3 EXISTING CONDITIONS IN AIR TRANSPORT

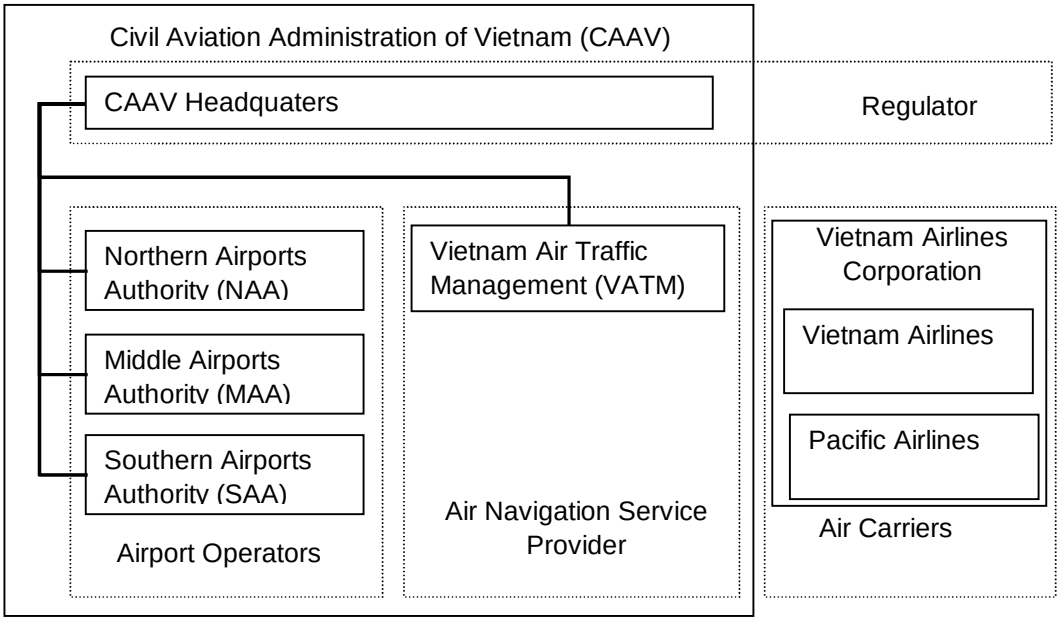
3.1 Administrative Framework

In 1976, the General Civil Aviation Administration (GCAA) was formed under the control of the Ministry of Defense and was responsible for civil aviation. In 1989, the control of GCAA passed to the Council of Ministers. It was then divided into two, one was the Civil Aviation Department (CAD) in the Ministry of Transport and Communications and the other was the General Company of Vietnam Airlines. At that time, Vietnam Airlines provided airport and air navigation services in addition to operating the national air carrier.

CAAV on the other hand was formed as a wholly state-owned and managed entity through the National Civil Aviation Law promulgated in 1992. CAAV, which handles civil aviation functions, is under direct authority of the Office of the Government.

Figure 3.1.1 shows the relationship among CAAV, state-owned enterprises under it, Vietnam Airlines, and Pacific Airlines.

Figure 3.1.1
Relationship among Air Transport Sector Organizations



CAAV plays the role of regulator in the air transport sector in Vietnam. Airport operators – the three airport authorities – and the air navigation service provider, that is, VATM, belong to CAAV. Air carriers, Vietnam Airlines and Pacific Airlines, are separate bodies.

Civil Aviation Administration of Vietnam

CAAV organizational chart is shown in Figure 3.1.2. There are three categories of organizations under it, i.e., state-owned enterprises, administrative organizations and other organizations. CAAV has 164 employees at its headquarters.

The four state-owned enterprises under CAAV are:

1) Northern Airports Authority (NAA)
2) Middle Airports Authority (MAA)
3) Southern Airports Authority (SAA)
4) Vietnam Air Traffic Management (VATM)

The administrative organizations include:

1) Planning and Investment Department
2) Air Transport and Traffic Department
3) Aviation Safety Department
4) Aviation Security Department
5) Science and Technology Department
6) Financial Department
7) Legal Office
8) Personnel Department
9) Administration Department
10) Administration Offices

Other organizations include:

1) Aviation Health Care Center
2) Civil Aviation Training Center of Vietnam
3) Aviation Magazines

CAAV's responsibilities are stipulated in Decree No. 68/CP dated 25 October 1995, as follows:

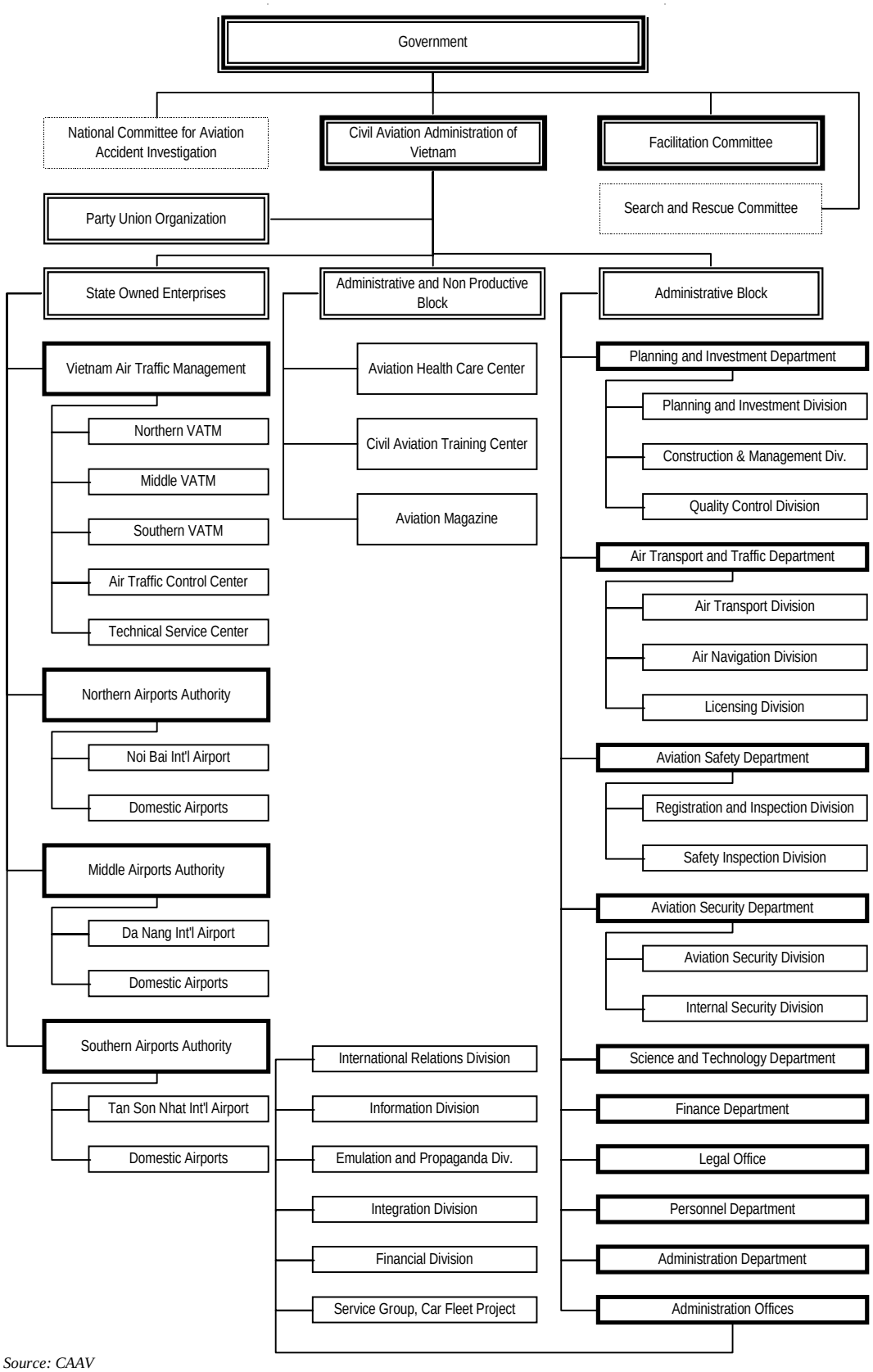
1) Submit to government draft laws, ordinances, strategies, planning, and policies regarding the development of civil aviation and organize their implementation.
2) Submit to government the setting up and allowed exploitation of air routes, prohibited or restricted flight areas; participate in and sign international treaties on aviation; sign cooperation documents with countries and international organizations on civil aviation as stipulated by government.
3) Issue technical, professional processes and norms on civil aviation safety; participate in building policies on taxes and fees in civil aviation activities.
4) Organize and control the exploitation of civil airlines, flight area information

and control, information technique planning and control serving civil aviation; coordinate with related agencies in airspace control for protection of national security.

5) Preside over and coordinate with the Ministries of Defense and Interior, with concerned state agencies and local administrations to assure air security and safety, the chartered flights, special flights, airports, civil airports, the common use of airports with national defense; coordinate with related branches and localities in search, rescue and investigation of civil aviation accidents.
6) Submit to government proposals on setting up and dissolving air transport enterprises, projects for foreign cooperation and investment in the field of civil aviation, and on setting up and exploitation of airports.
7) Control transport of goods through domestic civil air transport as provided for and stipulated by government; control activities of foreign air companies operating on Vietnam territory according to Vietnam law and international general rules.
8) Control civil aircraft registration; coordinate with the Trade Ministry in the control of aircraft import and export, equipment, facilities and materials serving civil aviation; control and supervise the repair and maintenance of aircraft, aircraft engines, production of aircraft facilities and equipment, and special equipment serving civil aviation activities.
9) Provide, suspend, extend, correct, and revoke certificates, diplomas and permits related to civil aviation activities as stipulated by government.
10) Control science and technology activities in the field of civil aviation; organize the research and application of scientific progress and technology in the field of civil aviation; coordinate with the Ministry of Science, Technology and Environment to protect the environment from the adverse impact of civil aviation activities.
11) Control the organization, personnel, training, recruitment and development of civil aviation manpower resources; coordinate with the Ministry of Education and Training in the works of cadre training for the civil aviation branch.
12) Control properties and land as entrusted by the State.
13) Control investment and building of civil aviation projects as assigned by government.
14) Organize control, inspection and settlement of petitions and denunciations; deal with violations in civil aviation activities as provided for by the law.

Figure 3.1.2

CAAV Organization Chart



Source: CAAV

Regional Airports Authorities (RAA)

Each of the airports authorities operates one international airport and several other domestic airports. The directors of these authorities are, at the same time, the directors of their respective international airport. By Decision No. 113/1998/QD-TTg dated 6 July 1998, airport authorities became state public enterprises.

The Northern Airports Authority currently operates the following airports:

1) Noi Bai (Hanoi) International Airport
2) Nasan (Son La) Airport
3) Cat Bi (Haiphong) Airport
4) Vinh Airport
5) Dien Bien Airport

The Middle Airports Authority currently operates the following airports:

1) Danang International Airport
2) Phu Bai (Hue) Airport
3) Nha Trang Airport
4) Phu Cat (Qui Nhon) Airport
5) Pleiku Airport
6) Tuy Hoa (Dong Tac) Airport (no scheduled flight as of February 2000)

The Southern Airports Authority currently operates the following airports:

1) Tan So Nhat (Ho Chi Minh) International Airport
2) Lien Khuong (Da Lat) Airport
3) Ban Me Thuot Airport
4) Rach Gia Airport
5) Phu Quoc (Kian Giang) Airport
6) Camly Airport (no scheduled flight as of February 2000)
7) Ca Mau (Quan Long) Airport (no scheduled flight as of February 2000)

The responsibilities of airport authorities are stipulated in Decision No. 950-TTg dated 19 December 1996, as follows:

1) Control and exploit airports in the region as stipulated by the law; collect fees and charges as provided for by the State; invest in projects, programs for repair, transformation, upgrading or building anew as provided for by law and as assigned by CAAV;
2) Supply or organize the supply of aeronautical services and public services at the airport in compliance with cost and cost frame stipulated by the State;
3) Control and exploit land surface, water surface and other projects pertaining to

infrastructures under the airport group's control and use, or transfer the right of use and exploitation to units, enterprises, organizations, and individuals operating within the airport area as stipulated by the State, at the price and price frame stipulated by the State;

4) Preside over the coordination among agencies, units, organizations, and individuals operating at the airport and with the local administration in assuring security, safety, public order, and environmental hygiene, against intrusion and illegal intervention of operations by civil aviation and civil aircraft; carry out emergency and rescue operations at the airport and the surroundings;
5) Build and plan options on development and exploitation and a security program for airports in the region to be submitted to the CAD head for approval; organize their implementation;
6) Build programs and plans to upgrade, extend and build new airport infrastructures, develop manpower resources, renew equipment, apply scientific and technical achievements, control skill, new technology, projects for cooperation and joint venture at home and abroad, and submit these for approval and organize their implementation.
7) Organize the control, supervision and implementation of environmental protection measures meant to overcome environmental pollution caused by airport activities; coordinate with concerned agencies in protecting the environment related to airport control and exploitation activities.
8) Assure absolute security and safety for passengers and chartered aircraft in all airports of the region.

The number of employees in each organization is:

1)	Northern Airports Authority:	1,422
2)	Middle Airports Authority:	710
3)	Southern Airport Authority:	1,254
4)	Vietnam Air Traffic Management:	1,380

Vietnam Air Traffic Management

The VATM is a state-owned nonprofit enterprise established in 1993 from the General Civil Aviation Administration of Vietnam. It was then known as the Air Navigation Department of Vietnam. Through Decision No. 15/1998/QD-TTg dated 24 January 1998, it became Vietnam Air Traffic Management, a public utility enterprise.

The services VATM provides are air traffic control, aeronautical information and maintenance of facilities used in the above services.

En-route facilities, such as radar and VOR/DME, are maintained by VATM. Airport facilities, such as NDB, airfield lighting, markers, etc., are maintained by each airport authority. When the airport authority has difficulty in maintaining the

equipment at the airport, it signs a contract with the VATM for equipment maintenance.

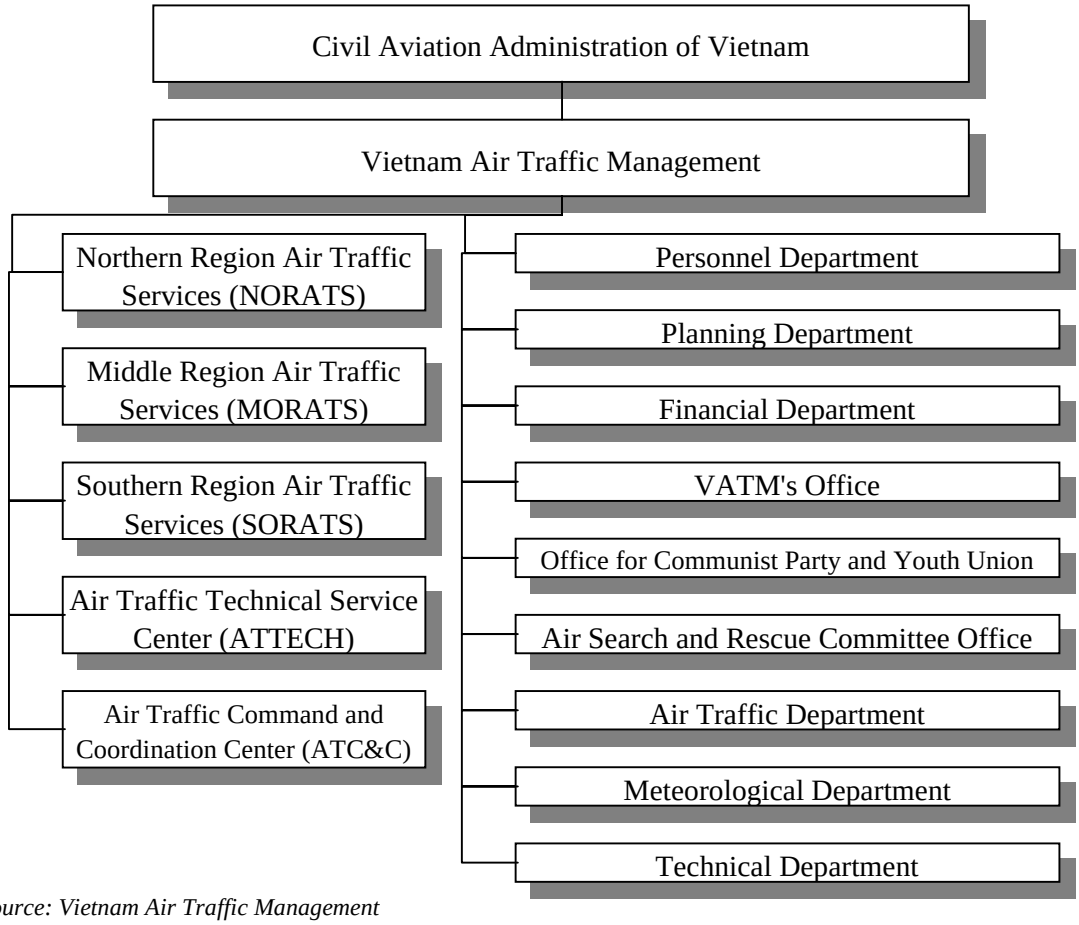
There are five units under VATM as follows:
1) Northern Region Air Traffic Services (NORATS)
2) Middle Region Air Traffic Services (MORATS)
3) Southern Region Air Traffic Services (SORATS)
4) Air Traffic Technical Service Center (ATTECH)
5) Air Traffic Command and Coordination Center (ATC&C)

There are approximately 1,380 staff in VATM. Staff allocations are as follows:

ATC and ATS:	28%
Technical Service:	40%
Administration and Management:	32%

Staff on direct duty, such as ATC, ATS and technical service, work on a 6-hour 4-shift schedule to provide 24-hour service.

Figure 3.1.3
Organization of Vietnam Air Traffic Management



Source: Vietnam Air Traffic Management

Civil Aviation Training Center of Vietnam

Civil Aviation Training Center of Vietnam (CATCV) was established as the only government authorized civil aviation training center on 24 March 1979. Even before 1979, an aviation training program was carried out from 1975.

The training program covers all aviation fields such as, air traffic control, transport service agent, communications/operations, electronics maintenance, aircraft maintenance, civil aviation security, flight attendants, languages, etc. Since its establishment, CATCV has trained 7,353 officers. Training facilities have been offered to Lao and Cambodia.

The pilot ab-initio training is not yet carried out but conversion courses are provided for military pilots to become civil pilots. There is a plan to start the pilot ab-initio training from 2001.

The French Government ODA project, "A Project to Develop and Upgrade CATCV" started June 1999. This FF 46 million project will provide new facilities and equipment.

3.2 Airlines

There are two airlines in Vietnam. One is the former monopolistic, state-owned Vietnam Airlines, and the other is Pacific Airlines, a joint venture of state-owned companies.

There are two general aviation operators. One is Vietnam Air Services Company (VASCO), which is the member unit of Vietnam Airlines Corporation and, and the other is Service Flight Corporation of Vietnam (SFC), which is a state-owned enterprise under military.

1) Vietnam Airlines Corporation

Vietnam Airlines was incorporated as a state enterprise in 1989. Vietnam Airlines Corporation (VAC) was established by Decision No. 4-C dated 27 January 1996, as a state-owned enterprise. VAC is composed of member units which are independent accounting enterprises, dependent accounting enterprises, and nonbusiness units.

Member units with independent accounting are:

(1) Aviation Petrol Supply Company (VINAPCO)
(2) Aviation Import – Export Company (AIRMEX)
(3) Aviation Service Supply Company
(4) Aviation Construction, Survey and Design Company

(5) Aviation Project Construction Company
(6) Aviation High-quality Plastics Company
(7) Aviation Motorized Transport Company
(8) Aviation Printing Company
(9) Noi Bai Air Service Company (NASCO)
(10) Tan Son Nhat Air Service Company (SASCO)
(11) Danang Air Service Company (MASCO)

Member units with dependent accounting are:

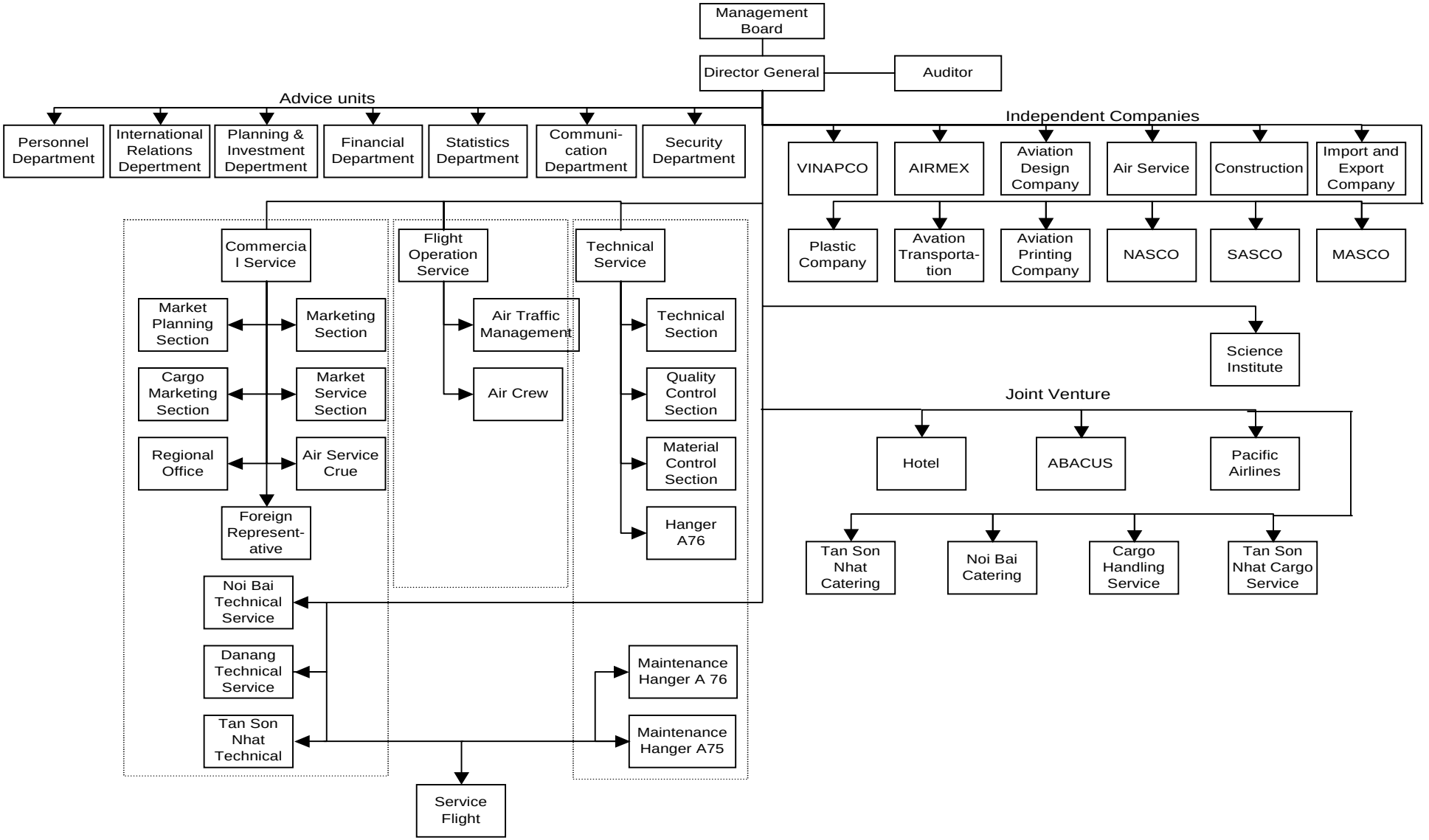
(1) Vietnam National Air Service (Vietnam Airlines)
(2) Vietnam Air Services Company (VASCO)
(3) Noi Bai Ground Trading Enterprise
(4) Tan Son Nhat Ground Trading Enterprise
(5) A75 Aircraft Repair Enterprise
(6) A76 Aircraft Repair Enterprise

Joint venture units with capital contributed by Vietnam Airlines Corporation are:

(1) Tan Son Nhat In-flight Meals Joint Venture Company (VAC)
(2) Tan Son Nhat Goods Service Company ltd. (TCS)
(3) Noi Bai In-flight Meals Joint Venture Company (NSC)
(4) Vietnam Airlines Hotels Joint Venture Company ltd. (VNH)
(5) Aviation Stocks Company (Pacific Airlines)
(6) Global Distribution Company (ABACUS-VIETNAM)

VAC is run by a seven-seat management board whose members are appointed by the Prime Minister (see Figure 3.2.1).

Figure 3.2.1
Organization Chart of Vietnam Airlines Corporation



2) Vietnam Airlines

International services by Vietnam Airlines cover major cities in the east and southeast Asia, some European capitals and two Australian cities. Its share in international passengers from/to Vietnam in 1997 accounted for 38.6% of the total market, while it had a share of 93.7% in the domestic market.

(1) Fleet Plan

Table 3.2.1 shows the current fleet of Vietnam Airlines. The fleet plan is being revised and will be finalized by the end of 1999.

Table 3.2.1 Fleet of Vietnam Airlines

Aircraft Type	Seat Capacity	Number of Aircraft	Ownership
B767	221	3	Dry lease
A320	150	10	Dry lease
F70	79	2	Owned
ATR72	64	5	Owned

(2) Operation, Maintenance and Training

Light maintenance and checking are carried out at Noi Bai Airport and Tan Son Nhat Airport. All engine maintenance is carried out abroad by subcontract. Brake and wing maintenance for ATR72 is carried out in the maintenance hangar at Tan Son Nhat Airport.

Vietnam Airlines has a plan to expand the capability of its maintenance facilities at Tan Son Nhat Airport and includes the construction of two new maintenance bases. It is seeking a partner for these maintenance facilities. A new maintenance hangar is under construction east of the terminal at Noi Bai Airport which will be completed in the middle of 2000.

Vietnam Airlines carries out staff training at the CATCV in Ho Chi Minh City and in its own facilities such as a mockup at Tan Son Nhat Airport. There are some foreign experts for maintenance and some foreign pilots.

(3) Cargo

In 1997, Vietnam Airlines in cooperation with Asiana Airlines and Korean Air launched weekly B767-300 and A300 freight services between Seoul and Ho Chi Minh City. Cargo cooperation agreements with Air France, Cargolux, etc. are also in service. Vietnam Airlines also operates cargo charter service by TU134 on domestic and regional routes (Cambodia, Thailand, Laos, China, and Singapore, etc.).

3) Pacific Airlines

Pacific Airlines, based in Ho Chi Minh City, is a joint venture enterprise and was established in 1995. This company is the first holding company in Vietnam. VAC owns 30% of the shares and the other 70% is owned by six other Vietnamese companies, according to Vietnam Airlines[1]. These companies are: the Saigon Tourism Company (Saigon Tourist), the Trading Brokerage and Transport Communication Development Investment Company (TRADEVICO), The Air Equipment Import Export Company (AIRIMEC), The Southern Airport Services Company (SASCO), The Vietnam Air Services Company (VASCO) and the Vietnam Air Petrol Company (VINAPCO).

Pacific Airlines flies on domestic routes between Ho Chi Minh City and Hanoi. Its MD-82 aircraft has 165 seats and a liquid crystal screen installed in front of each seat for in-flight entertainment. Its international service connects Ho Chi Minh City with Kaohsiung and Taipei.

4) Vietnam Air Services Company (VASCO)

VASCO is one of VAC's member units and provides flight services using small aircraft such as Jetstream and King Air B200. VASCO also provides emergency service flights for medical, social and economic purposes and air taxi services. It has regular flights from Tan Son Nhat to Con Dao Island, Vung Tau, Ca Mau, Danang, Hue, Nha Trang, Ban Me Thuot, and Phu Quoc.

5) Service Flight Corporation of Vietnam

SFC provides helicopter services. Its main customers are offshore petroleum industries whose equipment and people must be transported to and from offshore oilrigs. SFC also provides other services such as tourist flights, aerial works, etc. It owns Super Puma ML2 332-L2.

[1] According to Pacific Airlines, VAC holds 40% of the shares and 60% are held by other Vietnamese companies.

3.3 Air Network

1) International Flight Routes

Table 3.3.1 shows the international direct flight routes available at Noi Bai International Airport and Tan Son Nhat International Airport as of April 1999.

Vietnam Airlines operates 24 international routes, 54 international flights a week at Noi Bai Airport and 157 flights at Tan Son Nhat Airport. Since June 1999, scheduled flights between Hong Kong and Danang and Bangkok and Danang have operated.

Compared with the long haul flight, such as Dubai, Moscow, Melbourne, and Sydney, there are many short haul international flights to surrounding southeast Asian cities including Bangkok, Hong Kong, Kuala Lumpur, Singapore, and Taipei. In fact, 82% of its total flights are to/from southeast Asia.

Vietnam Airlines expressed its interest to open the following new international routes:

From	Danang	to	Bangkok
From	Danang	to	Siem Reap, Cambodia
From	Hanoi	to	Kunming, China Republic
From	Ho Chi Minh	to	Siem Reap, Cambodia
From	Ho Chi Minh	to	Los Angeles, U.S.A.

Table 3.3.1
International Direct Flight Route (as of April 1999)

from	to	Distance [km]	Airlines	Aircraft Type	No. of Flights per Week
Hanoi	Bangkok	969	VN	320	7
			TG	AB3	3
			AF	744	3
	Guangzhou	797	VN	F70	3
	Dubai	5,158	VN	763	2
	Hong Kong	871	CX/VN	343	2
			CX/VN	320	7
	Kuala Lumpur		MH	734	2
	Nannning		CZ	733	2
	Singapore		SQ/VN	310	3
	Moscow	6,700	VN	763	1
			SU	IL9	2
	Taipei	1,661	VN	320	6
	Vientiane	486	VN	AT7	4
			QV	AT7	2
			QV	F70	5
	Subtotal				54
Ho Chi Minh City	Bangkok	742	VN	320	7
			TG	AB3	7
				734	3
	Guangzhou		CZ	733	2
	Dubai	5,618	VN	763	3
	Hong Kong	1,510	VN/CX	320	7
				330	2
				343	5
	Osaka	3,946	VN	763	3
			JL	767	1
			JL	D10	6
	Kaohsiung	1,962	CI	320	4
			BL	M80	7
	Kuala Lumpur	1,011	VN/MH	320	3
			MH/VN	734	4
	Manila		VN	320	2
	Melbourne	6,708	VN	763	1
			QF	763	1
	Phnom Phen	212	VN	AT7	16
			VJ	AT7	4
	Seoul	3,592	KE/VN	AB3	3
			OZ	767	4
	Singapore		VN	320	3
			VN/SQ	320	7
			SQ/VN	310	12
	Sydney	6,849	VN	763	1
			QF	763	1
	Taipei	2,229	VN	320	7
			BL	M80	7
			CI	AB3	7
			BR	747	7
	Vientiane		QV	AT7	1
	Subtotal				148
Totak					202

Airlines Code:
AF: Air France, BL: Pacific Airlines, BR: EVA Airways, CX: Cathay Pacific, CI: China Airlines, CZ: China Southern Airlines, JL: Japan Airlines, KE: Korean Air, KLM: KLM Royal Dutch Airlines, MH: Malaysian Airlines, OZ: Asiana Airlines, QF: Qantas Airways, QV: Laos Aviation, SQ: Singapore Airlines, VN: Vietnam Airlines
Aircraft Code:
767: Boeing 767-300, 744: Boeing 747-400, 734: Boeing 737-400, AB3, Airbus Industries A300, 310: Airbus Industries A3!0, 320: Airbus Industries A320, 330: Airbus Industries A330, 343: Airbus Industries A340, M80: McDonell Douglass MD82, D10: McDonell Douglas DC-10, AT7: Aerospatiale ATR-72, F70: Fokker 70
Source: OAG World Airways Guide March 1999

2) Domestic Flight Routes

Figure 3.3.1 shows the domestic flight routes with regular services. Domestic flight routes are structured around the three international airports which serve as regional hub airports. Regular flight routes connecting these three airports are mainly operated with A320 and B767 by Vietnam Airlines and with MD82 by Pacific Airlines.

ATR-72 and F-70 are operated in all domestic airports except Haiphong, where A320 is operated from Ho Chi Minh City.

VASCO operates regular flights from Tan Son Nhat to Con Dao Island, Vung Tau and Ca Mau by small aircraft such as Jetstream and King Air B200.

Table 3.3.2 shows domestic flight routes from Hanoi, Ho Chi Minh City and Danang in March 1999. Vietnam Airlines expressed its interest to open the following new domestic routes:

From	Vinh City	to	Ban Me Thuot
From	Vinh City	to	Pleiku
From	Hanoi	to	Vinh City
From	Ho Chi Minh	to	Tuy Hoa
From	Danang	to	Qui Nhon
From	Danang	to	Haiphong
From	Danang	to	Da Lat

Figure 3.3.1
Domestic Air Routes

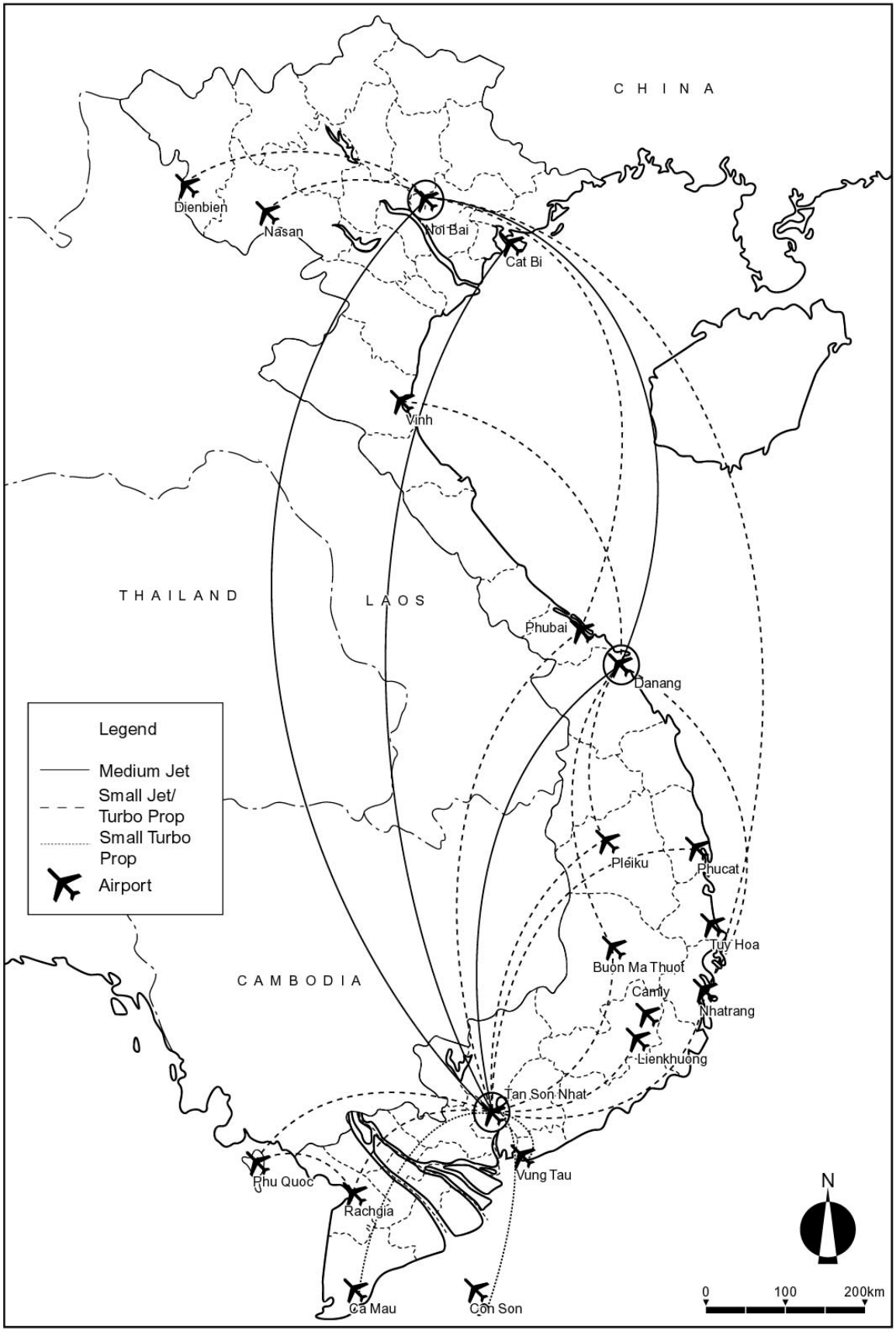


Table 3.2.2
Domestic Flight Route from Hanoi, Ho Chi Minh City and Danang

from	to	Distance [km]	Airlines	Aircraft Type	No. of Flights per Week
Hanoi	Danang	607	VN	320	9
			VN	F70	4
	Dienbienphu	301	VN	AT7	4
	Hue	549	VN	F70	8
			VN	AT7	3
	Nasan		VN	AT7	2
	Nhatrang	1,040	VN	AT7	7
	Ho Chi Minh City	1,138	VN	320	41
			VN	767	11
			BL	M80	16
	Subtotal				105
Ho Chi Minh City	Buon Ma Thout	261	VN	AT7	7
	Dalat	214	VN	AT7	3
	Danang	603	VN	320	12
			BL	M80	2
			VN	AT7	5
			VN	F70	2
	Haiphong	1,112	VN	320	4
			VN	F70	1
	Hanoi	1,138	VN	320	41
			VN	767	11
			BL	M80	16
	Hue	631	VN	AT7	5
			VN	F70	8
	Nhatrang	317	VN	AT7	14
	Phuquoc	301	VN	AT7	3
	Plieku	383	VN	AT7	7
	Quinhon	430	VN	F70	3
	Rachgia		VN	AT7	3
	Subtotal				147
Danang	Buon Ma Thout	375	VN	AT7	3
	Hanoi	607	VN	320	9
			VN	F70	4
	Ho Chi Minh City	603	VN	320	12
			BL	M80	2
			VN	AT7	5
			VN	F70	2
	Nhatrang	436	VN	AT7	5
	Pleiku	227	VN	AT7	3
	Vinh City	401	VN	AT7	3
	Subtotal				48
Total					300

Airlines Code:
BL: Pacific Airlines, VN: Vietnam Airlines
Aircraft Code:
767: Boeing 767-300, M80: McDonell Douglass MD82, AT7: Aerospatiale ATR-72, F70: Fokker 70
Source: OAG World Airways Guide March 1999

3.4 Airport Systems

3.4.1 General

There are 135 airports/airstrips for civil, military and police use in Vietnam. Of these, 18 airports are under the jurisdiction of CAAV. As of April 1999, regular flight services are operating in 15 airports. Locations of these airports are shown in Figure 3.4.1. CAAV plans to increase the number of those for civil aviation use to 24.

In the three international airports of Noi Bai (Hanoi), Danang and Tan Son Nhat (Ho Chi Minh), scheduled international flights are operated and immigration, customs and quarantine services are available.

Table 3.4.1 shows a summary of main airside facilities in airports.

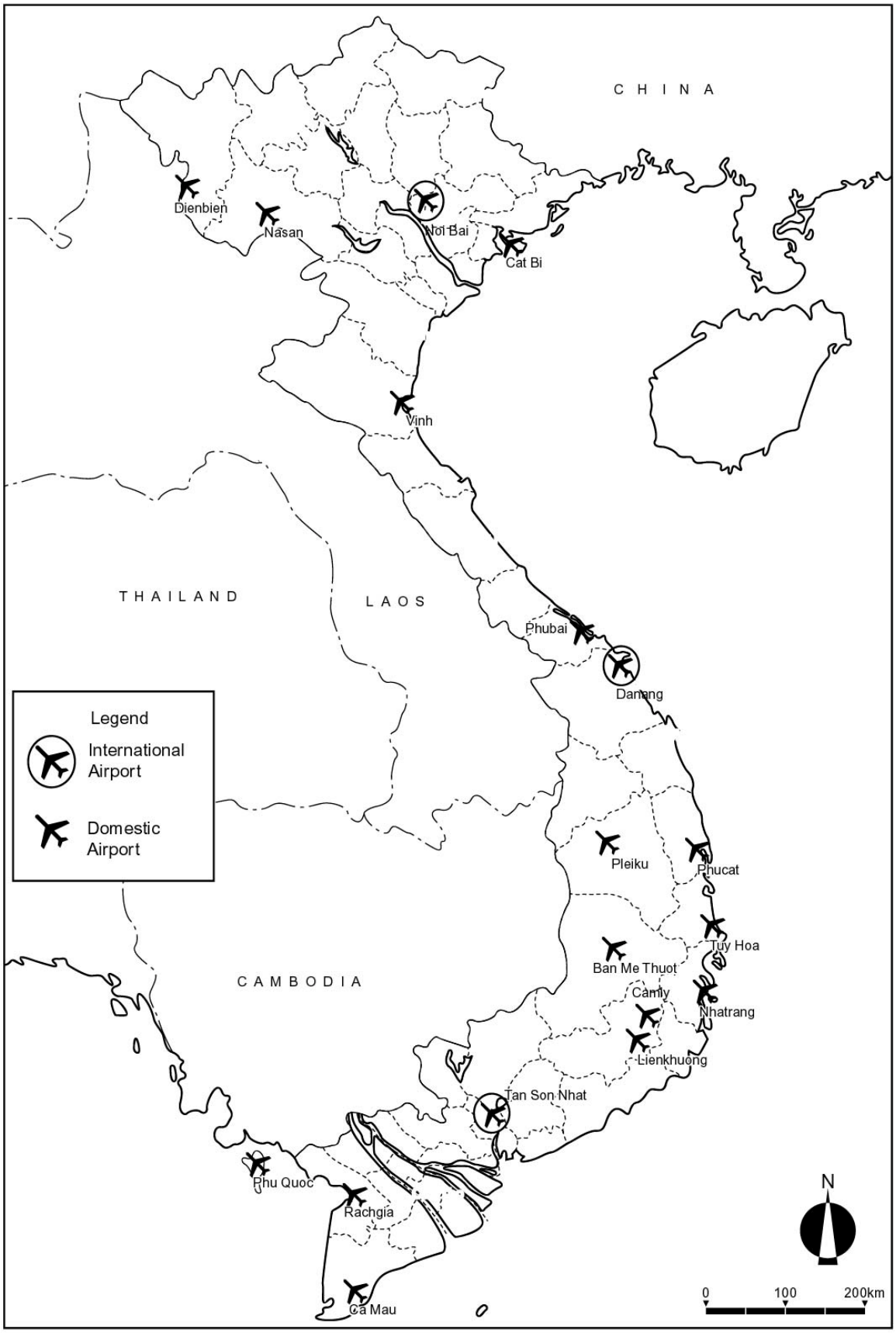
There is a 3,200-m runway at Noi Bai Airport and two parallel runways at Danang and Tan Son Nhat airports. Runway length of other airports is between 1,051 m and 3,050 m.

Table 3.4.1
Summary of Main Airside Facilities

Airport Name	Runway Length (m)	Runway Width (m)	Taxiway Configuration	Apron Area (sq m)	Pavement Strength
Noi Bai	3,200	45	Complete parallel	165,224	PCN 55 R/C/X/T
Cat Bi	2,400	50	Single connecting	15,129	PCN 36 R/C/X/T
Nasan	2,400	45	Single connecting	5,225	
Dienbien	1,830	30	Single connecting	5,225	PCN 13 R/C/Y/U
Vinh	2,147	30			PCN 28 F/C/Y/U
Phubai	2,700	40	Partial parallel	42,000	PCN 42 F/B/W/T
Chu Lai	2,800	45			
Danang	3,048	45	Complete parallel	117,298	PCN 46 F/A/W/T
Phucat	3,050	45	Parallel	40,000	Up to 90t
Tuy Hoa	2,900	45			Up to 112.5t
Nha Trang	1,860	45	Complete parallel	15,000	Up to 40t
Pleiku	1,830	36	Complete parallel	10,000	C130
Buon Ma Thuot	1,800	30	Dual connecting	10,800	Up to 50t
Tan Son Nhat	3,045	45	Complete parallel	162,500	PCN 60/R/B/X/U
Lienkhuong	2,354	37	Single connecting	23,925	Up to 21.5t
Rachgia	1,500	30	Single connecting	5,500	11ton SIWL
Phu Quoc	1,500	30	Single connecting	7,200	Up to 50t
Can Tho	1,830	N/A			
Ca Mau	1,051	30	Single connecting	9,600	27t ESWL

Complete parallel taxiways are provided at Noi Bai, Danang, Nha Trang, Pleiku, and Tan Son Nhat airports.

Figure 3.4.1
Airports in Vietnam



The new terminal (T1) is under construction at Noi Bai Airport, with a floor area of 77,000 sq m. After Phase 1, the capacity will be approximately four million passengers per annum.

An expansion of the terminal building is also being carried out at Tan Son Nhat Airport. When complete, the total floor area will be 32,000 sq m and the capacity will be approximately five million passengers per annum.

Cargo facilities are available in three international airports, Noi Bai, Danang and Tan Son Nhat.

Table 3.4.2
Summary of Terminal Facilities

	Domestic Passenger Terminal Building (sq m)	International Passenger Terminal Building (sq m)	Cargo Area (sq m)
Noi Bai	2,437	10,487	1,624
Cat Bi	1,942	-	-
Nasan	550	-	-
Dienbien	500	-	-
Vinh	570	-	-
Phubai	2,000	-	-
Danang	4,554	2,148	600
Phucat	500	-	-
Tuy Hoa	Not Available	-	-
Nha Trang	1,500	-	-
Pleiku	1,000	-	-
Buon Ma Thuot	1,380	-	-
Tan Son Nhat	5,000	14,000	3,000
Lienkhuong	720	-	-
Rachgia	578	-	-
Phu Quoc	700	-	-
Ca Mau	158	-	-

Descriptions on major airports are made in the following sections in detail which were worked out based on the site surveys conducted in April and October 1999 as well as Aeronautical Information Publication (AIP) of Vietnam.

3.4.2 Noi Bai International Airport

General

Noi Bai International Airport is located in Soc Son District of Hanoi City, approximately 20km north of the city center. This airport is used by both civil and military operations. These operations are reasonably segregated, the civil area being to the south of the runway and the military area to the north. Figure 2.1 shows the layout plan of Noi Bai International Airport.

Runway

There is one runway with the designation of 11/29. True bearings are 106°52'48"/286°51'12". The dimension of the runway is 3,200m in length and 45m in width. The pavement is a concrete pavement with the strength of PCN 54 R/B/W/U. Information on the surface condition and slab size of the pavement is not available. The operational category is Precision Approach Category-1 for runway 11. Wind coverage of the existing runway 11/29 with 20kt cross wind component is 99.89% based on the meteorological data in 1993 and 1994. Usability factor of the existing runway with Precision Approach Category-1 for runway 11 and VOR approach for runway 29 at 20kt cross wind is 99.29%.

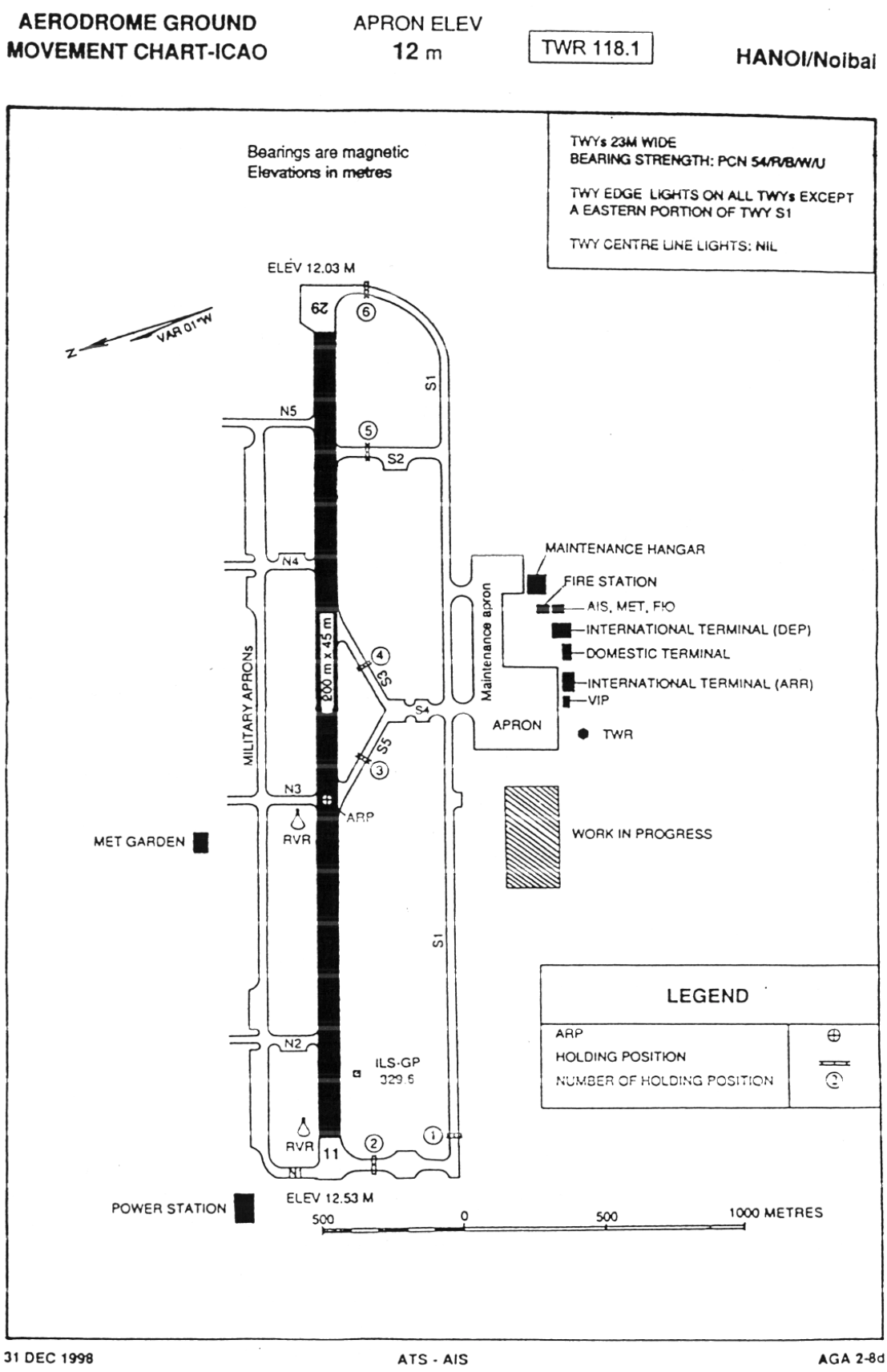
Taxiway and Apron

A complete parallel taxiway with 3 exit taxiways and Y-shaped exit taxiway are provided. It is constructed of concrete and the strength is PCN 55 R/C/X/T[2]. Information on the surface condition and slab size of the pavement is not available.

The apron is located at the south side of the runway. There are aprons for the hanger at the east end of the apron and an apron for cargo and passengers at the west end of the apron. The area for the hanger is 22,400sq.m and that for passenger and cargo is 112,100sq.m, total area is 134,500sq.m. There are four parking positions for large jet (B747 class), ten for medium jet (B767 class), ten for small jet (A320 and B737 class) and 40 for turbo prop and small jet (ATR 72 and small jet). It is a concrete pavement and the strength of the apron is PCN 55 R/C/X/T. The surface condition was fair without major cracks and the slab size of the pavement is 5m by 5m.

[2] *According to AIP Vietnam (AGA2-7, 25 Oct 1994), PCN is 54 R/B/W/U*

Figure 3.4.2
Layout Plan of Noi Bai International Airport



Buildings

Photo 3.4.1
International Passenger Terminal Building (Noi Bai)

The passenger terminal building complex consists of five buildings i.e., International Departure Terminal Building (G2), Domestic Terminal Building (G3), Departure Lounge Building, International Arrival Terminal Building (G4) and VIP Terminal Building. Although some facilities for international departures are provided on the second floor of G2, the passenger terminal concept is basically that of one level processing both domestic and international passengers. Since no passenger loading bridge is available, all passengers are transported by buses between the terminal buildings and aircraft. All the buildings are reinforced concrete structure. The total floor area of these buildings is approximately 8,570sq.m.

A New Terminal Building is under construction at the west side of the terminal. It has approximately 77,000sq.m. This new building is a five stories building. The first floor is the arrival floor, second floor is the departure floor, third floor is the transit lounge, restaurant, office, etc., the fourth and fifth floor will be a hotel. After the completion of this currently on going Phase-1 project, the capacity of the terminal will be 4 million passengers per year. The Northern Airport Authority expected to open part of this new building by the middle of 2000. After the completion of the Phase-1 project, the Phase-2 project will be commenced immediately. After completion of the Phase-2 project, the capacity of the terminal building will be 6 to 6.5 million passengers per year. Total investment cost of Phase-1 is USD80 million and that for Phase-2 will be USD120-150 million.

There are cargo warehouses in the southern area of the International Departure

Terminal (G2). The total floor area of these cargo warehouses is approximately 1,900sq.m.

After the completion of the new passenger terminal building, the CAAV plans to renovate the existing domestic terminal building as the cargo terminal building. The capacity will be 120 to 150,000 tons per year.
The Control Tower is located in the west side of the VIP building. The ground height of the control cabin is approximately 40m. This tower was constructed in 1995 and started operation in 1997.

Photo 3.4.2
Control Tower (Noi Bai)

The new terminal building obstructs the view from the tower to the parallel taxiway at the west end and apron in front of the new terminal building. According to the Northern Airport Authority, this problem will be fixed in future. At this moment the measures to be taken have not been decided.

An aircraft maintenance hanger is under construction at the east end of the terminal area by Vietnam Airlines. The construction will be completed by middle of 2000.

Road and Car Park

There are two access roads to the airport. The main access road from Hanoi City is “Noi Bai Thang Long Express”, which has 4 lanes for auto-vehicles and 2 lanes for non-auto-vehicles. The other access is Highway No.3, which used to be the major access before the completion of the “Noi Bai Thang Long Express” in 1994. Highway No.3 is a 2 lane road connects Hanoi City to Noi Bai Airport via Gia Lam District.

There are approximately 320 parking lots in the car park.

Airfield Lighting System

The following airfield lighting, which conforms to the requirements of ICAO Annex14, Aerodromes is operational at the airport.
a) Category-1 Precision Approach Lighting System for Runway 11
b) Precision Approach Path Indicator (PAPI) for Runway 11
c) Runway Edge Lights
d) Runway Threshold and End Lights for Runway 11 and Runway 29
e) Taxiway Edge Lights
f) Apron Flood Lights
g) Aerodrome Beacon

Meteorological System

The Noi Bai Meteorological Watch Office is responsible for meteorological observations and forecasts within the Hanoi FIR. The necessary data is provided from the Noi Bai Meteorological Center, located in the Airport, which also provides flight meteorological data for flight crew. The observation equipment, is installed at both ends of the runway, and the data are sent automatically to Area Control Center, Approach Control, the Control Tower Cabin ,and the briefing office.

Airport Utilities

Power is supplied from the national electricity distribution network. A sub-station is located outside of the airport, in the Dong Anh District, a few kilometers from the Airport. The main power house receives power from the 35kV line from the sub-station for distribution to the terminal and military area. Operational equipment such as air navigation and communication systems receive 35kV through the distribution boards at each location. Each of these facilities has individual back-up generators. There are one 1,000kVA and two 500 kVA generators for terminal and military facilities.

The water source is six deep wells with a diameter of about 300mm and the depth of 70 to 80m. Water is treated by natural settlement and chloride gas at the Water

Treatment Station. The capacity of the water supply systems is 3,000 to 3,500 cu.m per day.

Wastewater from the Airport is discharged without processing directly into Noi Bai Canal, and then flows into the Ca Lo River. Wastewater from lavatories is decomposed in septic tanks. The water is self-purified in the Noi Bai Canal.
A wastewater treatment plant will be required to maintain the water quality in future. Solid wastes are collected by a local agent and processed by reclaiming. No separate treatment is made for solid waste from aircraft used for international services.

An incinerator will be required to process combustible waste from aircraft and other facilities.

Rescue and Fire Fighting Facilities

The level of the protection available in Noi Bai Airport is ICAO Category 8. The fire station is located in the middle of the airport and the response time to the ends of the runway is less than 3 minutes. There are 100cu.m water reservoirs near to the each end of runway. There are 54 trained persons in three shifts to cover 24 hour operation. The military rescue and fire fighting units cooperate in emergencies.

Aviation Fuel Supply Facilities

Aviation fuel is supplied by Vietnam Air Petrol Company (VINAPCO). There are two aviation fuel storage areas; the main station “N-1” about 5km east of the airport and “N-2” in the airport (at about 1km east of the passenger terminal). The storage capacities of Jet A-1 at N-1 and N-2 are 6,500kl and 1,500kl respectively. Fuel is supplied by 8 re-fuelling trucks with 22kl capacity each.

Air Navigation and Communications System

1) Communications

The following frequencies are available for Aeronautical Mobile Services (AMS) from the Hanoi ACC and Noi Bai Control Tower:

- ACC VHF Channels: 125.9 MHz and 132.3 MHz
- Emergency VHF Channel: 121.5 MHz
- Noi Bai Approach (APP): 121.0 MHz
- Noi Bai Tower (TWR):118.1 MHz.

There is no indication in the AIP of a VHF channel allocated for surface movement control (SMC). However, equipment was reported as available for SMC on channels 121.9 MHz and 121.6 MHz.
Similarly, the AIP does not show any HF services on the HF SEA-2 family of

frequencies from Noi Bai but equipment for these frequencies was reported as available, although its serviceability was not indicated. The AIP should be revised to show the availability of these facilities at Hanoi/Noi Bai.

The AMS communications are recorded on a voice logging system and records kept for a minimum of 30 days.

The VHF ACC channels are remoted to a station on Tam Dao Mountain, about 35 km northwest of Noi Bai. Another remote VHF station serving the Hanoi ACC is also planned for installation at Vinh, south-southwest of Hanoi.

The VHF transceivers in the rescue and fire-fighting (RFF) vehicles at Noi Bai International Airport should be capable of operating on the emergency channel of 121.5 MHz, the SMC and other VHF channels in use at the airport.

2) Navigations

This airport is equipped with one NDB, one Locator, a DVOR/DME and an ILS supported by Markers as well as a DME at the GP site. The ILS is used for approaches to Runway (RWY) 11. The Team was unable to obtain access to any of the stations but it is understood that the NDB and the Locator were new in 1997, the DVOR/DME in 1998 and the ILS/DME in 1996. At the time of the Team's visit to the airport in April 1999, the DME associated with the ILS was reported unserviceable. When this is repaired, in the view of the Team, no new navigation systems will be needed at Hanoi/Noi Bai until CNS/ATM procedures are introduced.

<u>On going Project</u>

The new passenger terminal building “T1” is under construction and expected to be opened by beginning of 2001. The maintenance hanger is being constructed by Vietnam Airlines and expected to be completed by middle of 2000.

<u>Planned Project</u>

After opening of the new terminal building, phase 2 project for this building will be started immediately, which will expand its capacity to handle 6 to 6.5 million passengers annually. The existing domestic terminal building will be renovated as a cargo terminal building.

There is a long term master plan approved by the Government. This plan includes construction of new parallel runway, connecting taxiway, new apron, new terminal building, etc,. at the south side of the airport.

Identified Problem

View from the control tower to the new apron and parallel taxiway at runway 11 end is obstructed by the new terminal building T1.

Airport Inventory

The inventory of the basic facilities in Noi Bai Airport is shown in Appendix B-1.

3.4.3 Danag International Airport

General

Danang International Airport is located at a distance of about 3km from the city center of Da Nang. This airport is used by both civil and military operations. The boundary between the military and civil areas is not well defined. The civil facilities such as the terminal building and apron, etc., are located on the northeast side near the runway 17L threshold. The military aprons and aircraft shelters are located on both the eastern and western side of the parallel runways. CAAV designates this airport as the alternate international airport for Noi Bai and Tan Son Nhat International Airport. Since the airport is located close to the city, aircraft noise problems will occur in future unless proper land use surrounding the airport is managed. Figure 3.1 shows the layout plan of Danang International Airport.

This airport is operated by Middle Airports Authority (MAA).

Runway

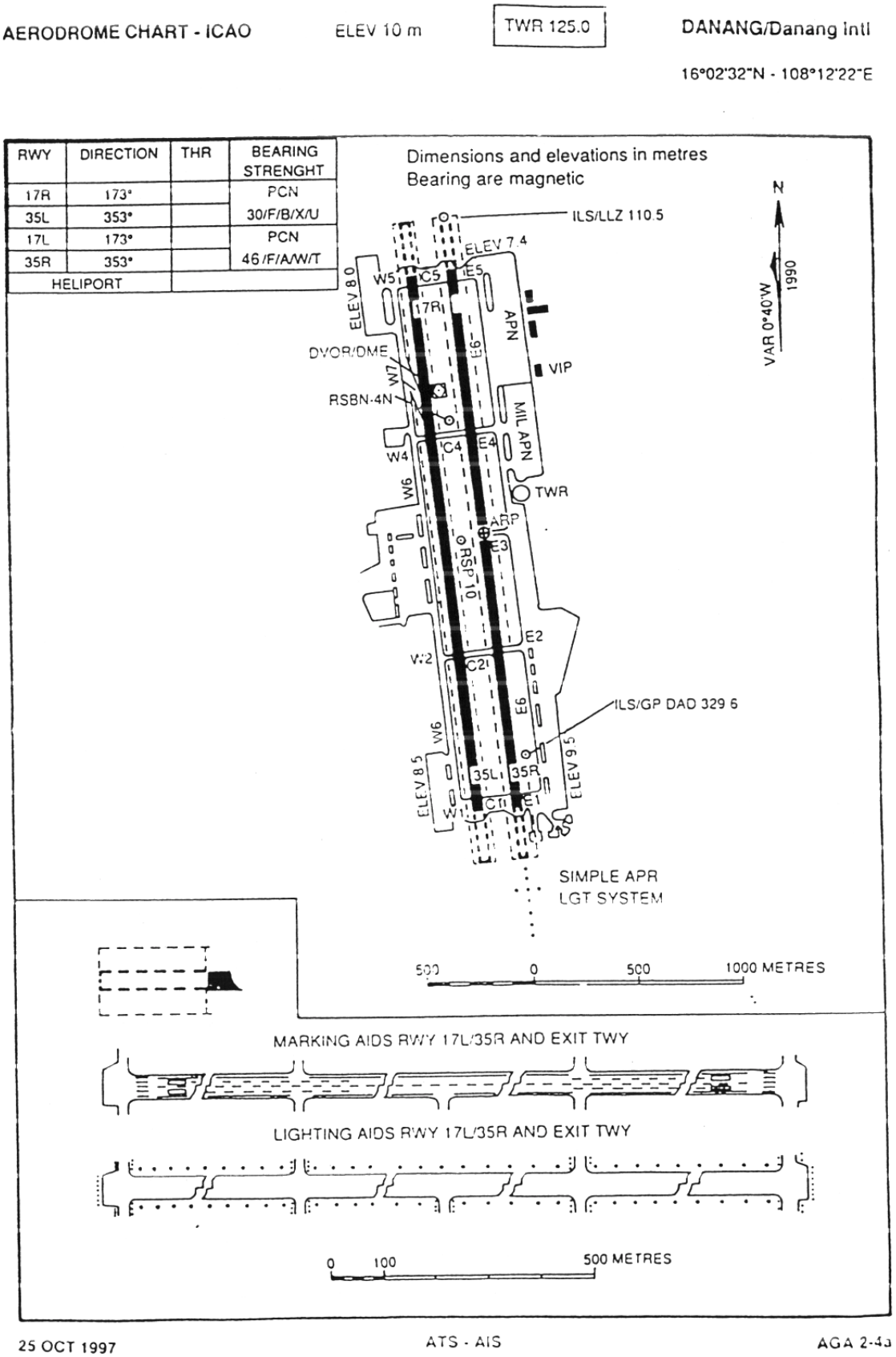
There are two runways in close parallel configuration. The main runway is 17L/35R and the other one is 17R/35L. True bearing is 173°/353°. The dimensions of both runways are 3,048m in length and 45m in width. Shoulders are provided with the width of 7.5m to 3m. The pavement surface is asphalt and the strengths are PCN 46/F/B/X/U and PCN 30 F/B/X/U for Runway 17R/35L and 17L/35R respectively. South part of the runway is concrete pavement and north part is asphalt pavement. The concrete slab size of the runway is 3.8m x 4.6m. The conditions of the pavements are good without major cracks. The operational category is Precision Approach Category-1 for 35R.

Taxiway and Apron

Two complete parallel taxiways with 14 right angled exit taxiways are provided at the east and west side of the runways. Civil aircraft normally use the taxiways located in the east side of runway. The width of the taxiways is 25m. The pavement surface is concrete and the strength is PCN 30 R/B/X/U. The size of the

concrete slab is 3.8m x 4.6m. The pavement conditions are good without major cracks.

Figure 3.4.3
Layout Plan of Danang International Airport



Two civil aprons are located at the northeast side of the runway 17L/35R. The areas are 73,450sq.m and 43,840sq.m. Parking positions are, one for B747, three for A320 and seven for ATR72 or Fokker 70. The pavement surface is concrete and the strength is PCN 30 R/B/X/U. The slab size is 3.8m x 4.6m and the conditions are good without major cracks.

Buildings

The passenger terminal building is located at the northeast corner of the airport property. This building was constructed in 1978. Three major expansions were carried out. There are temporary international departure facilities in the terminal building, which was constructed in 1996, but they are only capable of handling occasional charter flights. The total area of this building is approximately 5,700sq.m. The building structure is reinforced concrete.

Photo 3.4.3
Passenger Terminal Building (Danang International Airport)

Domestic departure passengers go through the departure hall after check-in and security check. There are 131 chairs in this departure hall. There are two departure gate lounges, one is on the ground floor (Gate-1) and the other one is on the 1st floor (Gate-2). There are 136 and 84 chairs in Gate-1 and Gate-2 respectively. There is no passenger boarding bridge so that a bus is used between the aircraft and the terminal.

There are two baggage conveyors in the domestic arrival hall. There are international arrival facilities, such as CIQ desks and x-ray machine in the same area of the domestic arrival hall. CAAV plans to install a new baggage conveyor and to separate the international arrival hall from the domestic arrival hall.

International departure passengers check in at the ground floor then go through the departure hall on the 1st floor. There are 200 chairs in this departure hall. After security check on the 1st floor, passengers go down to the ground floor and buses are used to carry passengers to the aircraft.

There is no cargo building, however there is a small warehouse for cargo handling. This warehouse is located in the south side of the terminal building. The contents of cargo handled in this airport are mainly sea products.

The Control Tower is located in the south side of the terminal building, almost opposite the middle of the runway. This tower was constructed in 1993 to 1994. The ground height of the control cabin is approximately 30m. This tower is a reinforced concrete building. The visibility from the tower to the airside facilities is good without any obstruction.

Road and Car Park

The access road is a dual lane road. There are approximately 100 parking lots in the car park. The pavement is asphalt.

Airfield Lighting System

The following airfield lighting, which conforms to the requirements of ICAO Annex14, Aerodromes is operational at the airport.
a) Simple Approach Lighting System for Runway 35R
b) Precision Approach Path Indicator (PAPI) for Runway 35R/17L
c) Runway Edge Lights
d) Runway Threshold and End Lights for Runway 35R/17L
e) Taxiway Edge Lights
f) Apron Flood Lights
g) Aerodrome Beacon

Meteorological System

An automated weather observation system is installed at this airport.

Airport Utilities

Power is supplied from the city network. There are five backup generator sets with

a total capacity of 1,500KVA.

Water is supplied from the city network and there is an underground storage tank from where it is pumped to an overhead tank for further supply to the terminal area, fire station and offices, etc., by gravity.

The sewage from the terminal area is connected to a septic tank where the effluent is directly discharged into a sewage drain.

Solid wastes are collected by another enterprise.

Rescue and Fire Fighting Facilities

The level of protection available in Danang Airport is ICAO Category 7. The fire station is located near the Runway 17L threshold. This is a steel structure with three vehicle bays. There is a 100cu.m underground water storage tank at the fire station and seven tanks for fire fighting are located in the airport area. There are twenty six trained persons in three shifts to cover 24 hours service. There are three fire fighting vehicles, two of them are crash fire vehicles and one is a rapid intervention vehicle, the water capacity is 11,360L, 8,000L and 2,000L and the foam capacity is 1,500L, 1,000L and 200L and chemical discharge rate is 6,800L/m, 6,000L/M and 2,400L/M. The military rescue and fire fighting units cooperate in emergencies.

Aviation Fuel Supply Facilities

Aviation fuel is supplied by Vietnam Air Petrol Company (VINAPCO). There is fuel storage area at the east side of the terminal.

Air Navigation and Communications System

1) Communications

The following channels are in use for the AMS at Danang:

- Danang Approach Control: 125.3 MHz and 119.5 MHz
- Danang Tower: 125.0 MHz
- Surface Movement Control: 121.6 MHz (main) and 121.9 MHz (standby)

Voice logging of the communications is provided and recordings are retained for 30 days.

Although Danang is designated in the ICAO Air Navigation Plan as an alternate airport (that is, available for use not only by aircraft diverting from Ho Chi Minh City/Tan Son Nhat or Hanoi/Noi Bai because of weather but also by aircraft experiencing an emergency), it was noted that the emergency channel, 121.5

MHz, is not available. This service should be provided urgently, possibly by reallocating one of the SMC systems and retuning it to 121.5 MHz.

The RFF vehicles examined at Danang International Airport did not appear to carry VHF transceivers. If this is the case, the vehicles should be equipped with transceivers capable of operating on the channels used at the airport, including 121.5 MHz (when available).

It was noted that the old steel lattice control tower has been demolished and replaced by a modern control tower which now provides a more suitable environment for controllers and the equipment.

2) Navigations

This airport is equipped with an NDB, a Locator, a DVOR/DME and an ILS with a DME at the GP site. The ILS is used for approaches to RWY 35R. Only the Localizer element of the ILS was accessible to the Team but it is understood that the Locator and NDB were new in 1991, the DVOR/DME in 1997 and the ILS/DME in 1994. In the view of the Team, no new navigation systems will be needed at Danang until CNS/ATM procedures are introduced.

On going Project

There is no project on going.

Planned Project

CAAV plans to renovate the arrival passenger area to separate the flow of international arrival passengers and domestic arrival passengers by October 1999.

Identified Problem

The following comments were made by MAA:

- There is no long term master plan in this airport. Without a master plan, it is very difficult to plan the improvement of this airport.
- Land use agreement between military and CAAV is not finalized.
- Passenger processing procedure is not established. There is a problem in handling international passengers, as international flights are infrequent.

The following problems were found in the site survey:

- Because land for civil aviation use is limited, it is difficult to expand the terminal facilities.
- When an A320 arrived, arrival hall was crowded. The length of the conveyor belt seemed insufficient.

Photo 3.4.4
Domestic Arrival Hall (Danang International Airport)

Airport Inventory

The inventory of the basic facilities in Danang Airport is shown in Appendix B-2.

3.4.4 Tan Son Nhat International Airport

General

Tan So Nhat International Airport is located at a distance of 6km northwest of Ho Chi Minh City Center. This airport is used by both civil and military operations. Both the parallel runways and taxiways are for common use by the civil and military but the apron areas are well segregated. This airport is operated by the Southern Airports Authority (SAA).

The ultimate capacity of this airport was estimated at approximately 13 to 15 million passenger per annum. CAAV plans to move the airport to Long Thanh if passenger volume exceeds this figure in future. Figure 4.1 shows the layout plan of Tan Son Nhat International Airport.

Runway

There are two runways in close parallel configuration. The primary runway is 07L/25R and the secondary runway is 07R/25L. The dimension of the main runway is 3,045m in length and 45m in width with 7.5m width shoulder, that of secondary runway is 3,036m in length and 45m in width with 7.5m width shoulder. The pavement surface is concrete and the strengths are PCN 60/R/B/X/U and PCN 30 F/B/X/U for Runway 07L/25R and 07R/25L respectively. The concrete slab size is 7.62m x 7.62m. The main runway was overlaid with concrete slab, dimensions

of which are 20cm in thickness and 3.8m x 3.8m. There are many cracks along the longitudinal direction in the secondary runway. Overlay of the secondary runway will be started in 1999, after the completion of the overlay, strength of the secondary runway will be as same as the primary runway. Currently, most of the aircraft use the primary runway. The secondary runway is used only by ATR72 or Fokker70 class aircraft. The operational category is Precision Approach Category-1 for runway 25R.

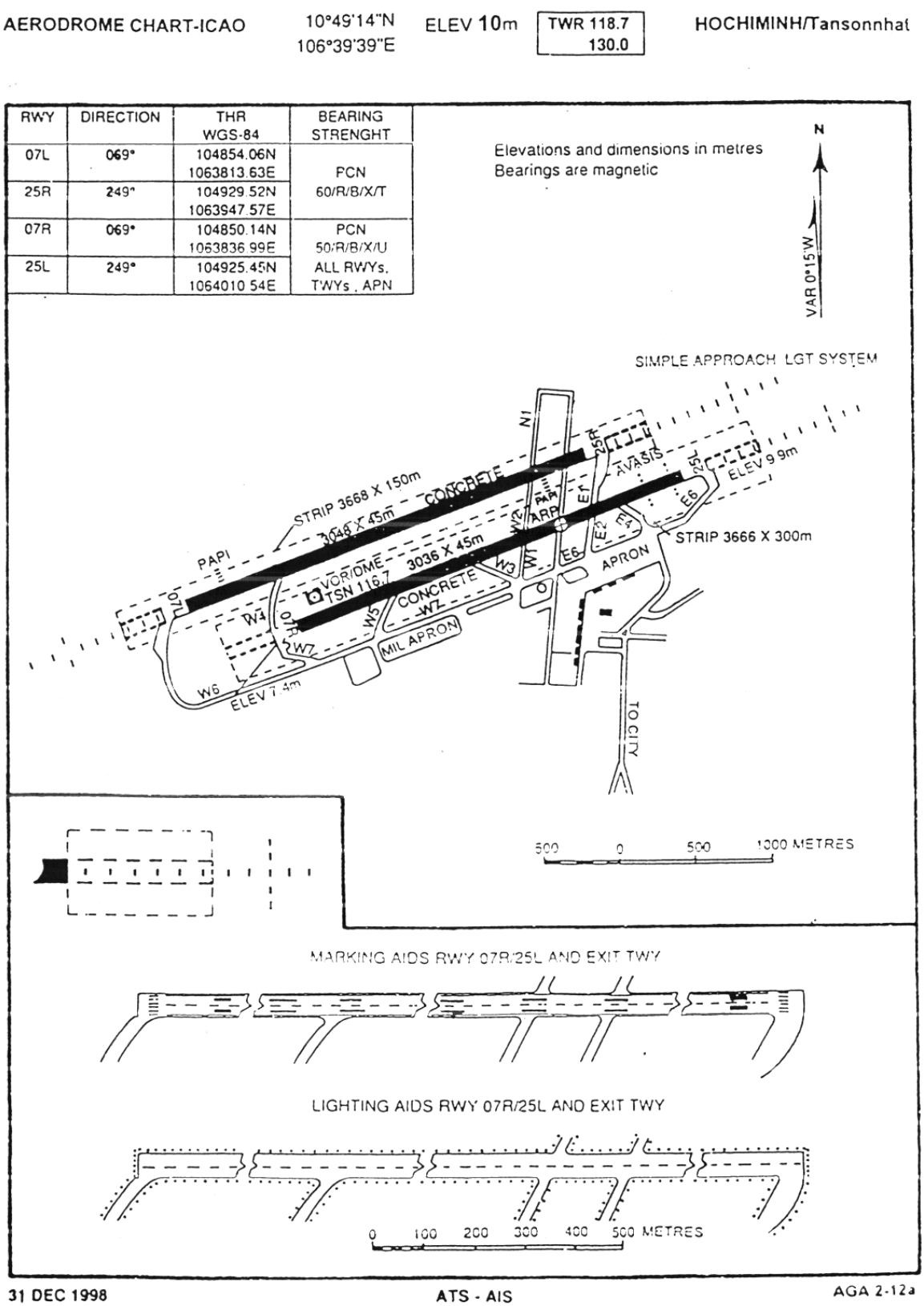
Taxiway and Apron

A complete parallel taxiway is provided at the south side of runway 07R/25L. There is an old runway and its parallel taxiway in north-south direction and these are used as taxiways. There are four connecting taxiways for runway 07R/25L and three connecting taxiways for runway 07L/25R. There are holding bays at the threshold of runway 07L, 25R, and 25L. Surface of all the taxiways is concrete and the slab size is as same as the runway. There are many cracks along the longitudinal direction. The strength of the pavement is PCN 50/R/B/X/U.

The apron for civil aircraft parking use is located at the east side of the airport area. There is a maintenance hanger, called A76, owned and operated by Vietnam Airlines Corporation, at the far east of the terminal area. There are two aprons for passenger loading and unloading at the center of the terminal, and there is a cargo apron at the south side of the terminal area. This cargo terminal is operated by a joint owned company of Vietnam Airlines Corporation. There are 14 parking positions for B747-400 and 30 positions for other aircraft. Surface of the aprons is concrete with the same slab size as the runway. The pavement strength is PCN 50/R/B/X/U. Some parts of the apron were upgraded before. Parking configuration is power-in, push-back. There are four 45 ton towing tractors owned by Vietnam Airlines Corporation and two 45 ton towing tractors owned by SAA. Vietnam Airlines Corporation's towing tractors are used for their own aircraft only. Other aircraft are towed by SAA's towing tractors. There are four "Follow Me" cars owned by SAA.

Figure 3.4.4

Layout Plan of Tan Son Nhat International Airport



Buildings

There are a domestic terminal building and an international terminal building. The total floor area of the buildings is approximately 22,000sq.m. Design capacity of the terminal building is 3.5million passenger per annum. There are two passenger loading bridges under installation. Expansion of the international passenger terminal area is being carried out. This work will be completed in 2002. After completion of this expansion, total floor area of the terminal building will be 32,000sq.m and its capacity will be approximately 5 million passenger per annum. Only passengers are allowed to enter the international passenger terminal building. International departure passengers are checked in at ground floor level, then after security check, go to the first floor for immigration. There are twenty four counters for check in and ten for immigrations. There are duty free shops and other concessions at first floor level. There are four gate lounges in the international area. Passengers go down to the ground floor and buses are used for transportation to/from aircraft. All the facilities for international arrival passengers are located at ground floor level. There are thirteen immigration counters, three baggage conveyors, and twenty four counters for customs.

Passenger flow for domestic departure is similar to that for international departure passengers. There are seventeen check-in counters at ground floor level and six departure gates on the first floor. There are two baggage conveyor belts on the ground floor for domestic arrival passengers.

Photo 3.4.5
Passenger Terminal Building (Tan Son Nhat Airport)

There is a plan to construct a new international passenger terminal building between the fire station and the existing terminal building. The total floor area will be 100,000sq.m and the capacity will be 8 million passengers per annum. This new building will be connected to the existing building. After the completion of the new building, the existing international building will be converted to a domestic

terminal building. Currently, a detailed feasibility study is being carried out.

The cargo building is located at the south end of the terminal area. Cargo is handled by Tan Son Nhat Cargo Services (TCS). TCS is a joint venture between Vietnam Airlines, Singapore Air Terminal Services, and Southern Airport Services, which is one of the subsidiaries of Vietnam Airlines Corporation. Total floor space of the cargo terminal is 22,000sq.m. The areas for parking lot, export and import & Transit is 80 x 120m. 24 x 96m and 99 x 96m respectively. Annual handling capacity is 100,000 ton. The capacity will be increased to 300,000 ton per annum by year 2003.

The Control Tower is located on the south side of the runway, almost in the middle of the airport. The ground height of the control cabin is approximately 28m. This building is eight stories reinforced concrete and it was constructed in 1972. The visibility of the control cabin is good without any obstruction of the view to the runways, taxiways and aprons. Ho Chi Minh Approach Control is located on the third floor of the control tower.

Photo 3.4.6
Control Tower (Tan Son Nhat Airport)

Road and Car Park

The access road is three lanes in each direction. There are approximately 600 parking lots in the car park. After the completion of the new terminal building, the car park will be expanded to 2,500 parking lots, the access road will be expanded and a new road from the airport roundabout will be constructed.

Airfield Lighting System

The following airfield lighting, which conforms to the requirements of ICAO Annex14, Aerodromes, is operational at the airport.
a) Simple Approach Lighting System for Runway 25R/25L and 07L
b) Precision Approach Path Indicator (PAPI) for Runway 25R/07L
c) AVASIS for Runway 25L
c) Runway Edge Lights for Runway 25R/07L
d) Runway Threshold and End Lights for Runway 25R/07L
e) Taxiway Edge Lights
f) Apron Flood Lights
g) Aerodrome Beacon
All the airfield lighting was upgraded recently.

Meteorological System

An Automated Weather Observation System (AWOS) is installed in the airport. Meteorological facilities are located in east side of the apron.

Airport Utilities

Power is supplied from the national power network. There are backup generators and UPSs for all the equipment. Water is supplied from the city network.

Rescue and Fire Fighting Facilities

The fire Station is located between the passenger terminal building and the maintenance hanger. There are thirty trained persons in three shifts to cover twenty four hours service. The fire station is a steel structure building with seven vehicle bays. Maintenance vehicles are also kept in this building. There are four fire fighting vehicles. An ambulance is not stationed in the fire station. There is a 200cu.m water tank at the fire station.

Aviation Fuel Supply Facilities

Aviation fuel is supplied by Vietnam Air Petrol Company (VINAPCO). Fuel is supplied by re-fuelling trucks.

Air Navigation and Communications System

1) Communications

The following AMS communications are provided from the Ho Chi Minh ACC and Tan Son Nhat control tower:

- HF SEA-2: 5655 kHz, 8942 kHz, 13,309 kHz
- ACC VHF Channels: 120.1 MHz, 124.5 MHz, 123.3 MHz, 120.7 MHz
- Emergency VHF Channel: 121.5 MHz
- Tan Son Nhat Approach: 125.5 MHz and 134.1 MHz
- Tan Son Nhat Tower: 118.7 MHz and 130.0 MHz
- Surface Movement Control: 121.9 MHz and 121.6 MHz.

In addition, Tan Son Nhat has an automatic terminal information service (ATIS) channel broadcasting meteorological (MET) information on 128.0 MHz.
The AMS communications are recorded on a voice logging system and records kept for a minimum of 30 days.

The Team was informed that the VHF ACC channels and the emergency channel are remoted via satellite to extended range VHF stations at Phu Cat (near Qui Nhon) and Son Tra (near Danang). The Team was also informed that another extended range VHF station was planned for Ca Mau by end of 1999 (together with a new radar) but confirmation of completion was not available to the JICA Team.

The VHF transceivers in the RFF vehicles at Tan Son Nhat International Airport should be capable of operating on the emergency channel of 121.5 MHz, the SMC and other VHF channels in use at the airport.

2) Navigations

Four NDBs are installed at this airport, one pair is for approaches to RWY 25L and the other pair for approaches to RWY 25R. The airport also has a VOR/DME and an ILS supported by DME at the GP site. The ILS is used for approaches to RWY 25R. The Team was unable to gain access to any of the sites but it is understood that the NDBs were new in 1996, the VOR/DME in 1990 and the ILS/DME in 1994. In the view of the Team, no new navigation systems will be needed at Ho Chi Minh City/Tan Son Nhat until CNS/ATM procedures are introduced.

On Going Project

Installation of two passenger loading bridges, expansion of the terminal building, and repair of apron pavements are on going.

Planned Project

The new international passenger terminal building construction is approved by the Government of Vietnam. Upgrading of airfield pavement for the secondary runway, taxiways and aprons is planned.

Airport Inventory

The inventory of the basic facilities in Tan Son Nhat Airport is shown in Appendix B-3.

3.4.5 Cat Bi Airport

General

Cat Bi Airport is located at approximately 6km southeast from Haiphong City center. There is a military airport named Kien An Airport from approximately 10km west from Cat Bi Airport. According to the airport staff in Cat Bi Airport, the traffic in Kien An Airport is rather busy.

Cat Bi Airport was a military airport though there is no military facility now. Only civil aircraft are operated in Cat Bi Airport. Cat Bi Airport is located in the flat area and there is no obstacles surrounding the airport. Land use surrounding the airport is rice field.

Vietnam Airlines operates scheduled flight from Cat Bi to Tan Son Nhat 5days a week by A320.

Most of the passengers are business purpose. The annual average ratio of the foreign passengers was 18% in 1998. From July 1999, the tourists from China has increased.

There were 3 chartered aircraft and 20 to 30 helicopter chartered flights in 1998. These flights were chartered by tourists and the destinations were Halong Bay in Quang Ninh.

Runways

The dimension of the runway is 2,400m in length and 50m in width without shoulder. The pavement surface is asphalt overlay on concrete slab and the strength is PCN 38 F/C/X/T. Pavement was overlaid in 1995. Pavement condition of asphalt surface is fair without major cracks. Turning pad is provided at the 07 threshold. Runway end safety area is provided in both end of the runway. The one in 07 threshold is 150m x 150m and the other in 25 threshold is 200m in length and 150m in width.

Taxiways and Apron

Single exit taxiway is connecting the apron from the runway. The dimension of the taxiway is 60m in width. The pavement surface is asphalt.

The passenger apron is located in north east of the runway. The dimension is 125.5m x 123.5m. There are two parking position for A320. The pavement strength is PCN 38F/C/X/T. This apron was overlaid with asphalt in 1998. There are two other unused aprons. The one locates in north west of the runway and the dimension is 400m x 80m. This apron is for lighter aircraft. The other one locates in south side of the runway and this one for heavier aircraft use.

Buildings

The passenger terminal building is located in north east side of the runway. This is a single story building and the total floor area is 1,945sq.m. There are 150 seats in departure hall and VIP room is provided inside of the building.

Photo 3.4.7
Passenger Terminal Building from Airside (Cat Bi)

Control tower is located in west side of the terminal building. There is no obstruction to the view from the tower to the runway, taxiway and apron.
Fire station is located at the west side of the control tower. There are two truck bays.

Road and Car Park

The access road is a dual lane road. The surface of car park and access road is

asphalt pavement.

Meteorological System

An Automated Weather Observation System (AWOS) was installed in 1997.

Airport Utilities

Power supply is from the national network. There is a septic tank under the passenger and control tower building. Solid waste is collected by the city service.

Rescue and Fire Fighting Facilities

There are two fire trucks. One is Titan from USA installed in 1997 with the water capacity of 8,000cu.m. The other one is from Russia with the water capacity of 4,000sq.m. Available ICAO rescue and fire fighting category is Category 7.

There are 10 fire fighting personnel with two shifts.

Air Navigation and Communications System

1) Communications
   The following AMS communications are provided in Cat Bi Control Tower:
   - Cat Bi Tower: 118.5 MHz

2) Navigation
   There are one NDB and one Locator. The NDB "BK" is located in 5,600m from the runway 07 threshold and the Locator "B" is located in 1,400m from the runway 07 threshold. Because of the approach procedure with these NDB and Locator, most of the approaches are made from runway 07 side.

Airfield Lighting System

There is no airfield lighting system except Apron Flood Lights. There is a plan to install the airfield lighting system by the end of 1999.

Airport Development Plan

Airport master plan was prepared by CAAV. The master plan includes runway extension to 3,200m, expansion of apron and construction of new passenger terminal building. Target year of the master plan is 2010. The estimated project cost is USD150million including land acquisition cost. The Government did not officially approve this master plan.

The west side of the airport area is owned by military. The east side of the airport is

rice and shrimp farm. Approximately 460 houses need to be moved to implement the master plan. No new construction is allowed in this area now.

Airport Inventory

The inventory of the basic facilities in Cat Bi Airport is shown in Appendix B-4.

3.4.6 Phu Bai (Hue) Airport

General

Phu Bai Airport is located at a distance of about 15km south east from the city center of Hue. Only civil aircraft are operated. This airport was constructed in 1950s. Civil aviation was started in 1976. The airport is located in a flat area and there is no obstacle around the airport. Since there is no lighting system in this airport, operating hours are daylight only. Hue is a famous tourist destination, so that 60 to 65% of the passengers are foreign tourists from France, Japan, Taiwan, China, America, etc.

Runway

There is one runway. The designation of the runway is 09/27. The dimension of the runway is 2,700m in length and 40m in width with 5m paved shoulder on both sides of the runway. The pavement surface is asphalt and the strength is PCN 42/F/B/W/T. Pavement condition is not bad, however since this was constructed more than 15 years ago, overlay may be required. The operational category is Non Precision Approach. There are turning pads at the each end of the runway. Paved overrun is provided at the each end of the runway with the length of 100m and 30m for Runway 27 and Runway 09 respectively.

Taxiway and Apron

One partial parallel taxiway with 5 exit taxiways are provided at the south side of the runway. Parallel taxiway and No. 1,2, and 5 exit taxiways are not in use because there are many cracks on the surface and the condition is not suitable for use. CAAV plans to upgrade these taxiways. The width of the exit taxiway No.4, which is most frequently used, is 20m and that of the other operating taxiway No.3, is 18m. The pavement surface is asphalt and the strength is PCN 42 F/B/W/T. Pavement condition is not bad, but since this pavement was constructed more than 15 years ago, overlay may be required.

The apron is located at the south side of the runway. The area is 62,125sq.m. The dimension is 355m in width and 175m in depth. The pavement surface is asphalt and the strength is PCN 42 F/B/W/T. Many cracks were observed in the apron. There are six stands for ATR72 and Fokker 70. The aircraft park parallel with passenger terminal building. Parking configuration is self-maneuvering.

Photo 3.4.8
Apron Pavement (Phu Bai Airport)

Taxiway and Apron

One partial parallel taxiway with 5 exit taxiways are provided at the south side of the runway. Parallel taxiway and No. 1,2, and 5 exit taxiways are not in use because there are many cracks on the surface and the condition is not suitable for use. CAAV plans to upgrade these taxiways. The width of the exit taxiway No.4, which is most frequently used, is 20m and that of the other operating taxiway No.3, is 18m. The pavement surface is asphalt and the strength is PCN 42 F/B/W/T. Pavement condition is not bad, but since this pavement was constructed more than 15 years ago, overlay may be required.

The apron is located at the south side of the runway. The area is 62,125sq.m. The dimension is 355m in width and 175m in depth. The pavement surface is asphalt and the strength is PCN 42 F/B/W/T. Many cracks were observed in the apron. There are six stands for ATR72 and Fokker 70. The aircraft park parallel with passenger terminal building. Parking configuration is self-maneuvering.

Buildings

The passenger terminal building with control tower was constructed in 1954. The departure hall and arrival halls have been expanded since then. The total area of this building is approximately 1,800sq.m. The building structure is reinforced concrete. There is a departure hall on the first floor of this building, but after the expansion of the departure hall on the ground floor, this first floor hall has not been used. Passenger handling is one floor concept. Passengers walk from the passenger building to the aircraft. Passenger processing areas are all

air-conditioned. There are 172 chairs in the departure hall. A new arrival hall was constructed in 1999, since installation of the equipment is not complete, this area was not used at the time of this survey.

There is no cargo building. There is a warehouse with the area of 20sq.m. Cargo contents from this airport are mainly sea products and handicrafts. Sea products are exported to Taiwan and Hong Kong, while handicrafts are exported to France and Japan.

The control cabin is located at the fourth floor in this building. There is no obstruction to the view from the tower to the runway and taxiways. The control tower was also constructed in 1954.

Photo 3.4.9

Passenger Terminal Building in Phu Bai Airport

Road and Car Park

The access road is a dual lane road. The surface is asphalt pavement.

Airfield Lighting System

Airfield lighting is not available at this airport.

Meteorological System

Meteorological system available at the airport is a wind cone only. The automated weather observation system will be installed on the west side of taxiway No.5 in May 1999.

Airport Utilities

Power is supplied from the national network. The transformer capacity is 250KVA. There are five backup generator sets. One is for the passenger terminal and control tower building and the other four for the NDBs.

Water is supplied from the city network. The pipe diameter from the city is 1.3 meter.

The sewage from the building is directly discharged to an open channel.
Solid waste is buried under ground.

Rescue and Fire Fighting Facilities

There is no fire station in the airside. Fire Fighting Vehicles are parked at the east side of the apron while an aircraft is parking at the apron. There is a vehicle garage at the land side for all the vehicles in the airport. There is no water storage tank at the airside. There are eight trained persons for fire fighting. There are two fire fighting vehicles. One is made in USSR and the other one is new and made in USA. The water capacity of the old one is 5,800kl and new one is 2,800kl. Foam capacity of new one is 400l and dry chemical capacity is 200kg. The discharge rate of new one is 2,500l/min.

Aviation Fuel Supply Facilities

Aviation fuel is supplied by Vietnam Air Petrol Company (VINAPCO). There is a fuel storage area at the east side of the terminal. The storage capacity of Jet A-1 is 80kl. Fuel is supplied by re-fuelling truck.

Air Navigation and Communications System

1) Communications
   The following AMS communications are provided in Phu Bai Control Tower:
   - Phu Bai Tower: 118.5 MHz

2) Navigation
   There are one NDB, “PB” and one Locator, “P”. These equipment was installed in 1993.

On going Project

Expansion of the arrival hall is on going.

Planned Project

- An Automated Weather Observation System (AWOS) will be installed at the west side of taxiway No.5 by May 1999.

- Installation of VOR/DME at the east side of taxiway No.4 is planned by CAAV.
- Detailed design of overlay on the parallel taxiway, other connecting taxiways and apron is being carried out. The total estimated cost is VD22million.
- Installation of the lighting system and ILS is planned.
- There is a master plan made by Airport Survey and Design Company. Target year of this master plan is 2010. Details of this master plan were not available at the time of this study.

Identified Problem

The following problems were observed from the site survey:
- There is no security/boundary fence around the airport.
- Many cracks were observed in taxiways and apron.
- There is no fire station in the airside.

Airport Inventory

The inventory of the basic facilities in Phu Bai Airport is shown in Appendix B-5.

3.4.7 Nha Trang Airport

General

Nha Trang Airport is located at a distance of about 2km south from the city center of Nha Trang. This airport is military and civil joint use airport. There is a military pilot training facility at this airport. Military training usually takes place in the morning. This airport was constructed initially by the French and further developed by the American Military. Civil operation was started in 1976.

The civil aviation terminal area is located at the northeast corner of the airport. The airport is located close to the Nha Trang Sea. There are mountains at the northwest side of the airport. There is an island with the elevation of 450m 9km distance from runway threshold 30. Since there is no lighting system in this airport, operating hours are daylight only.

Nha Trang is a famous beach resort, so that average of 42.5%[3] of the passengers are foreign tourists. This airport is managed and operated by Middle Airports Authority (MAA). The basic airport data is shown in Appendix 4.1.5.

Runways

There are two runways. However, one runway 06/24 is not used. The designation of the operating runway is 12/30. The dimension of the runway is 1,800m in length

[3] *According to the airport staff*

and 44m in width without shoulder. The pavement surface is asphalt and the allowable maximum take off weight is 50t. At both ends of the runway, there are concrete pavements with 56m in length and 44m in width. The slab size of this concrete is 7.6m by 7.6m. Pavement condition of asphalt pavement is fair, however there are many cracks in the concrete pavement. The operational category is Non Precision Approach. There are paved overruns at the both sides of the runway threshold with 30m in runway 30 side and 150m in runway 30 side.

Taxiways and Apron

One complete parallel taxiway with six exit taxiways are provided at the north side of the runway. Taxiways are designated No.1 to No.6 from the west to the east. Taxiway No. 2, 3, 5 and 6 are not in use because there are many cracks on the surface and the condition is not suitable. The width of the exit taxiway No.4, which is most frequently used, is 20m and width of the other operating taxiways, No.1 and No.3, is 15m. There are chip seal shoulders with 5m width at both side of the taxiway. The pavement surface is asphalt and the strength in PCN is not available. According to the airport staff, pavement is capable of weight less than 40t for parallel taxiway and Taxiway No. 6, less than 50t for taxiway No.4. Pavement condition is fair, however since this pavement was constructed more than 15 years ago, overlay may be required.

The apron is located in the area close to the runway threshold 30. The dimension is 150m x 100m. There are four parking positions for ATR 72 or Fokker 70. The pavement was overlaid in 1997. The pavement surface is asphalt and the maximum allowable load is 50t. The pavement condition is good without major cracks.

Buildings

The passenger terminal building with control tower is located in east end of the apron. This building was an aviation club. Check in counters, baggage x-rays, security checks, and arrival hall are located on the ground floor, two departure gates, and a VIP room are located on the first floor. There are 84 chairs at Gate 1 and 80 chairs at Gate 2. Total floor area of this building is approximately 1,500sq.m.

Control cabin is located at the fourth floor in this building. There is no obstruction to the view from the tower to the runway and taxiways.
There are no fire station and no cargo facilities.

Photo 3.4.10

Passenger Terminal Building in Nha Trang Airport

Road and Car Park

The access road is a dual lane road. The surface is asphalt pavement.

Meteorological System

The meteorological system available at the airport is a wind cone, wind direction and wind speed measurement equipment only. This equipment is located in between the terminal building and the administration building. An Automated Weather Observation System (AWOS) will be installed in May 1999.

Airport Utilities

Power supply is from the national network. The transformer capacity is 125KVA. There are three backup generator sets. One is for the passenger terminal and control tower building with the capacity of 150KVA and other two are for the NDB with the capacity of 5KVA.

Water is supplied by deep well. There is a septic tank under the passenger and control tower building. Solid waste is collected by the city service.

Rescue and Fire Fighting Facilities

There is no fire fighting vehicle in the airport, however there is an agreement

between military and airport to cooperate in fire fighting services and the city fire service has also agreed to assist. A new fire fighting vehicle will be installed in October 1999. A fire station is under construction.

Aviation Fuel Supply Facilities

Aviation fuel is supplied by Vietnam Air Petrol Company (VINAPCO).

Air Navigation and Communications System

1) Communications
   The following AMS communications are provided in Nha Trang Control Tower:
   - Nha Trang Tower: 125.0 MHz

2) Navigation
   There are one NDB, "NG". It was installed in 1995.

On going Project

A new fire station is under construction.

Planned Project

An Automated Weather Observation System (AWOS) will be installed in May 1999.

Airport Inventory

The inventory of the basic facilities in Nha Trang Airport is shown in Appendix B-6.

3.5 Air Navigation Systems

1) Air Navigation Systems

   In 1991, the ICAO prepared the Civil Aviation Master Plan (CAMP) for the period up to the year 2000 for Vietnam. The UNDP-funded master plan was issued in March 1992 and covered the major fields and specializations of civil aviation including the following:

   (1) Strategic development of the civil aviation infrastructure
   (2) Air transport forecasts
   (3) Economic aspects of civil aviation in Vietnam
   (4) Airports
      a) Engineering and architecture
      b) Emergency services
      c) Aviation security

(5) Air navigation services
   a) Air traffic services
   b) Communications and navigation aids
   c) Aeronautical meteorology
(6) Air carrier
   a) Sales and marketing
   b) Fleet development
(7) Regulatory
   a) Flight safety
   b) Air transport
(8) Organization and management

The master plan contained many recommendations in each of the above areas. Of relevance to the VITRANNS are over 150 recommendations for air navigation services. These may be summarized as follows:

(1) Collect movement statistics.
(2) Reorganize the Aeronautical Information Services Department, properly supplying it with printing equipment and developing documentation and manuals.
(3) Establish a search and rescue (SAR) organization, with a staff properly trained in SAR techniques and a SAR Plan.
(4) Equip aircraft registered in Vietnam with emergency locator transmitters.
(5) Develop an aviation law.
(6) Reorganize the air traffic services (ATS) department as indicated in the Master Plan, undertaking intensive training and introducing an ATS Evaluation and Standards Group, a proficiency development program and an air traffic control (ATC) licensing/rating system.
(7) Renovate buildings and fences of communications stations and navigation aid facilities.
(8) Equip rescue/fire-fighting vehicles with VHF transmitter/receivers capable of operating on the emergency channel (121.5MHz) and the airport surface movement control channel.
(9) Provide each major airport with adequate VHF-FM transmitter/receivers to control vehicles and other parties operating airside.
(10) Remove all old and redundant equipment.
(11) Equip Danang airport with the necessary ATC consoles, communications systems and navigation aids if it will continue as an alternate airport or be developed.
(12) Review the extended range VHF communications coverage.
(13) Replace obsolete VHF equipment at domestic airports.
(14) Improve the communications systems between air control centers (ACCs) and domestic airports through the introduction of satellite systems, improved HF or use of Post, Telephones and Telecommunications (PTT) facilities.

(15) Establish effective communications between Hanoi and corresponding ACCs in accordance with the ICAO Rationalized Plan.
(16) Ensure all navigation aids are equipped with remote control and status indication.
(17) Promulgate critical areas for navigation aids to exclude vehicles, clear brush and cut grass in critical areas around stations.
(18) Replace the very high frequency omni range/distance measuring equipment (VOR/DME) at Noi Bai and Danang, install another at Ninh Binh and possibly Moc Chau, and a new DME at Phan Thiet.
(19) Replace obsolete nondirectional beacons (NDBs) (26) nationwide.
(20) Reorganize the Technical Department to improve functional authority, develop maintenance and inspection programs, conduct ground and flight tests of navigation aids, introduce maintenance log books, and maintain closer supervision.
(21) Improve standards of cleanliness and air-conditioning at all electronic workshops and facilities.
(22) Develop and equip the measurement laboratory at HCMC to provide an in-house calibration facility.
(23) Establish a technical library for all publications and technical manuals.
(24) Obtain six 4-wheel drive vehicles for use by each Maintenance Section at international airports and Headquarters
(25) Introduce the proposed manpower and training plans.

2) CAAV's Response to the UNDP/ICAO CAMP Recommendations

CAAV has made a considerable investment in equipment to rectify many of the deficiencies highlighted in the ICAO Master Plan. In particular, the air navigation services facilities in area control centers (ACCs) serving the Hanoi and Ho Chi Minh City flight information regions (FIRs) have been upgraded and new communications and navigation equipment provided for Danang International Airport.

There are, however, several of the CAMP recommendations outstanding or which have only been partly rectified. Those relevant to air navigation services are mentioned in the preceding and subsequent paragraphs of this report.

3) Future Developments - CNS/ATM

Conventional aeronautical navigation and air traffic control has developed around an extensive network of communications systems and ground-based navigation aids but for many reasons the equipment and procedures are due to be replaced globally over the next few years.

The new procedures and systems, which have been approved by the Member States of ICAO, will primarily rely on equipment on board the aircraft and use

information obtained from satellite transmissions supplemented, where necessary, by a minimal ground infrastructure. This concept for the future management of air traffic and its new communications and navigation infrastructure is referred to as CNS/ATM. The system and procedures will be gradually introduced on a regional basis with the intention of completing the change-over from ground-based navigation aids by about the year 2010. The first region to be affected will be the ICAO Asia-Pacific region, and some trans-Pacific operations are already being conducted with those airlines whose aircraft have the appropriate on-board equipment.

As Vietnam is in the region to be first affected, it is essential that planning for CNS/ATM is undertaken as soon as possible and, to this end, VATM has submitted a draft plan (see Appendix C) to ICAO. Before national plans can be finalized, however, it is necessary to initiate coordination with adjacent countries, so that national plans do not proceed in isolation. The need for close cooperation between neighboring countries in the region is imperative for a successful implementation of the CNS/ATM program.

Several assessments must be undertaken before the national CNS/ATM program can be successfully implemented. The team was unable to determine whether all the appropriate steps have been considered by VATM in its planning process. In any event, it will only be when the plans of surrounding countries in the region are crystallized that definitive action regarding new equipment can commence.

While some existing ground-based systems will be incorporated or adapted for the CNS/ATM era, others will become redundant. In addition, some new ground equipment will be required to supplement the navigation information provided by satellite, in particular for the landing phase of flight. Thus, in planning the expansion of existing navigation services, due account must be given to the cost effectiveness of continuing to install conventional systems with the advent of CNS/ATM.

4) Communications

(1) General

Annexes 10 and 11 respectively to the Convention on International Civil Aviation set out the internationally accepted requirements for aeronautical telecommunications and air traffic services in the form of Standards and Recommended Practices (SARPs). Vietnam, as a contracting state to ICAO, has agreed to accept these SARPs. In addition to the Annexes, ICAO publishes Regional Air Navigation Plans (ANPs), agreed and established through dialogue between states in a region, which assign various responsibilities to states for the provision of aeronautical facilities.

The responsibilities of Vietnam are assigned in the Air Navigation Plan for the Asia and Pacific Regions, ICAO Document 9673. This part of the report therefore compares the facilities available in Vietnam with those required of the State according to that document.

The information presented in this part of the report is based on analysis of the information in the Aeronautical Information Publication (AIP) of Vietnam and the data provided by VATM.

(2) Aeronautical Mobile Services (AMS)

a) Introduction

The purpose of the AMS is to provide radio communications between aircraft and air traffic service units, that is, communications between pilot and controller.

As far as could be ascertained, adequate VHF channels are in operation at each of the international airports to provide air-ground communications in the Aeronautical Mobile Services, except that Danang has no emergency channel. Sufficient channels are allocated to each of the domestic airports for the present traffic. Most of the equipment for these services, however, is at least 10 years old and its availability into the CNS/ATM era will be limited.

b) Hanoi ACC and Noi Bai Control Tower

The following frequencies are available for AMS from the Hanoi ACC and Noi Bai Control Tower:

- ACC VHF Channels: 125.9 MHz and 132.3 MHz
- Emergency VHF Channel: 121.5 MHz
- Noi Bai Approach (APP): 121.0 MHz
- Noi Bai Tower (TWR): 118.1 MHz.

There is no indication in the AIP of a VHF channel allocated for surface movement control (SMC). However, equipment was reported as available for SMC on channels 121.9 MHz and 121.6 MHz.

Similarly, the AIP does not show any HF services on the HF SEA-2 family of frequencies from Noi Bai but equipment for these frequencies was reported as available, although its serviceability was not indicated. The AIP should be revised to show the availability of these facilities at Hanoi/Noi Bai.

The equipment for the above services is listed in Table 3.5.1.

The AMS communications are recorded on a voice logging system and records kept for a minimum of 30 days.

The VHF ACC channels are remoted to a station on Tam Dao Mountain, about 35 km northwest of Noi Bai. Another remote VHF station serving the Hanoi ACC is also planned for installation at Vinh, south-southwest of Hanoi.

The VHF transceivers in the rescue and fire-fighting (RFF) vehicles at Noi Bai International Airport should be capable of operating on the emergency channel of 121.5 MHz, the SMC and other VHF channels in use at the airport.

c) Ho Chi Minh City ACC and Tan Son Nhat Control Tower

The following AMS communications are provided from the Ho Chi Minh ACC and Tan Son Nhat control tower:

- HF SEA-2: 5655 kHz, 8942 kHz, 13,309 kHz
- ACC VHF Channels: 120.1 MHz, 124.5 MHz, 123.3 MHz, 120.7 MHz
- Emergency VHF Channel: 121.5 MHz
- Tan Son Nhat Approach: 125.5 MHz and 134.1 MHz
- Tan Son Nhat Tower: 118.7 MHz and 130.0 MHz
- Surface Movement Control: 121.9 MHz and 121.6 MHz.

Table 3.5.1
Aeronautical Mobile Services

March, 1999

Station	Services	Channel	TX MFR Model year	RX MFR Model year	Status
Buon Ma Thuot	TWR	118.3 MhZ	TA – 5103	RA – 502	S
Ca Mau	TWR	118.1 MhZ	TR – 6101	TR – 6101	
Camly	TWR	118.5 MhZ	TR – 6101	TR – 6101	S
Cat Bi	TWR	118.5 MhZ	Icom – A200	Icom – A200	S
Da Lat	TWR	118.4 MhZ	TA – 5103	RA – 502	S
Danang	APP	125.3 MhZ 119.5 MhZ	TA – 5103 TA – 5103	RA – 502 RA – 502	S Stand by
	TWR	125.0 MhZ	Icom – A200	Icom – A200	S
	Ground	121.1 MhZ 121.9 MhZ			S
Dien Bien	TWR	118.7 MhZ	Icom – A200	Icom – A200	S
Hanoi	ACC	125.9 MhZ 132.3 MhZ 121.5 MhZ	Exicom – 9100	Exicom – 9150	S US S
	A/G	5655 kHz 8942 kHz 11396 kHz 13309 kHz	Ambassador	Eddystone	
Noi Bai	APP	121.0 MhZ	Exicom – 9100	Exicom – 9150	S
	TWR	118.1 MhZ	Icom – A200	Icom – A200	S
	Ground	121.9 MhZ 121.6 MhZ			S S
Ho Chi Minh	ACC	120.1 MhZ 124.5 MhZ 123.3 MhZ 120.7 MhZ 121.5 MhZ	VU – 490 VU – 490 VU – 490 VU – 490 VU – 490	RA – 502 RA – 502 RA – 502 RA – 502 RA – 502	S S S S S
	APP	125.5 MhZ 134.1 MhZ	TA – 5103 TA – 5103	RA – 502 RA – 502	S S
	TWR	118.7 MhZ 130.0 MhZ	TA – 5103 TA – 5103	RA – 502 RA – 502	S S
	Ground	121.9 MhZ 121.6 MhZ			S S
	A/G	5655 kHz 8942 kHz 11396 kHz 13309 kHz	Ambassador	Eddystone	S S S S
Na San	TWR	118.4 MhZ	Icom – A200		S
Nha Trang	TWR	125.0 MhZ	Technisonic - TPS - 250	Technisonic - TPS - 250	S
Phu Bai	TWR	118.8 MhZ	Technisonic - TPS – 250 Icom – A200	Technisonic - TPS – 250 Icom – A200	S S
Phu Cat	TWR	118.6 MhZ	Technisonic - TPS – 250	Technisonic - TPS – 250	S
Phu Quoc	TWR	118.6 MhZ	TR – 6101	TR – 6101	S
Pleiku	TWR	118.1 MhZ	Technisonic - TPS – 250 Icom – A200	Technisonic - TPS – 250 Icom – A200	S S
Rach Gia	TWR	118.3 MhZ	TR – 6101 Motorola	TR – 6101 Motorola	S S
Tuy Hoa	TWR	118.9 MhZ	Icom – A22	Icom – A22	S
Vinh	TWR	118.3 MhZ	Icom – A200	Icom – A200	S

In addition, Tan Son Nhat has an automatic terminal information service (ATIS) channel broadcasting meteorological (MET) information on 128.0 MHz.

The equipment providing the above services are listed in Appendix E.

The AMS communications are recorded on a voice logging system and records kept for a minimum of 30 days.

The Team was informed that the VHF ACC channels and the emergency channel are remoted via satellite to extended range VHF stations at Phu Cat (near Qui Nhon) and Son Tra (near Danang). The Team was also informed that another extended range VHF station was planned for Ca Mau by end of 1999 (together with a new radar) but confirmation of completion was not available to the JICA Team.

The VHF transceivers in the RFF vehicles at Tan Son Nhat International Airport should be capable of operating on the emergency channel of 121.5 MHz, the SMC and other VHF channels in use at the airport.

d) Danang Approach Control and Control Tower

The following channels are in use for the AMS at Danang:

- Danang Approach Control: 125.3 MHz and 119.5 MHz
- Danang Tower: 125.0 MHz
- Surface Movement Control: 121.6 MHz (main) and 121.9 MHz (standby)

The equipment providing the AMS communications is listed in Table 3.5.1.

Voice logging of the communications is provided and recordings are retained for 30 days.

Although Danang is designated in the ICAO Air Navigation Plan as an alternate airport (that is, available for use not only by aircraft diverting from Ho Chi Minh City/Tan Son Nhat or Hanoi/Noi Bai because of weather but also by aircraft experiencing an emergency), it was noted that the emergency channel, 121.5 MHz, is not available. This service should be provided urgently, possibly by reallocating one of the SMC systems and retuning it to 121.5 MHz.

The RFF vehicles examined at Danang International Airport did not appear to carry VHF transceivers. If this is the case, the vehicles should

be equipped with transceivers capable of operating on the channels used at the airport, including 121.5 MHz (when available).

It was noted that the old steel lattice control tower has been demolished and replaced by a modern control tower which now provides a more suitable environment for controllers and the equipment.

e) Domestic airports

Each of the domestic airports has one VHF AMS channel, with the exception of Buon Ma Thuot, Gia Lam, Phu Quoc, and Vung Tau which have two each. Because of the comparatively low traffic levels at each of the domestic airports, the AMS channels allocated are sufficient for present purposes.

The equipment used at each of the domestic airports is listed in Table 3.5.1.

(3) Aeronautical Fixed Services (AFS)

a) Introduction

The AFS comprise two systems, namely:

- the Aeronautical Fixed Telecommunications Network (AFTN), providing facilities for the transmission of MET data, aircraft flight plans, etc. The accepted delivery time for messages on this network is five minutes.

- the Air Traffic Services Direct Speech (ATS-DS) circuits, providing direct controller-controller communications between air traffic service units. Communications between stations must be established within 15 seconds on these circuits.

b) AFTN

In an attempt to simplify the international AFTN, ICAO has adopted the Rationalized AFTN Plan for the Asian Region. Under this plan, Vietnam will be required to provide international connections in Ho Chi Minh City to Bangkok, Hong Kong, Singapore and Vientiane. Thus, AFTN messages originating in Vietnam for delivery internationally will then be routed through the AFTN Center in Ho Chi Minh City. However, pending the full implementation of the Rationalized AFTN Plan, any existing circuits should be retained.

Similarly, when the Rationalized Plan is fully implemented, all international AFTN messages destined for an ACC, airport or other addressee in Vietnam should be received through the Ho Chi Minh City AFTN Center. Vietnam is required to provide AFTN switches or terminals at each of its own air traffic services units, offices, etc, so that messages received over the systems are properly distributed to the addressee(s) within the acceptable transit time of five minutes.

Table 3.5.2 shows the international connections required for AFTN communications under the ICAO Regionalized AFTN Plan compared with those shown in the AIP for Vietnam.

Table 3.5.2
AFTN Circuits

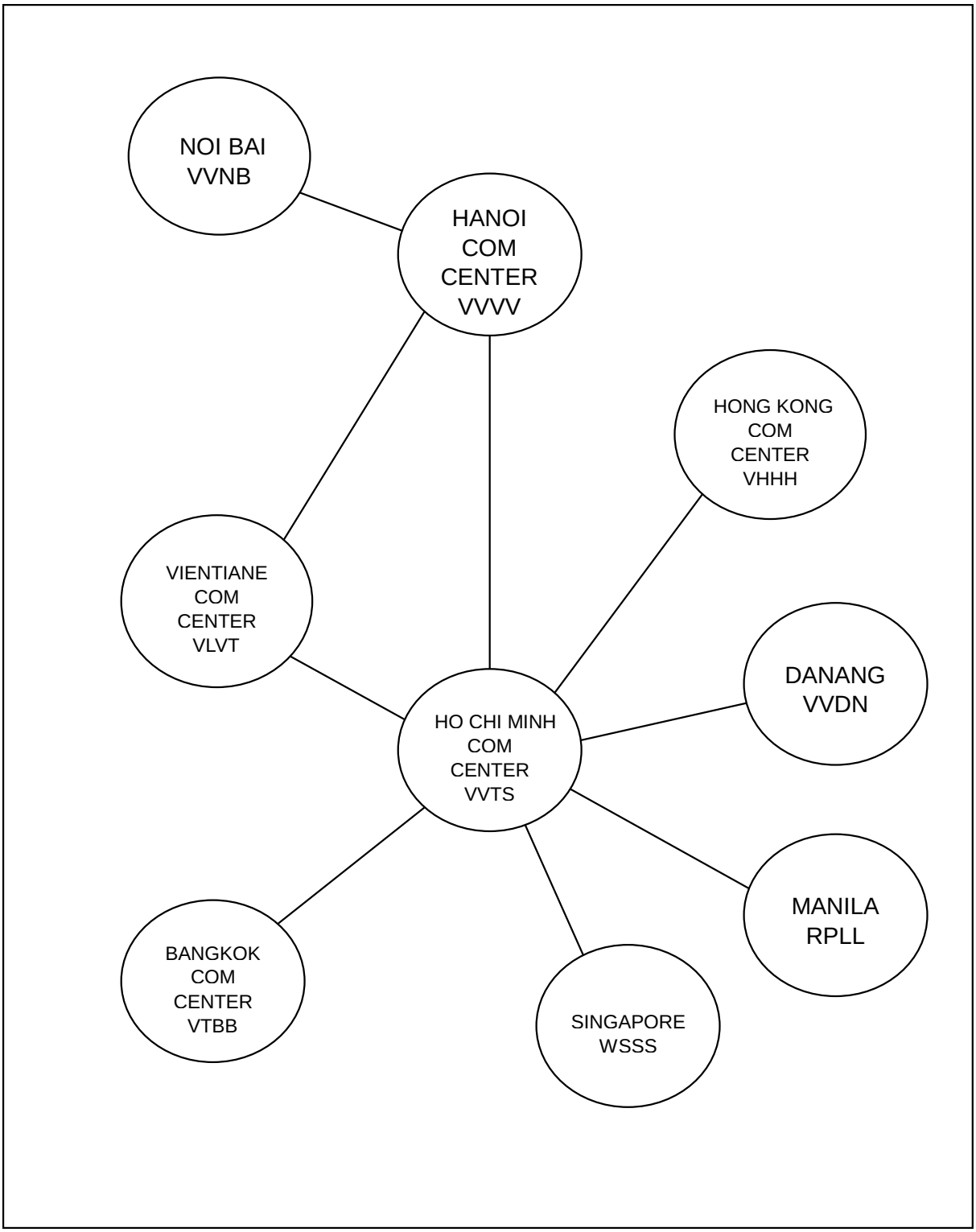
ANP Requirement	AIP Data
Hanoi : None	Hanoi – Vientiane *1
HCM – Bangkok	HCM – Bangkok
HCM – Hong Kong	HCM – Hong Kong
	HCM – Manuka
	HCM – Phnom Penh
HCM – Singapore	HCM – Singapore
HCM – Vientiane	HCM - Vientiane

**1: Reported as presently unserviceable*

It was reported that communications on the circuits available is good as satellite circuits are used except to Vientiane and Phnom Penh. The national circuits between international airports also operate through satellites, duplicated by HF radio, whereas those to domestic airports use either HF radio or telephone lines.

The diagram in Figure 3.5.1 shows the existing connections for the international and domestic AFTN circuits.

Figure 3.5.1
Aeronautical Fixed Telecommunications Network



Source: AIP Vietnam (ATS-AIS, 18 July 1996)

c) ATS-DS

Vietnam is required to provide international ATS-DS circuits from both Hanoi and Ho Chi Minh City. The implementation of the ICAO plan for the switching of ATS-DS circuits is dependent on the introduction of a voice switching system in Bangkok. The Team is not aware of the present status of the Bangkok switch but, subject to its availability, Hanoi ACC will then be required to be connected to the ACCs at Bangkok, Guangzhou, Ho Chi Minh City, Kunming and Vientiane. Also, Ho Chi Minh City ACC will be connected to the ACCs at Bangkok, Hanoi, Hong Kong, Kuala Lumpur, Manila, Phnom Penh, Singapore and Vientiane. Pending full implementation of the plan, present links should be retained. Communications should be established within 15 seconds on all these circuits.

Table 3.5.3 below shows the international connections that will be required for ATS-DS communications under the ICAO Rationalized Plan compared with those shown in the AIP for Vietnam.

Table 3.5.3
ATS-DS Circuits

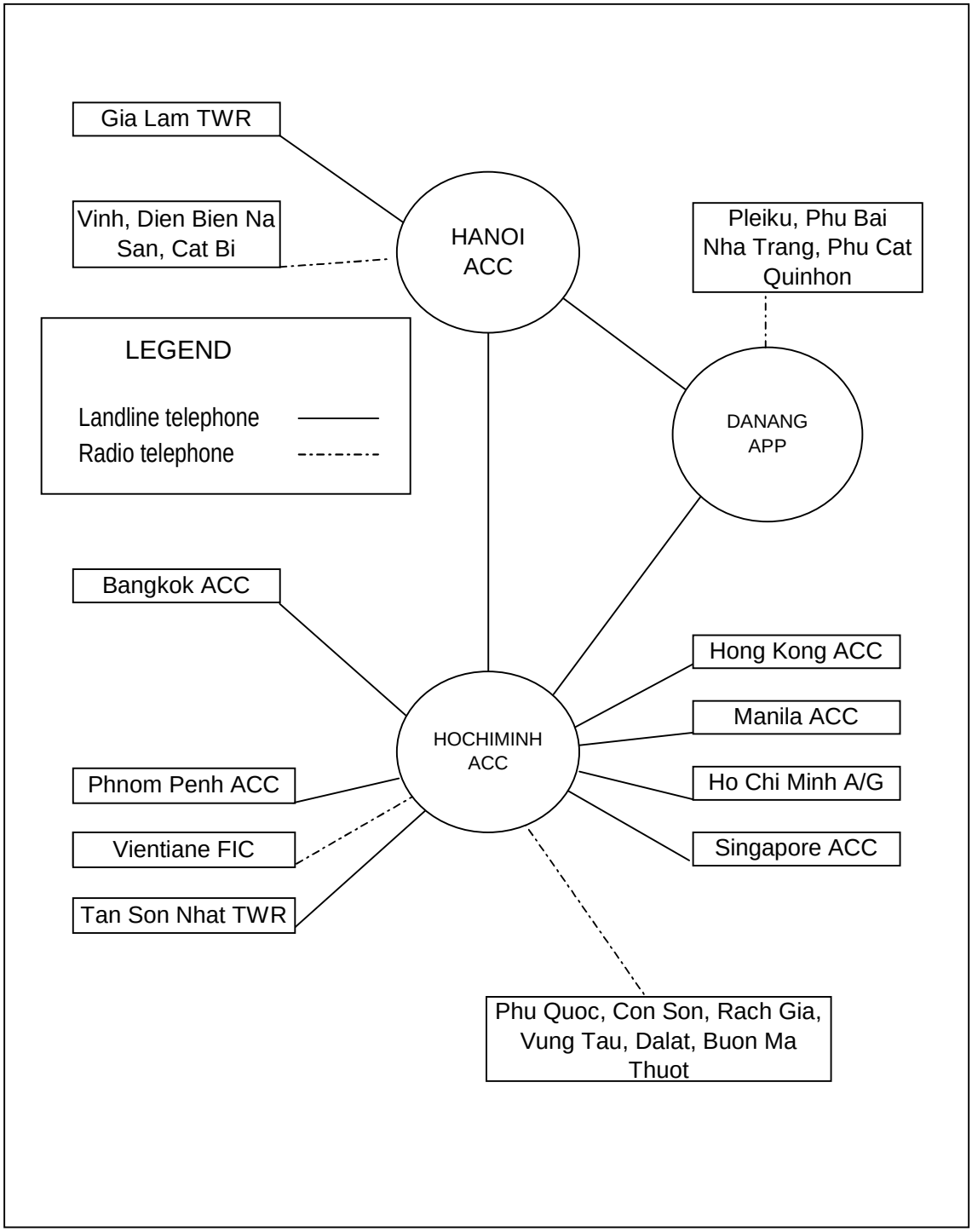
ANP Requirement	AIP Data
Hanoi – Bangkok *1	
Hanoi – Guangzhou	
Hanoi – Kunming	
Hanoi – Vientiane	Hanoi – Vientiane *2
HCM – Bangkok	HCM – Bangkok
HCM – Hong Kong	HCM – Hong Kong
HCM – Kuala Lumpur	
HCM – Manila	JCM – Manila
HCM – Phnom Penh	HCM – Phnom Penh
HCM – Singapore	HCM – Singapore
HCM – Vientiane *3	HCM – Vientiane

**1: When operationally required*
**2: Reported in AIP as unserviceable*
**3: Switched via Bangkok under Rationalized Plan*

Satellite circuits are used except to Vientiane and Phnom Penh. The domestic circuits between international airports also operate through satellites, whereas those to domestic airports use either HF radio or telephone lines.

The diagram in Figure 3.5.2 shows the existing connections for the international and domestic ATS-DS circuits.

Figure 3.5.2
Air Traffic Services – Direct Speech Circuits



Source: AIP Vietnam (ATS-AIS, 18 July 1996)

5) Navigation

(1) Background

a) Current Systems

Current aeronautical navigation practices for civil air transport employ a system of ground navigation aids installed along the air routes for en route navigation and at, or in the vicinity of, airports to provide guidance for approach and landing.

For en route navigation, the main systems in use are:

- NDBs
- VOR stations, usually combined with DME

The NDBs indicate only geographic locations on the ground and, apart from an identification in Morse code, the signal is not encoded with any navigational information. They may be divided into two broad types, high power and low power. The former is usually used for delineating the airways, whereas the low power beacons, known as locators (Loc) are often used to identify the initial approach point for an instrument landing system (ILS, see below). At airports with low traffic, NDBs are often used as a basis for nonprecision approach procedures. NDBs transmit in the low or medium frequency radio bands and the transmissions are affected by atmospheric conditions, particularly electrical storms. Because of the resulting propagation problems and the increasing use of VOR, the importance of NDBs has decreased.

VOR stations operate in the VHF band and the DMEs at UHF and these signals are not distorted by atmospheric conditions. The VOR/DME is the primary ground radio navigation aid used in the en route phase of flight.

The VOR signal is encoded with azimuth information which can be decoded by the aircraft receiver and displayed as a course to fly to the station. This information is supplemented by distance information provided by the collocated DME station. A variation of the VOR is the Doppler VOR (DVOR) which provides identical navigation information to that from a conventional VOR except that the equipment is less affected by siting problems.

The primary aid to approach and landing is the ILS, often supplemented by NDBs or lower power locator beacons, or by a VOR/DME located near the airport. The ILS comprises three elements:

- the Localizer (LLZ) which provides azimuth guidance to the runway,
- the Glide Path (GP) to provide guidance in the vertical plane to the runway surface, and
- Marker (MKR) beacons [usually 2, the Outer (OM) and the Middle (MM)] which radiate vertically and provide the aircraft with an indication of the approximate distance to go to the threshold of the runway.

The elements of the system operate in the VHF band and consequently are not affected by atmospheric conditions.

To avoid the need to acquire land outside the airport boundary for the installation of MKRs, a DME may be collocated with the GP which has an additional benefit of providing more accurate distance to the touch-down point than the MKRs.

b) Future Navigation Systems

Between now and the year 2010, a major change is developing in the way in which air traffic control and aeronautical navigation is conducted. This new methodology is the ICAO CNS/ATM concept. This is based upon the global navigation satellite system (GNSS) for navigation. The proof-of-concept tests and initial operations have been conducted using signals from the Russian GLONASS and the American NAVSTAR GPS constellations, but other satellite operators, such as INMARSAT and MTSAT, are introducing compatible systems. To use the system, receivers capable of receiving and decoding the satellite signals must be installed in the aircraft. The GNSS incorporates integrity monitoring to ensure validation of the navigation data. As the system evolves it will become the primary means of navigation and eventually replace the current long-range navigation systems. Also, depending on the level of augmentation in the future, GNSS will provide for different approach and landing capabilities.

By international agreement between ICAO and the International Telecommunications Union (ITU), ILS is only protected for use until 1 January 2010, after which it will be removed from service. Before GNSS can be used instead of ILS for precision approaches and the landing phases of flight, the navigation information from the satellite will require augmentation to enhance its accuracy. It is anticipated that this augmentation will be provided through some form of ground station installed at the airport which is expected to be cheaper, use less land and be less site-susceptible than the ILS equipment. Another advantage is that only one GNSS augmentation installation will be

required at an airport, instead of one system for each precision approach. Augmentation systems currently under study or test are:

- Differential GNSS (DGNS)
- Wide Area Differential GPS (WADGP)
- Local Area Differential GPS (LADGPS)

Commercial systems are still under development to provide navigation information of sufficient accuracy for the precision approach and landing phases of flight but they are expected to be introduced well within the next decade. It is thus necessary to proceed with caution in planning new installations to avoid unnecessary expenditure on systems which may have only a short lifespan.

As mentioned earlier in this report, to ensure ordination on a global basis, ICAO proposed that each state should draft a CNS/ATM Plan for review and discussion between the state, its neighbors and the area ICAO Regional Planning and Implementation Group. The draft plan submitted by VATM for the introduction of the concept is in Appendix C.

(2) Present Status of the Navigation Facilities in Vietnam

The existing system of en route navigation facilities in Vietnam comprises six VOR/DMEs supplemented by about 30 NDBs. Three of the VORs are the conventional type and the other three are DVORs. The three international airports, Noi Bai, Tan Son Nhat and Danang, are each equipped with an ILS which employs DME in lieu of markers for distance to touch down information. The chart in Figure 3.5.3 shows the location of the existing navigation aids in Vietnam.

It was noted that several of the installations did not provide alarm signals to indicate and equipment failure of the ILS or VOR/DME to the appropriate ATS unit (Airport Tower Control or ACC), as required by ICAO SARPs.

Details of the installations are in the following paragraphs and particulars regarding manufacturer, date of installation and service status (in April 1999) of the equipment are provided in Table 3.5.4 (NDBs and Locators) and Table 3.5.5 (ILS and VOR/DME).

Figure 3.5.3
Radio Facility Index Chart

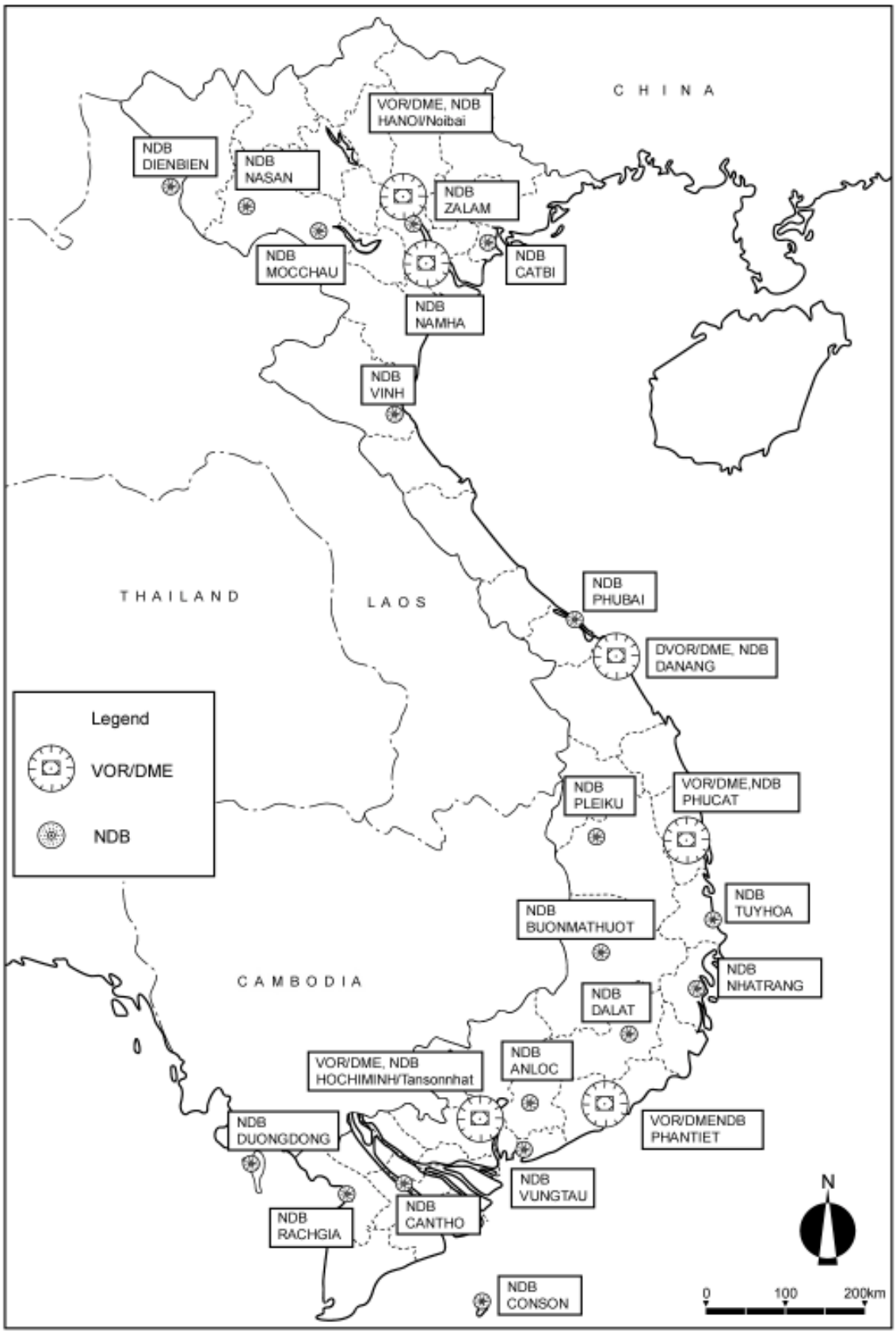


Table 3.5.4
Radio Facility Index Chart

March, 1999

ID	Station	Facility	Manufacturer	Model	YR	Status
MC	Moc Chau	NDB	SOUTHERNAVIONICS. CO/ USA	SA 500	'98	S
NB	Ninh Binh	NDB	USSR	PAR- 8	'83	S
NG	Nha Trang	NDB	NAUTEL/CANADA	NAUTEL	'95	S
P	Phu Bai	L	NAUTEL/CANADA	NAUTEL	'93	S
PB	Phu Bai	NDB	NAUTEL/CANADA	NAUTEL	'93	S
PC	Phu Cat	NDB	NAUTEL/CANADA	NAUTEL	'96	S
PK	Pleiku	NDB	NAUTEL/CANADA	NAUTEL	'95	S
PQ	Phu Quoc	NDB	NAUTEL/CANADA	NAUTEL	'96	S
QL	Ca Mau	NDB	-	-	-	S
RG	Rach Gia	NDB	NAUTEL/CANADA	NAUTEL	'96	S
SG	Tan Son Nhat	NDB	NAUTEL/CANADA	NAUTEL	'96	S
TD	Tan Son Nhat	NDB	NAUTEL/CANADA	NAUTEL	'96	S
TH	Tuy Hoa	NDB	NAUTEL/CANADA	NAUTEL	'80	S
VT	Vung Tau	L	-	-	-	S
XVL	Vung Tau	NDB	-	-	-	S
X	Vinh	L	SOUTHERNAVIONICS. CO/ USA	SA50	'97	S
XW	Vinh	NDB	SOUTHERNAVIONICS. CO/ USA	SA1000	'97	S
AC	An Loc	NDB	SOUTHERNAVIONICS. CO/ USA	SA1000	'97	S
B	Cat Bi	L	SOUTHERNAVIONICS. CO/ USA	SA50	'99	S
BK	Cat Bi	BK	SOUTHERNAVIONICS. CO/ USA	SA500	'99	S
BQ	Na San	NDB	USSR	PAR – 8	'83	S
BU	Buon Ma Thuot	NDB	NAUTEL/CANADA	NAUTEL	'96	S
C	Phu Cat	L	NAUTEL/CANADA	NAUTEL	'96	S
CL	Cam Ly	NDB	MT – 6/USA	TM – 6	'7...	S
CS	Con Son	NDB	-	-	-	S
CT	Can Tho	NDB	-	-	-	S
D	Danang	L	NAUTEL/CANADA	NAUTEL	'91	S
DG	Danang	NDB	NAUTEL/CANADA	NAUTEL	'91	S
D	Gia Lam	L	-	-	-	S
DB	Dien Bien	NDB	USSR	PAR – 8	'83	S
DC	Gia Lam	NDB	-	-	-	S
GL	Gia Lam	NDB	USSR	PAR – 10	'86	S
GN	Tan Son Nhat	L/25LRWY	NAUTEL/CANADA	NAUTEL	'96	S
GV	Tan Son Nhat	L/25LRWY	NAUTEL/CANADA	NAUTEL	'96	S
HT	Buon Ma Thuot	L	NAUTEL/CANADA	NAUTEL	'96	S
HVD	Da Lat	L	NAUTEL/CANADA	NAUTEL	'96	S
K	Noi Bai	L	SOUTHERNAVIONICS. CO/ USA	SA 50	'97	S
KW	Noi Bai	NDB	SOUTHERNAVIONICS. CO/ USA	SA 500	'97	S
NAD	Nam Dinh	NDB	SOUTHERNAVIONICS. CO/ USA	SA 500	'99	S

(-) Military Equipment

Table 3.5.5
Navigation Aids (ILS and VOR/DME)

March, 1999

ID	Station	Facility	Manufacturer	Model	Yr	Status
NHA	Nam Ha	DVOR/DME	ASII/USA	1150 DVOR 1119 DME	'96	S
NOB	Noi Bai	DVOR/DME	ASII/USA	1150 DVOR 1119 DME	'98	S
DAN	Danang	DVOR/DME	ASII/USA	1150 DVOR 1119 DME	'97	S
PCA	Phu Cat	VOR/DME *	ASII/USA	1150 DVOR 1119 DME	'90	S
PTH	Phan Thiet	VOR/DME **	ASII/USA THOMSON-CSF/FRANCE	1150 VOR DME 721	'90 '80	S
TSN	Tan Son Nhat	VOR/DME *	ASII/USA	1150 VOR 1119 DME	'90	S
NB	Noi Bai	ILS/DME	NM/NORWAY/CADION/USA	NM 7013 2020 DME	'96 '96	S US
HCM	Tan Son Nhat	ILS/DME	THOMSON-CSF/FRANCE THOMSON-CSF/FRANCE	ILS- 381 DME 721	'94	S
DAD	Danang	ILS/DME	THOMSON-CSF/FRANCE THOMSON-CSF/FRANCE	ILS – 381 DME 721	'94	S

Note:
* To be replaced by new auto ground check for 1150 VOR(ASII/USA) in 1999
** To be replaced by 1119 DMEs and new auto ground check 1150 VOR (ASII/USA) in 1999
as of 9 April 1999

a) International Airports

Hanoi/Noi Bai

This airport is equipped with one NDB, one Locator, a DVOR/DME and an ILS supported by Markers as well as a DME at the GP site. The ILS is used for approaches to Runway (RWY) 11. The Team was unable to obtain access to any of the stations but it is understood that the NDB and the Locator were new in 1997, the DVOR/DME in 1998 and the ILS/DME in 1996. At the time of the Team's visit to the airport in April 1999, the DME associated with the ILS was reported unserviceable. When this is repaired, in the view of the Team, no new navigation systems will be needed at Hanoi/Noi Bai until CNS/ATM procedures are introduced.

Ho Chi Minh City/Tan Son Nhat

Four NDBs are installed at this airport, one pair is for approaches to RWY 25L and the other pair for approaches to RWY 25R. The airport also has a VOR/DME and an ILS supported by DME at the GP site. The

ILS is used for approaches to RWY 25R. The Team was unable to gain access to any of the sites but it is understood that the NDBs were new in 1996, the VOR/DME in 1990 and the ILS/DME in 1994. In the view of the Team, no new navigation systems will be needed at Ho Chi Minh City/Tan Son Nhat until CNS/ATM procedures are introduced.

Danang

This airport is equipped with an NDB, a Locator, a DVOR/DME and an ILS with a DME at the GP site. The ILS is used for approaches to RWY 35R. Only the Localizer element of the ILS was accessible to the Team but it is understood that the Locator and NDB were new in 1991, the DVOR/DME in 1997 and the ILS/DME in 1994. In the view of the Team, no new navigation systems will be needed at Danang until CNS/ATM procedures are introduced.

b) Domestic Airports

Currently, no domestic airport is equipped with ILS but during the Team's visit to Hue/Phu Bai it was mentioned that an ILS and a VOR/DME are planned for that airport. It would be difficult to justify the cost of such an installation at the present time due to the low air traffic density (approximately 13 flights a week with the largest aircraft, a Fokker F70). The requirement should be reviewed in the light of any plans to increase the number of flights or substitute Airbus A320s on the route and the forthcoming introduction of CNS/ATM.

There is a plan to install an ILS and VOR/DME at Hai Phong/ Cat Bi Airport in the near future but, again, such installations there are difficult to justify on economic grounds with the current movement levels (five Airbus A-320 flights a week).

Eighteen (18) NDBs and 6 Locators are located to serve the domestic airports. In addition, there is a VOR/DME located at Phu Cat. This was installed in 1990. A very old VOR at Vung Tau has been unserviceable for some years. Table 3.5.6 lists the navigation aids at the domestic airports and shows the date of installation or renewal, except for the military equipment as these data are not available.

(c) En Route

According to the AIP, there are six NDBs located to serve the airway system, together with a VOR/DME at Phan Thiet and a DVOR/DME at Nam Ha, as shown in Table 3.5.7. The DME at Phan Thiet is now nearly 20 years old and its replacement was recommended in the UNDP/ICAO Civil Aviation Master Plan in 1992.

Table 3.5.6
List of Navigation Aids at Domestic Airports

Location	Equipment Type	Ident.	Date Installed or Renewed
Ban Me Thuot	NDB	BU	1996
	Locator	HT	1996
Cat Bi	NDB	BK	1999
	Locator	B	1999
Con Son	NDB	CS	Military
Da Lat	NDB	DL	No data
	Locator	HYD	1996
Dien Bien	NDB	DB	1983
Gia Lam	NDB	GL	1986
	NDB	DC	Military
	Locator	D	Military
Na San	NDB	BQ	1983
Nha Trang	NDB	NG	1995
Phu Bai	NDB	PB	1993
	Locator	P	1993
Phu Cat	NDB	PC	1996
	Locator	C	1996
	VOR/DME	PCA	1990
Phu Quoc	NDB	PQ	1996
Plei Ku	NDB	PK	1995
Rach Gia	NDB	RC	1996
Vinh	NDB	XW	1997
	Locator	X	1997
Vung Tau	NDB	XVL	Military
	Locator	VT	Military
	VOR	VTV	Unsrvcble

Table 3.5.7
List of En-route Navigation Aids

Location	Equipment Type	Ident.	Date Installed or Renewed
An Loc	NDB	AC	1997
Ca Mau	NDB	QL	Military
Can Tho	NDB	CT	Military
Moc Chau	NDB	MC	1998
Nam Ha	DVOR/DME	NAH	1996
Ninh Binh	NDB	NB	1983
Phan Thiet	VOR/DME	PTH	VOR 1990
	DME 1980		
Tuy Hoa	NDB	TH	1980

VATM also gave details of the two NDBs shown in Table 3.5.8, neither of which are listed in the current AIP.

Table 3.5.8
En-route Navigation Aids not Listed in the AIP

Location	Equipment Type	Ident.	Date Installed or Renewed
Cam Ly	NDB	CL	1970s??
Nam Dinh	NDB	NAD	1999

Although the NDB concept is old technology, it is relatively inexpensive equipment and a useful navigation aid at a small airport where traffic does not justify a VOR/DME. NDBs have a useful life of 15-20 years and it may be expected that those listed above as installed in the 1980s or earlier are coming to the end of their useful lives. VATM should thus consider replacing these old NDBs in the near future to carry the facilities through to the introduction of CNS/ATM.

6) Surveillance

(1) Introduction

The implementation of CNS/ATM will require in due course the introduction of monopulse secondary surveillance radar (MSSR) with the capability of operating in Mode S. The date of implementation of Mode S for the Asia-Pacific region will need to be clarified with the ICAO Regional Office, Bangkok through the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG). As far as could be ascertained, none of the radars in Vietnam at the present time are capable of operating in Mode S.

The current trend for new radars is to concentrate on the use of MSSR in preference to primary surveillance radar (PSR), not only because of the increased range available for a given radiated power from the ground station but also because of the additional information that can be encoded on the MSSR signal. Eurocontrol, for example, is recommending the sole use of MSSR with composite displays where the signals for the displays are shared from not only the State's own radar stations but from stations in adjacent member states. This technique facilitates the 'seamless' air traffic management procedures being introduced with the new CNS/ATM systems.

(2) Present Status of Radar Surveillance in Vietnam

a) Hanoi ACC/Noi Bai APP

The Team was informed that both the ACC and Noi Bai Approach Control Unit use PSR information only from the Ckala-M radar installed at Noi Bai Airport. This is of Russian manufacture and was originally designed for military use. It was installed in 1991 and the range of the PSR was quoted as 200 nautical miles (nm). The Team received conflicting reports on the availability of SSR from this radar. The radar is located at 21^{o} 11' 50"N 105^{o} 48'06"E. VATM plans to replace this radar in the near future with a new primary and secondary radar installation and will also install a new SSR at Vinh.

b) Ho Chi Minh ACC and Tan Son Nhat APP

Both the ACC and Tan Son Nhat Approach Control Unit use PSR and SSR information from three radars, namely the PSR/SSRs installed at Son Tra and Tan Son Nhat and an SSR at Qui Nhon. All three radars are from the same manufacturer, Thomson-CSF, the PSRs being Model TRAC-2000 and the SSRs, Model RSM-970. Each PSR has a range of 80 nm and the SSR 250nm.

These radars are located as follows:

- Son Tra: 16^{o} 07' 55"N 108^{o} 14' 57"E
- Ho Chi Minh 10^{o} 49' 36"N 106^{o} 39' 28"E
- Qui Nhon 13^{o} 44' 25"N 109^{o} 12' 00"E

The Thomson-CSF radars were installed between 1994 and 1995 and were not Y2K compatible. The Team was informed that VATM had arranged to fix the Y2K problem by the end of October 1999 and, as at 19 February 2000, no problems had been apparent. Another radar was due to be installed at Ca Mau by end of 1999 (this will be an SSR only) but the Team was not informed on whether the installation had been completed. (A new remote VHF station will also be installed at the site).

c) Danang APP

The radar information available at Danang Approach Control is a composite display from the Son Tra PSR/SSR and the SSR at Qui Nhon

7) Maintenance Organization, Facilities and Procedures

The en-route navigation equipment, such as radar and VOR/DME, is maintained by VATM, whereas equipment at airports is maintained by the appropriate RAA. If an RAA cannot maintain the equipment, it signs a contract with the VATM for the maintenance. VATM takes care of the calibration of all facilities. The new radars from Thomson-CSF will be maintained by the manufacturer under contract.

No opportunity occurred for the Team to survey the maintenance workshops or discuss maintenance procedures. As far as could be ascertained, there was 'a maintenance facility' at Noi Bai. The usual procedure is for a mobile team from Hanoi to travel to the site of any navigation aid requiring maintenance as and when required. If the work is beyond the capability of the maintenance team, the manufacturer of the equipment is then contacted to assist with the repair.

VATM reported that it has sufficient test equipment for its immediate needs but is short of spare parts. There is no laboratory for calibrating the test equipment so the instruments have not been recalibrated since they were originally procured. VATM is currently trying to establish a calibration facility for this purpose.

It was learned that navigation aids are ground-tested periodically and flight-tested annually under contract. The last two flight tests had been undertaken by the Norwegians and prior to that units from Australia, India or Malaysia had been contracted. The last calibration was in December 1998.

There are several other aspects of maintenance which have a bearing on master planning but the Team was unable to make the appropriate visits or obtain adequate information to comment on the following:

- Engineering organization
- Maintenance facilities
- Transportation for maintenance teams
- Maintenance procedures
- Installation practices
- Maintenance schedules
- System performance records

8) Manpower and Training

(1) Manpower

The Team was informed that the staff of VATM totaled 1,380 of which 300 were air traffic controllers. The breakdown of the number of technicians

was not available to the Team, neither was the breakdown by location of either controllers or technicians. Of the total staff, 28% had university degrees and 42% had high school or technical institute education.

(2) Training

Of the air traffic controllers, 15% are university graduate level. They are trained at the CATCV in Ho Chi Minh City for 24 months followed by further training abroad either in Singapore, New Zealand or France. There is difficulty in recruiting university graduates for the position.

After this training, the controllers each spend three years as an air traffic controller before getting an 'official position' as controller. It was not clear whether the controllers at that stage become licensed in accordance with ICAO Annex 1 - Personnel Licensing.

When new equipment is purchased, technicians are trained by the manufacturer of the equipment. There is difficulty in maintaining the standard of the technicians in high level posts. As all the equipment is imported and maintenance manuals are written in English, there is particular difficulty when technicians have an inadequate standard of English.

(3) CATCV, Ho Chi Minh

a) Introduction

The CATCV has a training program encompassing air traffic control, communications/operations, electronics maintenance, air transport economics, aircraft maintenance, civil aviation security, flight attendants, and English language. Courses are also provided for the conversion of military-to-civil pilot (theoretical aspects only). Those facilities of particular interest to the Team are described in more detail below.

b) Air Traffic Control (ATC) Department

The ATC Department provides training in the following subjects:

- Aerodrome control
- Procedural approach control
- Procedural en-route control
- Radar approach control
- Radar en-route control.

At present, there is a sufficient number of ATC staff in Vietnam and the number of controllers trained ab-initio will be reduced from 60 per annum in 1999 to 15 in 2000.

c) Electronics and Aeronautical Communication Department

This Department provides the following training:

- Basic electronics for telecommunications
- Air navigation systems
- Generators and air conditioning
- Computer operation

No information was available on the number of students per annum in these fields.

d) Department of General Subjects and Aviation Foreign Language

This Department teaches the following:

- General English and general subjects
- Aviation English
- Technical English
- Other languages

Again, no information was available on the number of students per annum in these fields.

e) Equipment

Much of the equipment at the CATC was provided under ICAO-UNDP projects in the early 1980s and, as such, is now obsolete and difficult to maintain. This is particularly true for the aerodrome simulator and the radar simulator whose facilities are no longer representative of those available on modern simulators. The language and the electronics training laboratories are also obsolete and require replacement. Considerable investment will be required to modernize the three departments involved in these disciplines. The ATC simulator will need to be similar to that installed at the Hanoi ACC to provide both procedural and radar training.

f) Other Training Fields

The CATCV also provides training of flight attendants and to this end has constructed, with its own resources, a mockup of a segment of a cabin similar to that of a Boeing B767. At present, the mockup lacks seats as these are particularly expensive. Nevertheless, the CATCV hopes to commence training using the mockup soon.

g) Development Plans

The CATCV is planning to become a College of Civil Aviation in the course of 1999 and a University or Institute of Civil Aviation by 2003. It is, however, currently facing a range of difficulties in its plans for modernization and development. It needs to upgrade not only in terms of its instructional ability and knowledge but also its training equipment and teaching aids. Apart from the modernization of the equipment described in paragraph e) above, more computers are needed, together with a simulator for ab-initio flight training and a CASA CB-20 flight simulator.

The CATCV requires to have some of its instructors trained to Master's level in subjects such as air transport economics, airport management, electronics, telecommunications, aircraft engineering and English language.

The CATCV is hoping to obtain the support of Central Government for its plans to raise its standards of education in the air transport sector, but so far funds have not been forthcoming.

3.6 Aeronautical Meteorological (MET) Services

1) Introduction

Access to the Aeronautical Meteorological Service was not available to the Team so the following comments are based on the answers from the MET Service to a questionnaire submitted by the Team.

As the supporting services required to support CNS/ATM may only available at present to a limited extent from the MET Service, the following information may be helpful in outlining the background and requirements.

2) Evolution of Meteorological Services for Aviation

Prior to the introduction of the World Area Forecast System (WAFS), the aeronautical meteorological service of each State had to collect, plot and analyze vast amounts of basic data, prepare observations and forecasts for the aerodromes and for the en route phase of flights departing the national airports.

The WAFS, through its two World Area Forecast Centres (WAFCs) at Bracknell (near London), England and Suitland, Maryland (near Washington, DC), USA, now provides all the charts and digital data for the en route phase of flights previously prepared by national MET offices, thus relieving them of a considerable burden of work.

The data produced by the two world centers are broad-cast globally on the Satellite Distribution System for World Area Forecast System Products, SADIS. Three satellites - the Atlantic, Pacific and Indian Ocean INTELSAT satellites are used. Washington uplinks the WAFS data to the Atlantic and Pacific INTELSAT satellites, and London uplinks the data to the Indian Ocean INTELSAT satellite. States under the footprint of one of the satellites need only relatively inexpensive equipment to receive all the data they require to provide for the en route phase of flights departing their national airports. Some States fall under the footprint of two of the three satellites but usually the one providing the better coverage is selected.

3) Responsibilities of the Aeronautical MET Service

To take full advantage of the very high quality and timeliness of the data receivable from WAFS, an aeronautical MET service needs to:

- prepare accurate hourly observations and six-hourly aerodrome forecasts, as required by ICAO Annex 3, Chapters 4 and 6 respectively, with the observations and aerodrome forecasts monitored and supplemented by special observations or aerodrome forecast amendments whenever certain conditions occur;

- plot and analyze local surface charts covering the sub-regional area to permit the preparation of aerodrome forecasts;

- prepare and disseminate aerodrome and wind shear warnings in accordance with ICAO Annex 3, Chapter 7, whenever special conditions occur; and

- provide a modern and efficient communications system for dissemination of aerodrome reports, forecasts and warnings, catering for all internal dissemination to all users (air traffic services units, aeronautical information services offices and airline offices), to other airports in the State and to neighboring States in accordance with the ICAO Regional Plan.

4) MET Systems to Support CNS/ATM

The development of the World Area Forecast System (WAFS) and various changes to Operational Meteorological (OPMET) messages already allow Air Traffic Management to provide aircrews with additional and augmented MET information.

Developments in satellite broadcasting techniques and introduction of data link communications now permit:

- uplinking of MET information directly to the flight deck, either initiated by the

ATM system or at the pilot's request;

- downlinking of local data from the aircraft, such as wind, temperature, humidity and turbulence.

Where provision of additional MET data may be critical to operations or is cost beneficial, the following additional information could be made available for pre-flight planning and en-route operations:

- medium level significant weather forecasts, en-route diversion airport reports and forecasts for one-engine inoperative drift-down procedures for extended range operations;

- latest data on MET conditions affecting safety of flight, upper wind and temperature data from MET watch offices and WAFCs respectively, for direct input to ATC computers for up-dating flight plans for dynamic routing over the Pacific Ocean; and

- real-time information on hazardous en-route and destination weather, and updated upper wind fields for air traffic flow control.

In the terminal area, data link can be used for the automated provision of MET information directly to aircraft such as:

- the uplink of reports from AWOS

- the uplink of windshear/microburst warnings from terminal Doppler weather radar; and

- the automatic downlink of wind/temperature data from aircraft on approach.

5) MET Systems to Support the Transition to the new Global CNS/ATM Systems

The introduction of global ATM will require a more immediate access to global MET information (including real-time) than in the past. This need for instant information will demand increased automation in as many of the processes as possible.

Development of MET systems to support global ATM will demand:

- full implementation of the final phase of WAFS;

- extension of the three ICAO direct satellite broadcasts;

- availability of background upper wind fields for display at ATS centers and

airline operational control offices;

- automatic uplink of airport weather observations to aircraft on approach or departure, including data from automatic systems detecting hazardous weather and the replacement of HF and VHF VOLMET by digital data links;

- automatic downlink of MET information derived from aircraft sensors to ATM computers;

- provision of automated runway wake vortex reports and forecasts to assist in optimizing aircraft separation;

- quicker delivery to ATM centers and aircraft in flight of volcanic ash reports and advisories from volcano observatories, etc; and

- harmonization of AIS and MET information to support combined AIS/MET pre-flight briefing.

6) Planning and Implementation of MET Systems

The MET components described above either exist or are under development. Progressive implementation will proceed as operational requirements are determined and appropriate ICAO SARPs developed. Once requirements are established, standardization of MET facilities and services will expedite the planning of a seamless MET system to support global ATM.

Implementation of improved MET systems must take into account the status of the existing national, regional and global meteorological and telecommunications infrastructures, as some parts of these may themselves require upgrading.

Experience with the new services will show to what extent the MET information will need to be transmitted automatically to the aircraft and what the pilot will need to demand from the ground. In the future, it is expected that routine MET information will be accessible to the pilot automatically on demand, with directed or broadcast transmission reserved mainly for safety related information. In practice, information may be uplinked and stored in the aircraft computers, or stored on the ground in OPMET data bases and/or servers for interrogation by the pilot.

7) Existing Facilities in Vietnam

a) An Automatic Weather Observation Station (AWOS) is installed at Noi Bai International Airport collecting information on surface wind speed and direction, air temperature and dew point at Runway 11, air pressure QFE and QNH settings, and data from runway visual range transmissometers and

ceilometers at Runways 11 and 29.

b) At Tan Son Nhat International Airport, a Vaisala MILOS 200 remote weather station, with sensors measuring air temperature, relative humidity, precipitation and air pressure QNH and QFE settings, is located in the MET garden. The garden is situated 700m laterally to the south of the runway centerline. Surface wind speed and direction are measured by cup anemometer and wind vane, also installed in the MET garden.

c) An AWOS is installed at Danang International Airport. This comprises two wind sensors (one near threshold 35, one near threshold 17), two runway visual range transmissometers near the runway ends, two ceilometers (one near NDB 'D' and one near threshold 17L). The sensors for wind speed and direction, air temperature and dew point, precipitation and air pressure QFE and QNH settings are sited in the MET garden.

d) There are weather radars located at Hanoi/Gia Lam and Tan Son Nhat.

e) There are SADIS receiving stations located in Hanoi and Ho Chi Minh City. One is operated by the Aeronautical MET Service and the other by the General Department of Hydrology and Meteorology.

f) No information was available to the JICA Team on the manufacturer, model or age of any of the MET equipment.

8) Future Requirements

As mentioned earlier, information available to the Team on existing MET facilities in Vietnam was very limited and it has not been possible to make detailed recommendations for the Aeronautical Meteorological Service. The foregoing is therefore intended to provide a background of the MET services required to support CNS/ATM procedures, upon which the Aeronautical Meteorological Service may base its plans.

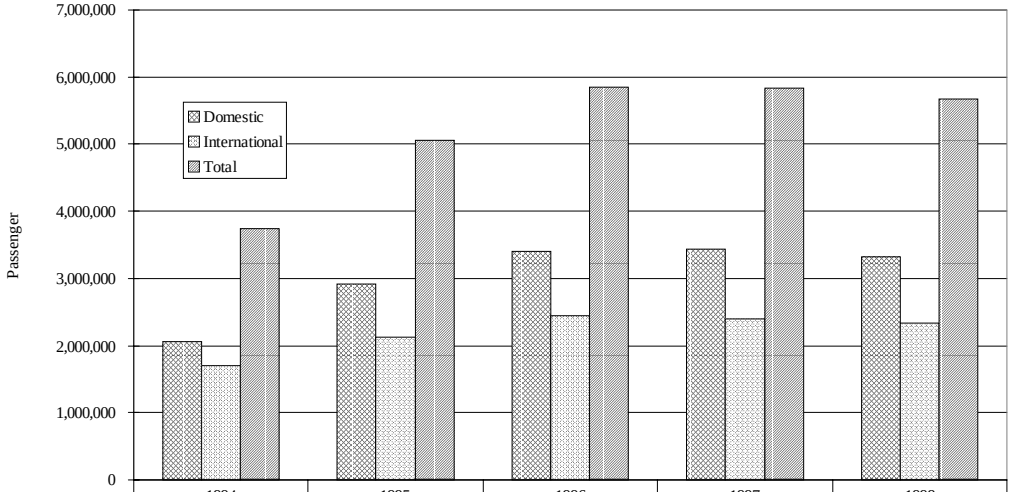
3.7 Traffic Volume and Characteristics

Air Passenger Traffic

1) Total Air Passenger Traffic

The historical trends of air passenger traffic in Vietnam are shown in Figure 3.7.1. The air passenger traffic recorded very high growth until 1996. It has decreased since 1997 because of the economic crisis that happened in Asia. According to Vietnam Airlines, the traffic will increase in 1999.

Figure 3.7.1
Total Air Passenger Traffic in Vietnam



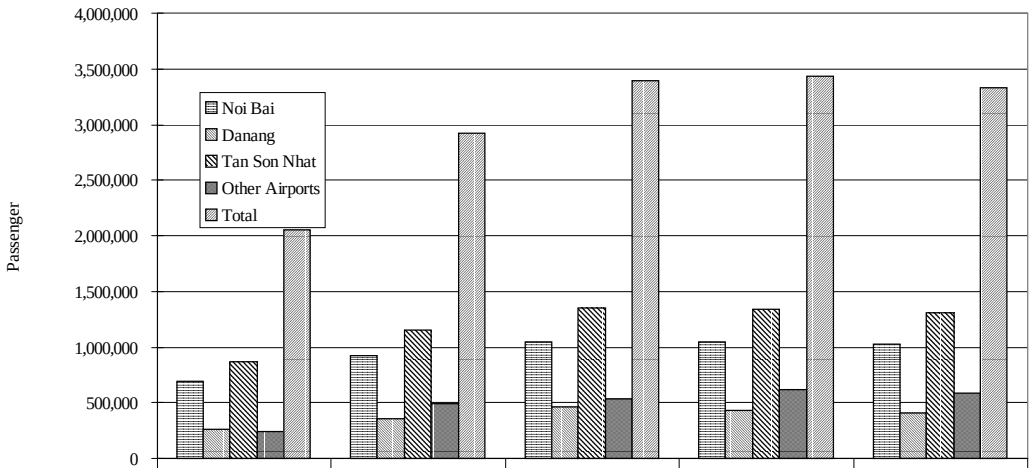
	1994	1995	1996	1997	1998
Domestic	2,053,930	2,921,669	3,395,862	3,434,117	3,329,602
International	1,694,075	2,126,396	2,446,325	2,402,591	2,341,434
Total	3,748,005	5,048,065	5,842,187	5,836,708	5,671,036

Source: CAAV

2) Domestic Air Passenger Traffic

The historical trends of domestic air passenger traffic in Vietnam are shown in Figure 3.7.2. Approximately 82% of total domestic air passenger traffic was handled by three international airports, Noi Bai, Danang and Tan Son Nhat, in 1998.

Figure 3.7.2
Domestic Air Passenger Traffic in Vietnam



	1994	1995	1996	1997	1998
Noi Bai	689,983	925,798	1,044,392	1,043,522	1,028,706
Danang	258,594	359,000	463,328	431,747	407,324
Tan Son Nhat	869,074	1,149,347	1,354,287	1,343,809	1,308,791
Other Airports	236,279	487,524	533,855	615,039	584,781
Total	2,053,930	2,921,669	3,395,862	3,434,117	3,329,602

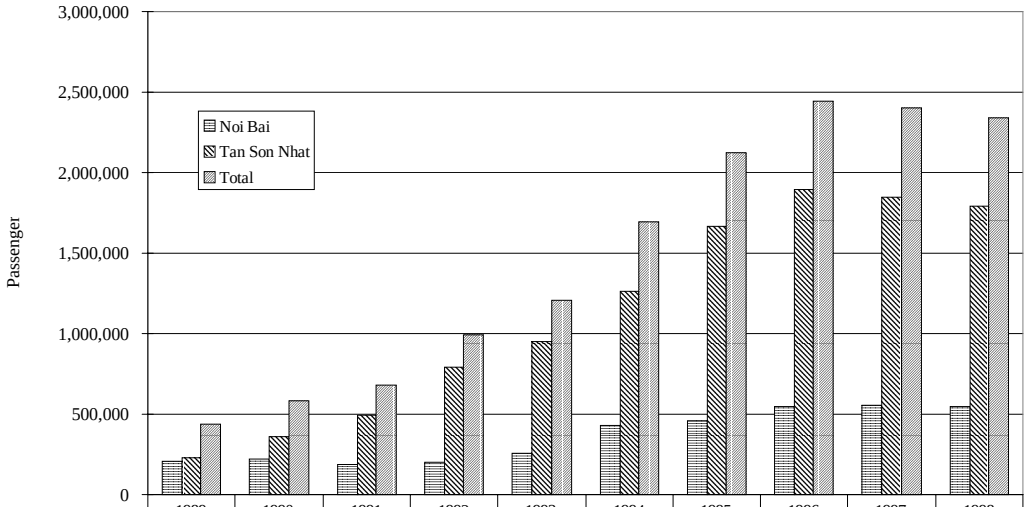
Year

Source: CAAV

3) International Air Passenger Traffic

The historical trends of international air passenger traffic at Noi Bai and Tan Son Nhat international airports are shown in Figure 3.7.3. The international air passenger traffic at Tan Son Nhat Airport had been growing rapidly until 1997. Approximately 77% of international air passengers were handled at Tan Son Nhat Airport in 1998.

Figure 3.7.3
International Air Passenger Traffic in Noi Bai, Tan Son Nhat and Total of Vietnam



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Noi Bai	208,378	221,007	188,343	202,341	258,711	428,454	461,798	550,654	554,859	549,428
Tan Son Nhat	227,129	358,397	492,374	789,344	949,353	1,265,621	1,664,598	1,895,671	1,847,732	1,792,006
Total	435,507	580,737	680,717	991,685	1,208,064	1,694,075	2,126,396	2,446,325	2,402,591	2,341,434

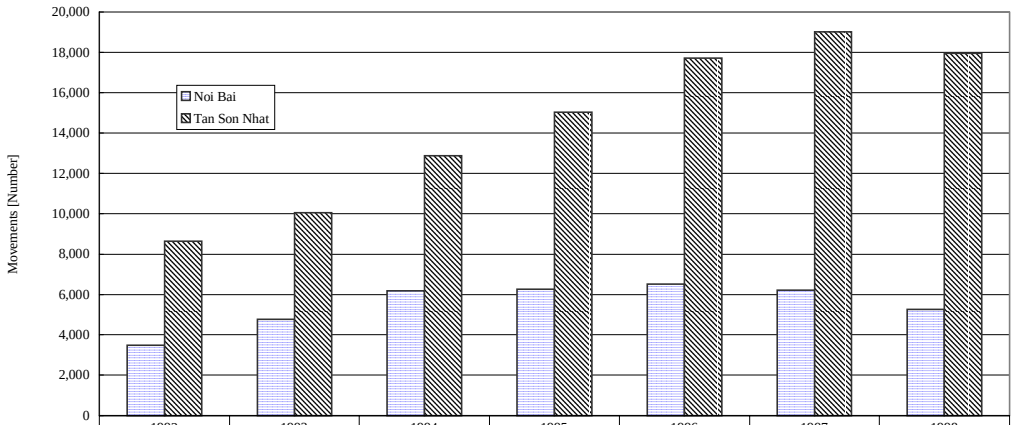
Year

Source: CAAV

Aircraft Movements

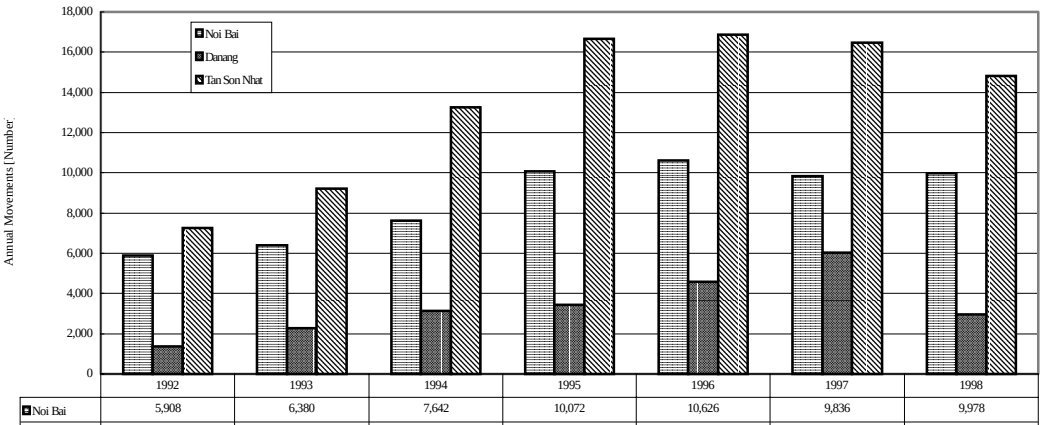
The historical trends of international aircraft movements at Noi Bai and Tan Son Nhat international airports are shown in Figure 3.7.4. The historical trends of domestic aircraft movements at Noi Bai, Danang and Tan Son Nhat international airports are shown in Figure 3.7.5.

Figure 3.7.4
International Aircraft Movements in Noi Bai and Tan Son Nhat



	1992	1993	1994	1995	1996	1997	1998
Noi Bai	3,477	4,769	6,188	6,258	6,524	6,206	5,270
Tan Son Nhat	8,643	10,056	12,863	15,017	17,708	19,019	17,940

Figure 3.7.5
Domestic Aircraft Movements in Noi Bai, Danang and Tan Son Nhat



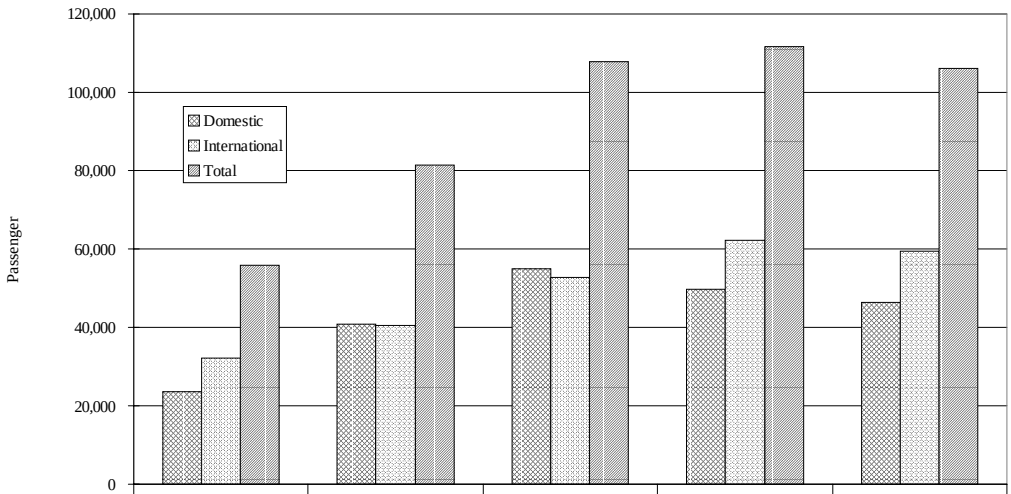
	1992	1993	1994	1995	1996	1997	1998
Noi Bai	5,908	6,380	7,642	10,072	10,626	9,836	9,978
Danang	1,379	2,283	3,152	3,427	4,608	6,032	2,960
Tan Son Nhat	7,256	9,216	13,278	16,659	16,868	16,471	14,805

Air Cargo Traffic

1) Total Air Cargo Traffic

Figure 3.7.6 shows the historical trend of total domestic and international air cargo traffic. Domestic air cargo traffic decreased in 1997, however international air cargo traffic had increased until 1997.

Figure 3.7.6
Total Air Cargo Traffic in Vietnam

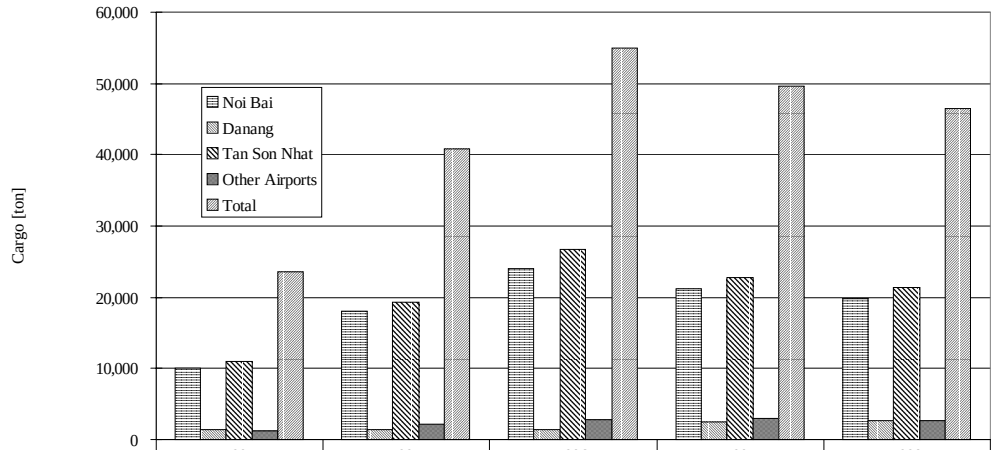


	1994	1995	1996	1997	1998
Domestic	23,555	40,895	54,957	49,611	46,502
International	32,144	40,539	52,700	62,139	59,546
Total	55,699	81,434	107,657	111,750	106,048

2) Domestic Air Cargo Traffic

Figure 3.7.7 shows the historical trend of domestic air cargo traffic. Most of the domestic air cargo was handled in Noi Bai and Tan Son Nhat airports. The relative share of domestic air cargo traffic of Noi Bai and Tan Son Nhat airports was approximately 42% and 46% in 1998, respectively.

Figure 3.7.7
Domestic Air Cargo Traffic in Vietnam



	1994	1995	1996	1997	1998
Noi Bai	10,004	17,994	24,092	21,223	19,736
Danang	1,405	1,458	1,354	2,552	2,733
Tan Son Nhat	10,920	19,296	26,667	22,811	21,432
Other Airports	1,226	2,147	2,844	3,025	2,601
Total	23,555	40,895	54,957	49,611	46,502

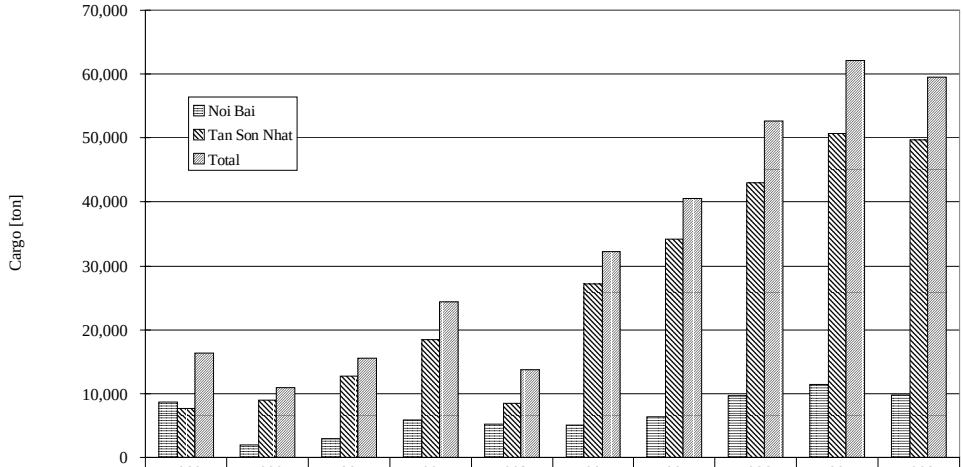
Year

Source: CAAV

3) International Air Cargo Traffic

The historical trends of international air cargo traffic in Noi Bai and Tan Son Nhat International airports are shown in Figure 3.7.8. The volume of international air cargo has increased rapidly. Approximately 84% of the international air cargo was handled in Tan Son Nhat Airport in 1998.

Figure 3.7.8
International Air Cargo Traffic in Noi Bai, Tan Son Nhat and Total of Vietnam



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Noi Bai	8,735	1,976	2,891	5,925	5,187	5,015	6,380	9,701	11,440	9,853
Tan Son Nhat	7,619	8,918	12,686	18,438	8,558	27,129	34,159	42,999	50,699	49,693
Total	16,354	10,941	15,577	24,363	13,745	32,144	40,539	52,700	62,139	59,546

Year

Source: CAAV

3.8 Finance and Management

Fees and Charges

1) Aeronautical Fees

Landing, parking and passenger service charges are collected by airport authorities, while navigation charges are collected by VATM.

a) Landing Charges

Basic charges are based on the maximum takeoff weight of aircraft as shown in the Table 3.8.1. An extra 50% of the basic charges will be added for nonscheduled flight and 25% will be added for using landing lighting system at night-time or in case of bad weather, on request by the crew.

Table 3.8.1
Landing Charges

Maximum take-off weights of aircraft (Ton)	Charges per landing (USD)	Adding charge for each exceeding ton (USD)
Up to 20	65	
From 20.1 to 50	65	3.5
From 50.1 to 100	170	4
From 100.1 to 150	370	5
From 150.1 to 190	620	6
From 190.1 to 240	800	7
Above 2440	1140	8.5

Source: AIP Vietnam FAL3-1, 25 Mar 1996

b) Charges for the Use of Air Navigation Facilities and Air Traffic Services

Basic charges are based on the maximum takeoff weight of aircraft as shown in the Table 3.8.2. An extra 20% of the basic charges will be added for nonscheduled flight and 30% will be added for flight to/from the airports in Vietnam on the Vietnamese public holidays.

Table 3.8.2
Air Navigation and Air Traffic Services Charge

Maximum take-off weights of aircraft (Ton)	Charges for arrival flight (USD)		Charges for Overflight (USD)	
	Flown distance	Flown distance		
	Under 400km	400km and above	Under 500km	500km and above
Less than 20	254	310	115	129
From 20 to less than 50	388	474	176	197
From 50 to less than 100	564	689	255	286
From 100 to less than 150	730	893	330	370
From 150 to less than 190	850	1040	384	431
From 190 to less than 240	956	1171	420	460
From 240 to less than 300	1072	1313	450	490
300 and above	1132	1387	480	520

Source: AIP Vietnam FAL3-2, 25 Mar 1996

c) Parking Charges

Basic charges are based on the maximum takeoff weight of aircraft as shown in the Table 3.8.3. The minimum parking charge US$ 2.80 will be charged for unexpected hours.

Table 3.8.3
Parking Charge

Number of parking hours	Charges for each ton (USD)
Above 03 hours to 05 hours	2.8
Above 05 hours to 08 hours	3.5
Above 08 hours to 12 hours	3.8
Above 12 hours to 18 hours	4
Above 18 hours	4.2

Source: AIP Vietnam FAL3-3, 25 Mar 1996

d) Discount for Vietnamese Air Carriers

There is an agreement, effective 1 May 1995 that Vietnam Airlines will pay 80% of landing and air navigation charges set forth in the AIP for international flights and 50% of those for domestic flights. It has also been agreed that a lump-sum fee for aircraft parking and terminal rental fee will be paid to airports authorities. The same condition applies to Pacific Airlines.

e) Passenger Service Charges

Passenger service charges are shown in the Table 3.8.4.

Table 3.8.4
Passenger Service Charge

Airports	International Passenger (USD)	Domestic Passenger (VND)
Tan Son Nhat International Airport	10.00	20,000
Noi Bai and Danang International Airport	10.00	20,000
Other Airports		10,000

Source: Vietnam Airlines Time Table 31 October 1999 - 25 March 2000

2) Airfare

a) General

Airfares are decided based on Decision No. 818-TTg of the Prime Minister on the Management of Airfares of Vietnam Civil Aviation dated 13 December 1995.

b) Passenger Airfare

International airfares are set in conformity with the transportation fares provided for in international treaties to which Vietnam has signed or based on transportation fares announced by international airlines. International airfares are proposed by airlines and ratified by the CAAV.

There are two different domestic airfares in Vietnam, one is applicable to foreign citizens or overseas Vietnamese and the other is for Vietnamese citizens. The fares for foreign citizens or overseas Vietnamese on domestic routes are set on the basis of international air transportation fares, more particularly those applied in neighboring regions. Airfares applicable to foreign citizens and Vietnamese are decided by the CAAV.

Airfares on domestic flights applicable to Vietnamese citizens are decided to assure compensation for the average cost of air transportation on domestic flights, taking into consideration the compensation between fares applied to different categories of passengers. In addition, this airfare is made to suit the capability of Vietnamese, taking into consideration the reasonable price ratio to transportation by other means.

The maximum airfare applicable to Vietnamese passengers on domestic flights between Hanoi and Ho Chi Minh City is decided by the CAAV and Government Price Committee and approved by the Prime Minister. Based on this maximum airfare, airfares on other routes are proposed by airlines and CAAV ratifies them.

Table 3.8.5 and 3.8.6 show domestic airfares for business class and economy class and the comparison between foreign and Vietnamese passenger and airfare by distance.

Table 3.8.5
Domestic Business Class Airfare

Business Class

Route	Distance [km]	Class	Airfare [VND]			Airfare/km	
			Foreigner	Vietnamese	Ratio	Foreigner	Vietnamese
Hanoi - Danang	607	C	1,200,000	850,000	1.412	1,977	1,400
Hanoi - Hue	549	C	1,200,000	750,000	1.600	2,186	1,366
Hanoi - Ho Chi Minh	1,138	C	2,450,000	1,500,000	1.633	2,153	1,318
Ho Chi Minh - Danag	603	C	1,200,000	850,000	1.412	1,990	1,410
Ho Chi Minh - Haiphong	1,112	C	2,450,000	1,500,000	1.633	2,203	1,349
Ho Chi Minh - Hue	631	C	1,200,000	850,000	1.412	1,902	1,347
Average					1.517	2,068.443	1,365.027

Table 3.8.6
Domestic Economy Class Airfare

Route			Distance [km]	Class	Airfare [VND]			Airfare/km	
					Foreigner	Vietnamese	Ratio	Foreigner	Vietnamese
Hanoi	-	Danang	607	Y	1,000,000	500,000	2.000	1,647	824
Hanoi	-	Dienbienphu	301	Y	650,000	330,000	1.970	2,159	1,096
Hanoi	-	Hue	549	Y	1,000,000	480,000	2.083	1,821	874
Hanoi	-	Nasan		Y	550,000	120,000	4.583		
Hanoi	-	Nhatrang	1,040	Y	1,450,000	780,000	1.859	1,394	750
Hanoi	-	Ho Chi Minh City	1,138	Y	1,900,000	1,000,000	1.900	1,670	879
Ho Chi Minh City	-	Buon Ma Thuot	261	Y	650,000	250,000	2.600	2,490	958
Ho Chi Minh City	-	Dalat	214	Y	450,000	230,000	1.957	2,103	1,075
Ho Chi Minh City	-	Danag	603	Y	1,000,000	570,000	1.754	1,658	945
Ho Chi Minh City	-	Haiphong	1,112	Y	1,900,000	1,000,000	1.900	1,709	899
Ho Chi Minh City	-	Hue	631	Y	1,000,000	570,000	1.754	1,585	903
Ho Chi Minh City	-	Nhatrang	317	Y	650,000	290,000	2.241	2,050	915
Ho Chi Minh City	-	Phuquoc	301	Y	700,000	400,000	1.750	2,326	1,329
Ho Chi Minh City	-	Plieku	383	Y	700,000	400,000	1.750	1,828	1,044
Ho Chi Minh City	-	Quinhon	430	Y	700,000	330,000	2.121	1,628	767
Ho Chi Minh City	-	Rachgia		Y	700,000	400,000	1.750		
Danang	-	Buon Ma Thuot	375	Y	550,000	330,000	1.667	1,467	880
Danang	-	Nhatrang	436	Y	550,000	290,000	1.897	1,261	665
Danang	-	Pleiku	227	Y	550,000	200,000	2.750	2,423	881
Danang	-	Vinh City	401	Y	700,000	400,000	1.750	1,746	998
Danang	-	Quinhon		Y	550,000	150,000	3.667		
Rachgia	-	Phuquoc		Y	450,000	220,000	2.045		
Average							2.170	1,831.421	926.827

Source: Vietnam Airlines, as of April 1999

c) Cargo Fare

Cargo handling is carried out by Vietnam Airlines Corporation. Cargo charges are shown in Table 3.8.7.

Table 3.8.7
Cargo Charges

Items	Charges (USD)
Handling Charge	
Minimum handling charges per kg	0.08
Storage	
General Cargo	
For the for the first 3 days, per kg	0.02
From the 4th day, per day, per kg	0.05
From the 8th day, per day, per kg	0.08
Minimum storage charge per Air Way Bill	3.00
News Media Cargo	
Minimum storage charge per Air Way Bill	1.00
Others	
Service Charge for Handling Air Way Bill	
Its authorized agent, per kg	0.50
Maximum charge per HAWB	10.00

Source: http://www/vietnamair.com.vn

The above charges will be applied to handling, transshipment/transit and export.

Financial Conditions of Airport Authorities and the VATM

All airport authorities and the VATM were financially profitable in 1998. Table 3.8.8 shows the past records of revenues and expenditures of three regional airports authorities and VATM.

Table 3.8.8

Revenue and Expenditure Record of Airports Authorities and VATM

million VND

	1994	1995	1996	1997	1998
Northern Airports Authority					
Revenue	38,839	54,048	66,382	78,398	109,330
Expenditure	41,194	53,963	85,453	88,267	97,718
Balance	-2,355	85	-19,071	-9,869	11,612
Middle Airports Authority					
Revenue	24,713	57,632	74,553	82,259	70,459
Expenditure	25,267	47,301	50,383	74,707	62,778
Balance	-554	10,331	24,170	7,552	7,681
Southern Airports Authority					
Revenue	193,765	308,896	372,140	389,429	521,056
Expenditure	150,511	197,103	240,050	263,898	341,279
Balance	43,254	111,793	132,090	125,531	179,777
Vietnam Air Traffic Management					
Revenue	196,268	490,278	541,254	619,568	679,000
Expenditure	90,456	177,451	225,932	223,790	268,775
Balance	105,812	312,827	315,322	395,778	410,225

Source: CAAV