to improve SAR capabilities at rescue coordination centres, the implementation of a disaster management plan at the national, district, city and village levels with the participation of resource agencies would provide the basis for preparedness to tackle natural disasters.

Mr. Ramalingam was speaking at the inauguration of a two-day seminar on search and rescue operations hosted by the AAI and

sponsored by the International Civil Aviation Organisation.

The Coast Guard Director-General and National SAR Board chairman, Vice-Admiral A.K. Singh, said the recent tsunami disaster highlighted the need for strengthening the SAR organisation.

David Moores, air traffic management officer, ICAO's Asia-Pacific Office in Bangkok, and Brian Day of ICAO, Montreal headquarters, gave an account of the international organisation's role in global search and rescue operations.

S.K. Saraswathi, regional executive director, southern region, AAI, and Srikrishan, executive director, Air Traffic Management, AAI, outlined its initiatives in providing effective SAR operations.

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Coast Guard conducts search and rescue exercise off city coast

Express News Service

Chennai, March 10

The Indian Coast Guard today conducted a search and rescue exercise off the coast of Chennai.

The exercise, part of the international seminar on 'Search and Rescue', conducted by the Airport Authority of India (AAI) and Indian Coast Guard (ICG), had three ICG ships, two Naval fast attack craft, one ICG Dornier aircraft and two Chetak helicopters in the simulated rescue operation.

In the beginning, an emergency situation was simulated onboard a civil airliner Boeing 772 on a routine flight from Bangkok to Chennai with 75 passengers. The aircraft initiated the crash while approaching Chennai. With the help of an emergency locator beacon onboard the flight, distress signals were sent to Mission Control Centre Banglore. This was then diverted to Air Traffic Control at Chennai.

Meanwhile, a merchant vessel on passage from Nagapattinam to Vishakapattinam had spotted the crash and saved around 15 people. The ship immediately sent a 'ditching report' to all ships in the area and the Coast Guard.

Following the distress call, the Indian Coast Guard mobilised a Dornier aircraft from the Meenambakkam ICG Air Station and two Chetak helicopters for immediate search and rescue operation.

Apart form this, two ICG ships Sammar and Vajra operating off the coast of Chennai were diverted to the scene of the crash.

The Indian Navy also played its part by putting into action two Fast Attack Craft (T-83, T-84) for the mission. The entire operation was co-ordinated by the Maritime Rescue Coordination Centre, Chennai, and all the 75 persons onboard the air craft were rescued.

While the injured were treated onboard the ships, Samar and Vajra, the more seriously injured ones were evacuated by the helicopters and Hovercraft to the Military and civil hospitals on land.

The operation was co-ordinated by Commodore UN Chitnavis, Commander ICG, Eastern Region. While the operation began at 9.15 a.m. and ended at 12.45 p.m, the evacuation of all the 75 persons was over within 45 minutes.
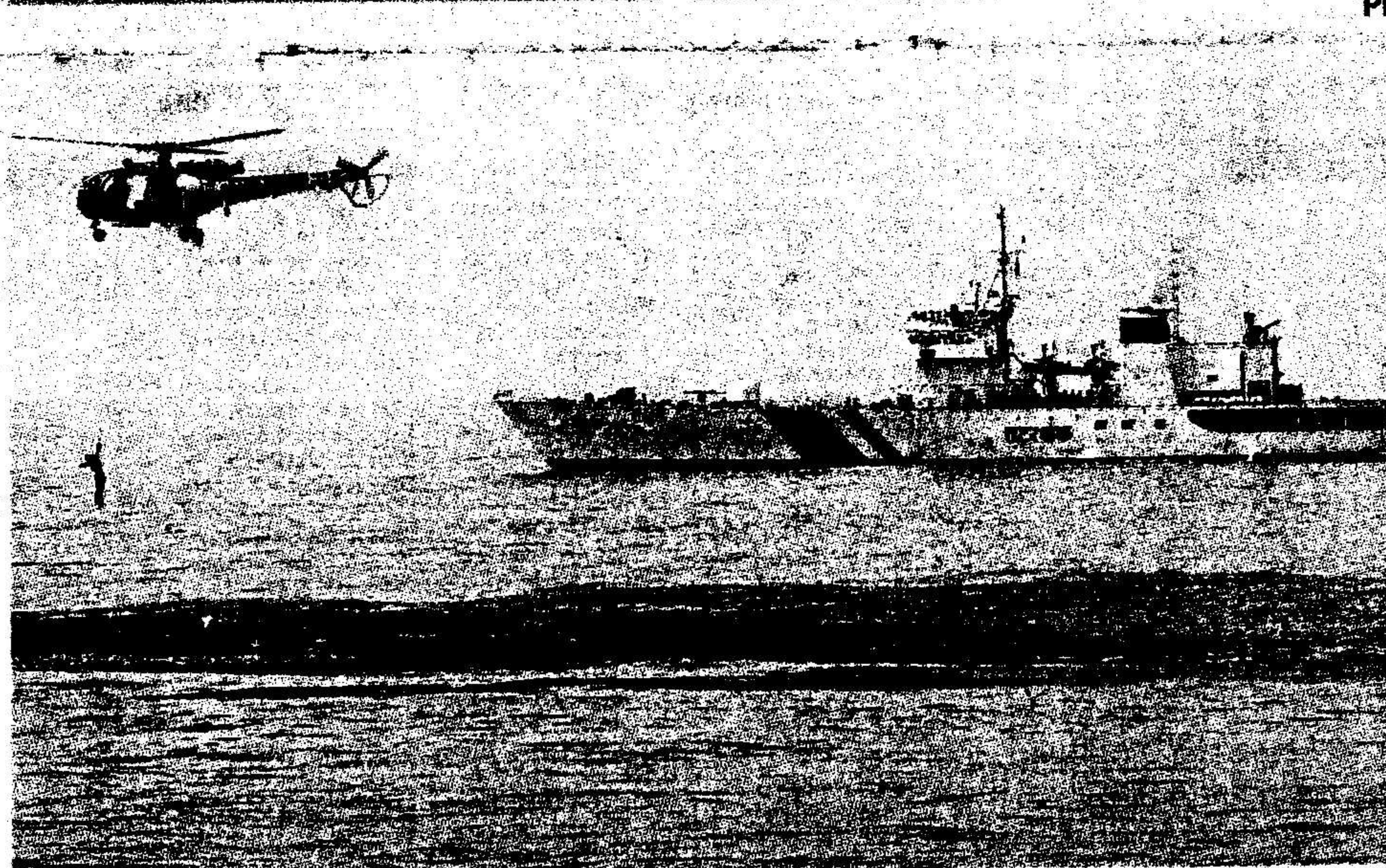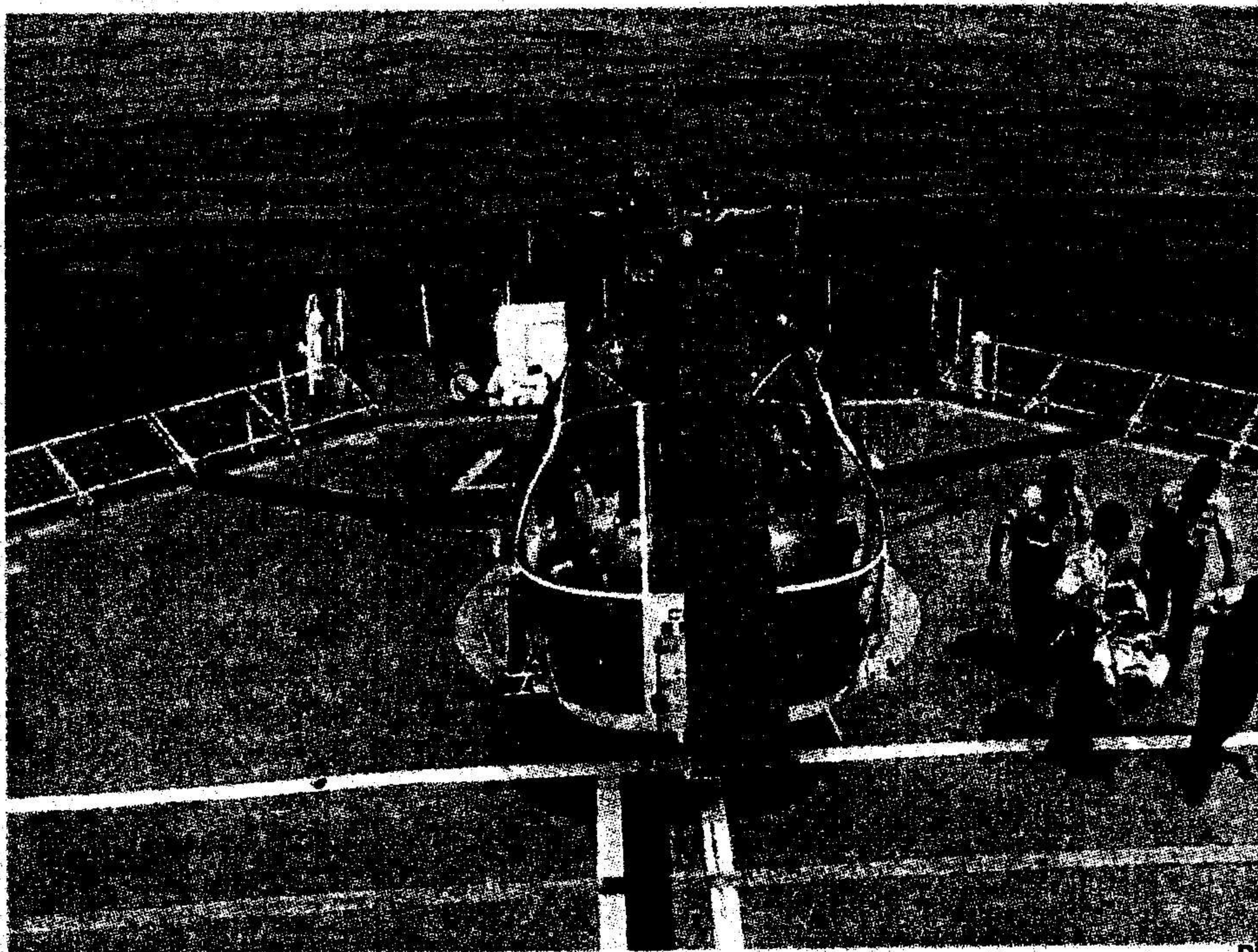
(Top) **Coast Guard personnel on board CGS Vajra during the search and rescue exercise coast on Thursday. Here they are simulating a scene of rushing an injured person to the board the ship.** *(Above)* **A Chetak helicopter in action during the operation.**

Simulated crash tests rescuers' readiness

By Our Special Correspondent

CHENNAI, MARCH 9. Venue: Vandalur; time: 11-06 a.m. Feverish pitch of activity. Suddenly, smoke spotted from a damaged Thiruvananthapuram-Chennai Dorner flight, which crashed near Vandalur area. Of 20 crew members on board, 11 sustain serious injuries.

That is not a real crash but a simulated accident, organised to evaluate the preparedness of "search and rescue" operations of various agencies in a real-time situation.

The personal locator beacon (PLB), mandatory for all commercial aircraft, gives signal to the base station of Indian Space Research Organisation (ISRO). The Air Traffic Control (ATC) nearest to the accident site takes control of the situation. The local police are alerted within 15 minutes and they arrive at the site in 20 minutes. They are followed by fire services personnel and ambulances with medical and paramedical staff. The wounded passengers are removed to the nearest hospitals. An Army helicopter transporting the injured to hospitals in less than 30 minutes catches everyone's attention.

This special exercise was held as

An Army helicopter taking part in a search and rescue operation after a simulated crash in Chennai on Wednesday. — Photo:S. R. Raghunathan

part of the international seminar on SAR hosted by the Airports Authority of India and sponsored by the International Civil Aviation Organisation. International delegates from 14 countries witnessed the exercise.

The General Manager, Air Traffic Management, AAI, V. Somasundaram, said such exercises would enhance the preparedness of the operational wing.